Taylor's Choice Selected GIS Terminology A-Z

(Draft 1 Jan. 2011; from ESRI online resources)

annotation

In cartography, text or graphics on a map that provide information for the map reader. Annotation may identify or describe a specific map entity, provide general information about an area on the map, or supply information about the map itself.

annotation feature class

A geodatabase feature class that stores text or graphics that provide information about features or general areas of a map (annotation). An annotation feature class may be linked to another feature class, so that edits to the features are reflected in the corresponding annotation (feature-linked annotation). Annotation in a geodatabase is edited during an edit session, using the tools on the Annotation toolbar.

arc

On a map, a shape defined by a connected series of unique x,y coordinate pairs. An arc may be straight or curved.

arc-node topology

The data structure in a coverage used to represent linear features and polygon boundaries and to support analysis functions, such as network tracing. Nodes represent the beginning and ending vertices of each arc. Arcs that share a node are connected, and polygons are defined by a series of connected arcs. An arc that intersects another arc is split into two arcs. Each arc that defines all or part of a polygon boundary records the number of the polygon to its left and to its right, giving it a direction of travel.

arc#	A	B	C	D
from-node	3	4	6	4
to-node	4	5	4	7

ArcGIS Spatial Analyst

An ArcGIS extension that provides spatial modeling and analysis features. It allows the creation, querying, mapping, and analysis of cell-based raster data and integrated vector-raster analysis.

ArcIMS

ESRI software that allows for centrally hosting and serving GIS maps, data, and applications for use on the Internet. The administrative framework lets users author configuration files, publish maps, design Web pages, and administer ArcIMS spatial servers. ArcIMS supports Windows, Linux, and UNIX platforms and is customizable on many levels.

ArcInfo interchange file

A file format, also known as an export file, used to enable a coverage, grid or TIN and an associated INFO table to be transferred between different machines which are not connected by any type of file sharing network. ArcInfo interchange files have a .E00 extension, which increments to .E01, .E02, and so on, if the interchange file is composed of several separate files.

ArcSDE

Technology for managing geographic information in a relational database management system (RDBMS). ArcSDE is part of the ArcGIS platform, and is the data server between ArcGIS and relational databases. It is widely used to enable geographic information to be shared by many users across a network and to scale in size from personal, to workgroup, to enterprise use.

ArcToolbox

A user interface in ArcGIS used for accessing, organizing, and managing a collection of geoprocessing tools, models, and scripts.

ArcToolbox Window

A dockable window used to display, manage, and use the contents of toolboxes in ArcGIS. It provides a shortcut to frequently used tools contained within toolboxes that may be stored in folders or geodatabases on disk.

ArcView project

In ArcView 3, a file for creating and storing documents for GIS work. All activity in ArcView 3 takes place within project files, which use five types of documents to organize information: views, tables, charts, layouts, and Avenue scripts. A project file organizes its documents and stores their unique settings in an ASCII format file with the extension .apr.

ArcXML

Acronym for *Arc Extensible Markup Language*. A file format that provides a structured method for communication between all ArcIMS components. ArcXML defines content for services and is used for requests and responses between clients, the business logic tier, and servers.

area

A closed, two-dimensional shape defined by its boundary or by a contiguous set of raster cells.

array

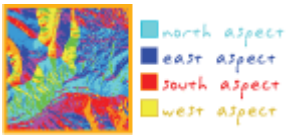
In computing, a fundamental data structure consisting of a variable with multiple, sequentially indexed, cells that can each store a value of the same type. Each cell of the array acts as a variable, and the cells are referenced by an index value for each array dimension. One-dimensional arrays, called vectors, and two-dimensional arrays, called matrices, are most common, but arrays may have more dimensions.

ASCII

Acronym for *American Standard Code for Information Interchange*. The de facto standard for the format of text files in computers and on the Internet that assigns a 7-bit binary number to each alphanumeric or special character. ASCII defines 128 possible characters.

aspect

The compass direction that a topographic slope faces, usually measured in degrees from north. Aspect can be generated from continuous elevation surfaces. For example, the aspect recorded for a TIN face is the steepest downslope direction of the face, and the aspect of a cell in a raster is the steepest downslope direction of a plane defined by the cell and its eight surrounding neighbors.



aspect ratio

The ratio of the width of an image to its height. The aspect ratio of a standard computer monitor is 4:3 (rectangular).

attribute

Nonspatial information about a geographic feature in a GIS, usually stored in a table and linked to the feature by a unique identifier. For example, attributes of a river might include its name, length, and sediment load at a gauging station.

attribute

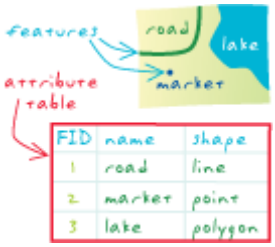
In raster datasets, information associated with each unique value of a raster cell.

attribute data

Tabular or textual data describing the geographic characteristics of features.

attribute table

A database or tabular file containing information about a set of geographic features, usually arranged so that each row represents a feature and each column represents one feature attribute. In raster datasets, each row of an attribute table corresponds to a certain zone of cells having the same value. In a GIS, attribute tables are often joined or related to spatial data layers, and the attribute values they contain can be used to find, query, and symbolize features or raster cells.

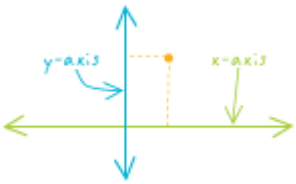


Avenue

The object-oriented programming language on which ArcView 3.x is based. Avenue provides tools for customizing ArcView 3.x and developing ArcView 3.x applications.

axis

A line along which measurements are made in order to determine the coordinates of a location.



axis

In a spherical coordinate system, the line that directions are related to and from which angles are measured.

azimuth

The horizontal angle, measured in degrees, between a baseline drawn from a center point and another line drawn from the same point. Normally, the baseline points true north and the angle is measured clockwise from the baseline.

azimuth

In navigation, the horizontal angle, measured in degrees, between a reference line drawn from a point and another line drawn from the same point to a point on the celestial sphere. Normally, the reference line points true north and the angle is measured clockwise from the reference line.

azimuthal projection

A map projection that transforms points from a spheroid or sphere onto a tangent or secant plane. The azimuthal projection is also known as a planar or zenithal projection.

background image

A satellite image, aerial photograph, or scanned map over which vector data is displayed. Although a background image can be used to align coordinates, it is not linked to attribute information and is not part of the spatial analysis in a GIS.

band

A set of adjacent wavelengths or frequencies with a common characteristic. For example, visible light is one band of the electromagnetic spectrum, which also includes radio, gamma, and infrared waves.

base layer

A data layer in a GIS to which all other layers are geometrically referenced.

baseline

An accurately surveyed line from which other lines or the angles between them are measured.

basemap

A map depicting background reference information such as landforms, roads, landmarks, and political boundaries, onto which other thematic information is placed. A basemap is used for locational reference and often includes a geodetic control network as part of its structure.

batch file

A text file containing commands that is sent to the CPU to be executed automatically. A batch file allows the central processing unit (CPU) to process the commands at off-peak times or at a regularly scheduled time, rather than on demand from the user.

bathymetric map

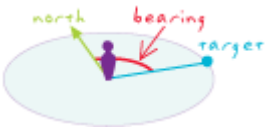
A map representing the topography of a seafloor or lake bed, using contour lines to indicate depth.

Bayesian statistics

A statistical approach to measuring likelihood. Bayesian estimates are based on the synthesis of a prior distribution and current sample data. Classical approaches to statistics estimate the probability of an event by averaging all possible data. The Bayesian approach, in contrast, weights probability according to actual data from a particular situation. It also factors in data from sources outside the statistical investigation, such as past experience, expert opinion, or prior belief. This outside information is described by a distribution that includes all possible values for the parameter.

bearing

The horizontal direction of a point in relation to another point, expressed as an angle from a known direction, usually north, and usually measured from 0 degrees at the reference direction clockwise through 360 degrees. Bearings are often referred to as true bearings, magnetic bearings, or assumed bearings, depending on whether the meridian is true, magnetic, or assumed.



benchmark

A brass or bronze disk, set in a concrete base or similarly permanent structure, inscribed with a mark showing its elevation above or below an adopted vertical datum.

bin

In a histogram, user-defined size classes for a variable.

binary file

A file that contains data encoded as a sequence of bits (ones and zeros) instead of plain text. A binary file, such as a DLL or an executable file, contains information that can be directly loaded or executed by a computer.

bit

The smallest unit of information within a computer. A bit can have one of two values, 1 and 0, that can represent on and off, yes and no, or true and false.

bitmap

An image format in which one or more bits represent each pixel on the screen. The number of bits per pixel determines the shades of gray or number of colors that a bitmap can represent.

Boolean expression

An expression, named for the English mathematician George Boole (1815-1864), that results in a true or false (logical) condition. For example, in the Boolean expression 'HEIGHT > 70 AND DIAMETER = 100,' all locations where the height is greater than 70 and the diameter is equal to 100 would be given a value of 1, or true, and all locations where this criteria is not met would be given a value of 0, or false.

Boolean operator

A logical operator used in the formulation of a Boolean expression. Common Boolean operators include AND, which specifies a combination of conditions (A and B must be true); OR, which specifies a list of alternative conditions (A or B must be true); NOT, which negates a condition (A but not B must be true); and XOR (exclusive or), which makes conditions mutually exclusive (A or B may be true but not both A and B).

boundary

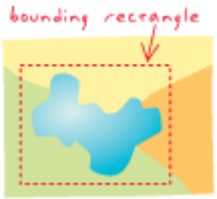
A line separating adjacent political entities, such as countries or districts; adjacent tracts of privately-owned land, such as parcels; or adjacent geographic zones, such as ecosystems. A boundary is a line that may or may not follow physical features, such as rivers, mountains, or walls.

boundary effect

A problem created during spatial analysis, caused by arbitrary or discrete boundaries being imposed on spatial data representing nondiscrete or unbounded spatial phenomena. Boundary problems include edge effects, in which patterns of interaction or interdependency across the borders of the bounded region are ignored or distorted, and shape effects, in which the shape imposed on the bounded area affects the perceived interactions between phenomena.

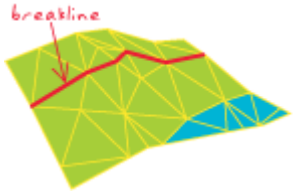
bounding rectangle

The rectangle, aligned with the coordinate axes and placed on a map display, that encompasses a geographic feature or group of features or an area of interest. It is defined by minimum and maximum coordinates in the x and y directions and is used to represent, in a general way, the location of a geographic area.



breakline

A line in a TIN that represents a distinct interruption in the slope of a surface, such as a ridge, road, or stream. No triangle in a TIN may cross a breakline (in other words, breaklines are enforced as triangle edges). Z-values along a breakline can be constant or variable.



buffer

A zone around a map feature measured in units of distance or time. A buffer is useful for proximity analysis.

buffer

A polygon enclosing a point, line, or polygon at a specified distance.

build

An ArcToolbox command in the Coverage toolbox that creates or updates feature attribute tables and polygon topology. Build is also used to synchronize polygon User-IDs with label point User-IDs.

CAD

Acronym for *computer-aided design*. A computer-based system for the design, drafting, and display of graphical information. Also known as computer-aided drafting, such systems are most commonly used to support engineering, planning, and illustrating activities.

CAD file

The digital equivalent of a drawing, figure, or schematic created using a CAD system. CAD files are the data source for CAD drawing datasets, feature datasets and feature classes. ArcGIS software-supported formats include DWG (AutoCAD), DXF (AutoDesk Drawing Exchange Format), and DGN (the default Microstation file format). A CAD file is represented in ArcCatalog with a CAD feature dataset and a CAD drawing dataset.

cadastral survey

A boundary survey taken for the purposes of ownership and taxation.

cadastre

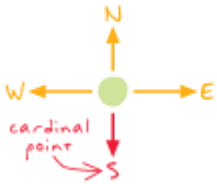
An official record of the dimensions and value of land parcels, used to record ownership and assist in calculating taxes.

calibration

The comparison of the accuracy of an instrument's measurements to a known standard.

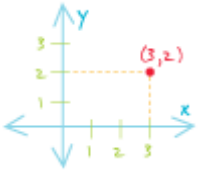
cardinal point

One of the four compass directions on the earth's surface: north, south, east, or west.



Cartesian coordinate system

A two-dimensional, planar coordinate system in which horizontal distance is measured along an x-axis and vertical distance is measured along a y-axis. Each point on the plane is defined by an x,y coordinate. Relative measures of distance, area, and direction are constant throughout the Cartesian coordinate plane. The Cartesian coordinate system is named for the French mathematician and philosopher René Descartes (1596-1650).



cartography

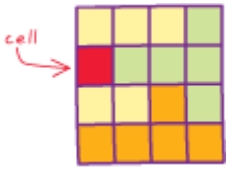
The art and science of expressing graphically, usually through maps, the natural and social features of the earth.

celestial sphere

The sky, considered as the inside of a sphere of infinitely large radius that surrounds the earth, on which all celestial bodies except the earth are imagined to be projected.

cell

The smallest unit of information in raster data, usually square in shape. In a map or GIS dataset, each cell represents a portion of the earth, such as a square meter or square mile, and usually has an attribute value associated with it, such as soil type or vegetation class.



cell

A pixel.

cell size

The dimensions on the ground of a single cell in a raster, measured in map units. Cell size is often used synonymously with pixel size.

census block

The smallest geographic entity for which the U.S. Census Bureau tabulates decennial census data. Many blocks correspond to city blocks bounded by streets, but blocks in rural areas may include several square miles and have some boundaries that are not streets. The Census Bureau established blocks covering the entire nation for the first time in 1990. Previous censuses dating back to 1940 had blocks established only for part of the nation.

census tract

A small, statistical subdivision of a county that usually includes approximately 4,000 inhabitants but may include from 2,500 to 8,000 inhabitants. A census tract is designed to encompass a population with relatively uniform economic status, living conditions, and some demographic characteristics. Tract boundaries normally follow physical features but may also follow administrative boundaries or other nonphysical features. A census tract is a combination of census block groups.

center

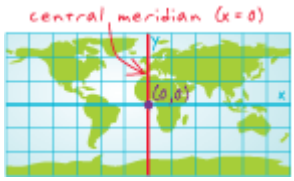
The point in a circle or in a sphere equidistant from all other points on the object.

centerline

A line digitized along the center of a linear geographic feature, such as a street or a river, that at a large enough scale would be represented by a polygon.

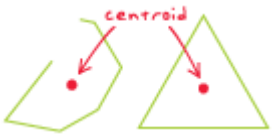
central meridian

The line of longitude that defines the center and often the x-origin of a projected coordinate system. In planar rectangular coordinate systems of limited extent, such as state plane, grid north coincides with true north at the central meridian.



centroid

The geometric center of a feature. For line, polygon, or three-dimensional features, it is the center of mass (or center of gravity) and may fall inside the feature, as shown below for a triangle, or outside the feature, as shown below for a complex line. For multipoints, polylines, or polygons with multiple parts, it is computed using the weighted mean center of all feature parts. The weight for a point feature is 1, for a line feature is its length, and for polygon features is its area.



chart

A graphic representation of tabular data; a diagram showing the relationship between two or more variable quantities, usually measured along two perpendicular axes. A chart may also be referred to as a graph.

choropleth map

A thematic map in which areas are distinctly colored or shaded to represent classed values of a particular phenomenon.

circle

A two-dimensional geometric shape for which the distance from the center to any point on the edge is equal; the closed curve defining such a shape.

circular arc

A curved line that is a section of a circle, with two vertices, one situated at each endpoint.

Clarke ellipsoid of 1866

A reference ellipsoid having a semimajor axis of approximately 6,378,206.4 meters and a flattening of 1/294.9786982. It is the basis for the North American Datum of 1927 (NAD27) and other datums. The Clarke ellipsoid of 1866 is also known as the Clarke spheroid of 1866.

class

A set of entities grouped together on the basis of shared attribute values.

class intervals

A set of categories for classification that divide the range of all values so that each piece of data is contained within a nonoverlapping category.

classification

The process of sorting or arranging entities into groups or categories; on a map, the process of representing members of a group by the same symbol, usually defined in a legend.

client/server architecture

A software system with a central processor (server) that accepts requests from one or more user applications, computers, or devices (clients). Although client/server architecture can exist on one computer, it is more relevant to (and is typically thought of as relating to) network systems that distribute applications over computers in different locations.

clip

A command that extracts features from one feature class that reside entirely within a boundary defined by features in another feature class.

closure error

A discrepancy between existing coordinates and computed coordinates that occurs when the final point of a closed traverse has known coordinates and the final course of a traverse computes different coordinates for the same survey point.

cluster analysis

A statistical classification technique for dividing a population into relatively homogeneous groups. The similarities between members belonging to a class, or cluster, are high; while similarities between members belonging to different clusters are low. Cluster analysis is frequently used in market analysis for consumer segmentation and locating customers, but it is also applied to other fields.

CMYK

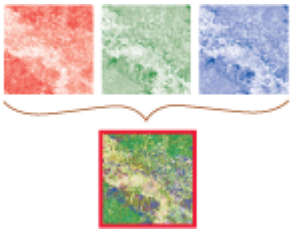
A color model that combines the printing inks cyan, magenta, yellow, and black to create a range of colors. Most commercial printing uses this color model.

COGO

Acronym for *coordinate geometry*. A method for calculating coordinate points from surveyed bearings, distances, and angles.

color composite

A color image made by assigning red, green, and blue colors to each of the separate monochrome bands of a multispectral image and then superimposing them.



color map

A set of values that are associated with specific colors. Color maps are most commonly used to display a raster dataset consistently on many different platforms.

color model

Any system that organizes colors according to their properties for printing or display. Examples include RGB (red, green, blue), CMYK (cyan, magenta, yellow, black), HSB (hue, saturation, brightness), HSV (hue, saturation, value), HLS (hue, lightness, saturation), and CIE-L*a*b (Commission Internationale de l'Eclairage-luminance, a, b).

color ramp

A range of colors used to show ranking or order among classes on a map.

color separation

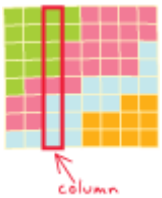
In printing, the use of a separate printing plate for each ink color used.

column

The vertical dimension of a table. Each column stores the values of one type of attribute for all the records, or rows, in the table. All the values in a given column are of the same data type; for example, number, string, BLOB, or date.

column

A vertical group of cells in a raster, or pixels in an image.



command bar

A toolbar, menu bar, menu, or shortcut menu in an ArcGIS application.

command line

A string of text that acts as a command, typed at an interface prompt.

Command Line Window

In geoprocessing, a window that provides a command line for running tools and a message window for viewing the status messages created when running those tools.

compass

An instrument used to find the direction of north from one's current location, consisting of a case with compass points marked around its edge and a floating magnetic needle that pivots to point to magnetic north.

compiler

A program used in software development that translates the lines of a programmer's code from one programming language to another, usually from a high-level language to the ones and zeros of machine language.

compression

The process of reducing the size of a file or database. Compression improves data handling, storage, and database performance. Examples of compression methods include quadtrees, run-length encoding, and wavelets.

concatenate

To join two or more character strings together, end to end; for example, to combine the two strings 'spatial' and 'analysis' into the single string 'spatial analysis.'

conflation

A set of procedures that aligns the features of two geographic data layers and then transfers the attributes of one to the other.

conformal projection

A projection that preserves the correct shapes of small areas. In a conformal projection, graticule lines intersect at 90-degree angles, and at any point on the map the scale is the same in all directions. A conformal projection maintains all angles at each point, including those between the intersections of arcs; therefore, the size of areas enclosed by many arcs may be greatly distorted. No map projection can preserve the shapes of larger regions.

conformality

The characteristic of a map projection that preserves the shape of any small geographic area.

conic projection

A projection that transforms points from a spheroid or sphere onto a tangent or secant cone that is wrapped around the globe in the manner of a party hat. The cone is then sliced from the apex (top) to the bottom, and flattened into a plane.

contiguity

In a coverage, the topological identification of adjacent polygons by recording the left and right polygon for each arc.

contiguous

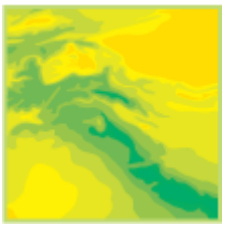
Of polygons: adjacent; having a common boundary; sharing an edge.

continuous data

Data such as elevation or temperature that varies without discrete steps. Since computers store data discretely, continuous data is usually represented by TINs, rasters, or contour lines, so that any location has either a specified value or one that can be derived.

continuous raster

A raster in which cell values vary continuously to form a surface. In a continuous raster, the phenomena represented have no clear boundaries. Values exist on a scale relative to each other. It is assumed that the value assigned to each cell is what is found at the center of the cell. Rasters representing elevation, precipitation, chemical concentrations, suitability models, or distance from a road are examples of continuous rasters.

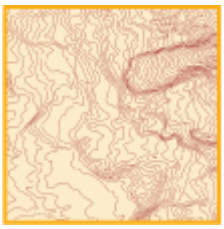


contour interval

The difference in elevation between adjacent contour lines.

contour line

A line on a map that connects points of equal elevation based on a vertical datum, usually sea level.



control point

An accurately surveyed coordinate location for a physical feature that can be identified on the ground. Control points are used in least-squares adjustments as the basis for improving the spatial accuracy of all other points to which they are connected.

convex hull

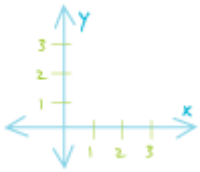
The smallest convex polygon that encloses a group of objects, such as points. In ArcGIS, TIN boundaries are convex hulls by default.

convex polygon

A polygon in which a straight line drawn between any two points inside the polygon is completely contained within the polygon. Visually, the boundary of a convex polygon is the shape a rubber band would take around a group of objects.

coordinate system

A reference framework consisting of a set of points, lines, and/or surfaces, and a set of rules, used to define the positions of points in space in either two or three dimensions. The Cartesian coordinate system and the geographic coordinate system used on the earth's surface are common examples of coordinate systems.

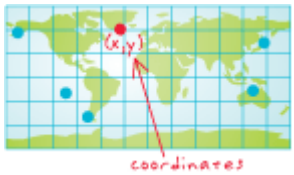


coordinate transformation

The process of converting the coordinates in a map or image from one coordinate system to another, typically through rotation and scaling.

coordinates

A set of values represented by the letters *x*, *y*, and optionally *z* or *m* (measure), that define a position within a spatial reference. Coordinates are used to represent locations in space relative to other locations.

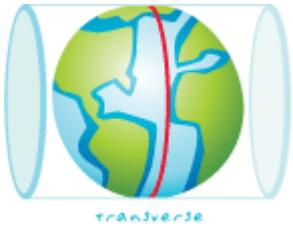


coverage feature class

In ArcInfo, a classification describing the format of geographic features and supporting data in a coverage. Feature classes include point, arc, node, route, route system, section, polygon, and region. One or more coverage features are used to model geographic features; for example, arcs and nodes can be used to model linear features, such as street centerlines. The tic, annotation, link, and boundary feature classes provide supporting data for coverage data management and viewing.

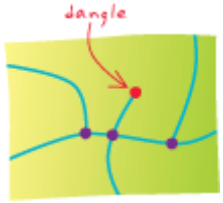
cylindrical projection

A projection that transforms points from a spheroid or sphere onto a tangent or secant cylinder. The cylinder is then sliced from top to bottom and flattened into a plane.



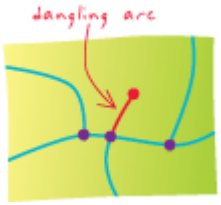
dangle

The endpoint of a dangling arc.



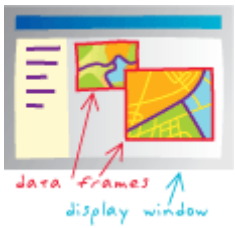
dangling arc

An arc having the same polygon on both its left and right sides and having at least one node that does not connect to any other arc. It often occurs where a polygon does not close properly, where arcs do not connect properly (an undershoot), or where an arc was digitized past its intersection with another arc (an overshoot). A dangling arc is not always an error; for example, it can represent a cul-de-sac in a street network.



data frame

A map element that defines a geographic extent, a page extent, a coordinate system, and other display properties for one or more layers in ArcMap. A dataset can be represented in one or more data frames. In data view, only one data frame is displayed at a time; in layout view, all a map's data frames are displayed at the same time. Many cartography texts use the term 'map body' to refer to what ESRI calls a data frame.



data model

In GIS, a mathematical construct for representing geographic objects or surfaces as data. For example, the vector data model represents geography as collections of points, lines, and polygons; the raster data model represents geography as cell matrixes that store numeric values; and the TIN data model represents geography as sets of contiguous, nonoverlapping triangles.

data type

The attribute of a variable, field, or column in a table that determines the kind of data it can store. Common data types include character, integer, decimal, single, double, and string.

data view

An all-purpose view in ArcMap and ArcReader for exploring, displaying, and querying geographic data. This view hides all map elements, such as titles, north arrows, and scale bars.

database

One or more structured sets of persistent data, managed and stored as a unit and generally associated with software to update and query the data. A simple database might be a single file with many records, each of which references the same set of fields. A GIS database includes data about the spatial locations and shapes of geographic features recorded as points, lines, areas, pixels, grid cells, or TINs, as well as their attributes.

database management system

A set of software applications used to create and maintain databases according to a schema. Database management systems provide tools for adding, storing, changing, deleting, and retrieving data.

datum

The reference specifications of a measurement system, usually a system of coordinate positions on a surface (a horizontal datum) or heights above or below a surface (a vertical datum).

datum level

A surface to which heights, elevations, or depths are referenced.

DBF file

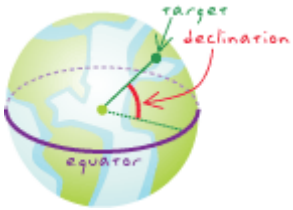
A database file format. In the ArcWeb Services Web site, users can upload data into Builder as either a DBF file or a shapefile (SHP).

decimal degrees

Values of latitude and longitude expressed in decimal format rather than in degrees, minutes, and seconds.

declination

In a spherical coordinate system, the angle between the equatorial plane and a line to a point somewhere on the sphere.



degree

The angle equal to 1/360th of the circumference of a circle. A degree can be divided into 60 minutes of arc or 3600 seconds of arc.

degree

A unit of angular measure represented by the symbol °. The earth is divided into 360 degrees of longitude and 180 degrees of latitude.

degree slope

One method for representing the measurement of an inclined surface. The steepness of a slope may be measured from 0 to 90 degrees.

degrees-minutes-seconds

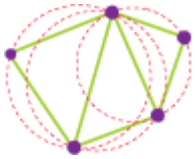
The unit of measure for describing latitude and longitude. A degree is 1/360th of a circle. A degree is further divided into 60 minutes, and a minute is divided into 60 seconds.

Delaunay triangles

The components of Delaunay triangulation. Delaunay triangles cannot exist alone; they must exist as part of a set or collection that is typically referred to as a triangulated irregular network (TIN). A circle circumscribed through the three nodes of a Delaunay triangle will not contain any other points from the collection in its interior.

Delaunay triangulation

A technique for creating a mesh of contiguous, nonoverlapping triangles from a dataset of points. Each triangle's circumscribing circle contains no points from the dataset in its interior. Delaunay triangulation is named for the Russian mathematician Boris Nikolaevich Delaunay.

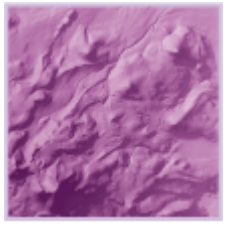


delimiter

A character, such as a space or comma, that separates words or values.

DEM

Acronym for *digital elevation model*. The representation of continuous elevation values over a topographic surface by a regular array of z-values, referenced to a common datum. DEMs are typically used to represent terrain relief.



density

In spatial measurements, the quantity per unit area or length.

dependent variable

The variable representing the process being predicted or modeled, such as crime, foreclosure, or rainfall. The dependent variable is a function of the independent variables. Regression can be used to predict the dependent variable, using known (observed) values to build (calibrate) the regression model. In the regression equation, the dependent variable appears on the left side of the equal sign.

desktop GIS

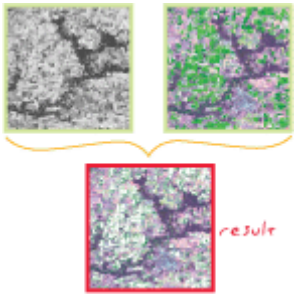
Mapping software that is installed onto and runs on a personal computer and allows users to display, query, update, and analyze data about geographic locations and the information linked to those locations.

deterministic model

In spatial modeling, a type of model or a part of a model in which the outcome is completely and exactly known based on known input; the fixed or nonrandom components of a spatial model. The spline and inverse distance weighted interpolation methods are deterministic since they have no random components. The kriging and cokriging interpolation methods may have a deterministic component, often called the trend.

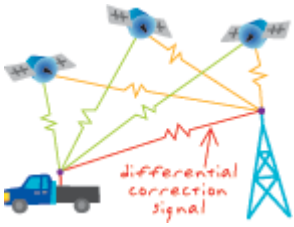
difference image

In image processing, an image made by subtracting the pixel values of one image from those in another.



differential correction

A technique for increasing the accuracy of GPS measurements by comparing the readings to two receivers—one roving and the other a fixed base station—and a known location.



digital image

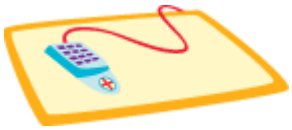
An image stored in binary form and divided into a matrix of pixels. Each pixel consists of a digital value of one or more bits, defined by the bit depth. The digital value may represent, but is not limited to, energy, brightness, color, intensity, sound, elevation, or a classified value derived through image processing. A digital image is stored as a raster and may contain one or more bands.

digital image processing

Any technique that changes the digital values of an image for the sake of analysis or enhanced display, such as density slicing or low- and high-pass filtering.

digitizer

A device connected to a computer, consisting of a tablet and a handheld puck, that converts positions on the tablet surface as they are traced by an operator to digital x,y coordinates, yielding vector data consisting of points, lines, and polygons.



digitizing

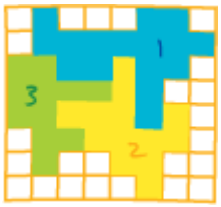
The process of converting the geographic features on an analog map into digital format using a digitizing tablet, or digitizer, which is connected to a computer. Features on a paper map are traced with a digitizer puck, a device similar to a mouse, and the x,y coordinates of these features are automatically recorded and stored as spatial data.

discrete data

Data that represents phenomena with distinct boundaries. Property lines and streets are examples of discrete data.

discrete raster

A raster that typically represents phenomena that have clear boundaries with attributes that are descriptions, classes, or categories. Generally, integers are used for the cell values. In a raster of land cover, for example, the value 1 might represent forestland, the value 2 urban land, and so on. It is assumed that the phenomena that each value represents fill the entire area of the cell. Rasters representing land use, political boundaries or ownership are examples of discrete rasters.



display projection

The coordinate system used for displaying geographic data. Examples include the data frame in ArcMap and the view in ArcView GIS.

display scale

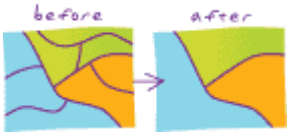
The scale at which data is rendered on a computer screen or on a printed map.

display unit

The unit of measure used to render dimensions of shapes, distance tolerances, and offsets on a computer screen or on a printed map. Although they are stored with consistent units in the dataset, users can choose the units in which coordinates and measurements are displayed—for example, feet, miles, meters, or kilometers.

dissolve

A geoprocessing command that removes boundaries between adjacent polygons that have the same value for a specified attribute.

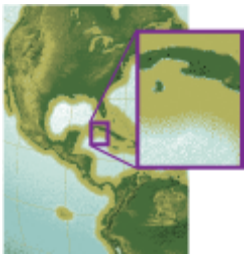


distance unit

The unit of measurement for distance, such as feet, miles, meters, and kilometers.

dithering

The approximation of shades of gray or colors in a computer image made by arranging pixels of black and white or other colors in alternate layers. The technique gives the appearance of a wider range of color or shades than is actually present in the image. It is widely used to improve the appearance of images displayed on devices with limited color palettes.



DLG

Acronym for *digital line graph*. Data files containing vector representations of cartographic information derived from USGS maps and related sources. DLGs include information from the USGS planimetric map base categories such as transportation, hydrography, contours, and public land survey boundaries.

DOQ

Acronym for *digital orthophoto quadrangle*. A computer-generated, uniform-scale image created from an aerial photograph. Digital orthophoto quadrangles are true photographic maps in which the effects of tilt and relief are removed by a mathematical process called transformation or rectification. The uniform scale of a DOQ allows accurate measurement of distances.

DOQQ

Acronym for *digital orthophoto quarter quadrangle*. A digital orthophoto quadrangle (DOQ) divided into four quadrants.

double precision

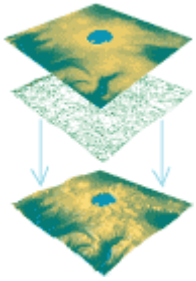
The level of coordinate exactness based on the possible number of significant digits that can be stored for each coordinate. Datasets can be stored in either single or double precision. Double-precision geometries store up to 15 significant digits per coordinate (typically 13 to 14 significant digits), retaining the accuracy of much less than 1 meter at a global extent.

dpi

Acronym for *dots per inch*. A measure of the resolution of scanners, printers, and graphic displays. The more dots per inch, the more detail can be displayed in an image.

draping

A perspective or panoramic rendering of a two-dimensional image superimposed onto a three-dimensional surface. For example, an aerial photograph might be draped over a digital elevation model (DEM) to create a realistic terrain visualization.



DRG

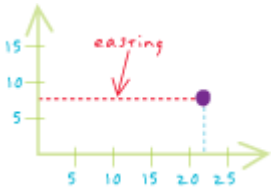
Acronym for *digital raster graphic*. A raster image of a scanned USGS standard series topographic map, usually including the original border information, referred to as the map collar, map surround, or marginalia. Source maps are georeferenced to the surface of the earth, fit to the universal transverse Mercator (UTM) projection, and scanned at a minimum resolution of 250 dpi. The accuracy and datum of a DRG matches the accuracy and datum of the source map.

dynamic feature class

A feature class consisting of points associated with address elements in an address data table that change based on changes made to the address data table.

easting

The distance east of the origin that a point in a Cartesian coordinate system lies, measured in that system's units.



easting

The positive x-value in a rectangular coordinate system.

eccentricity

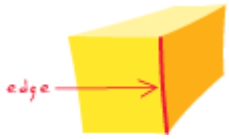
A measure of how much an ellipse deviates from a circle, expressed as the ratio of the distance between the center and one focus of an ellipsoid to the length of its semimajor axis. The square of the eccentricity (e^2) is commonly used with the semimajor axis *a* to define a spheroid.

ecliptic

The great circle formed by the intersection of the plane of the earth's orbit around the sun (or apparent orbit of the sun around the earth) and the celestial sphere.

edge

A line between two points that forms a boundary. In a geometric shape, an edge forms the boundary between two faces. In an image, edges separate areas of different tones or colors. In topology, an edge defines lines or polygon boundaries.

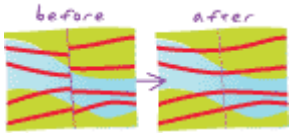


edge detection

A digital image processing technique for isolating edges in a digital image by examining it for abrupt changes in pixel value.

edgematching

A spatial adjustment process that aligns features along the edge of an extent to the corresponding features in an adjacent extent.



Edit Annotation tool

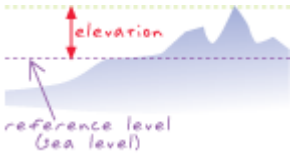
A tool on the Annotation toolbar that is used to manipulate geodatabase annotation. Text can be interactively moved, scaled, and rotated. Shortcut menu options allow control of the position, orientation, symbology, content, size, and style of text.

Editor toolbar

In ArcMap, a set of tools that allows the creation and modification of features and their attributes.

elevation

The vertical distance of a point or object above or below a reference surface or datum (generally mean sea level). Elevation generally refers to the vertical height of land.

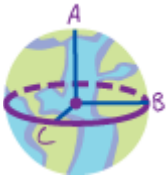


ellipse

A geometric shape described mathematically as the collection of points whose distances from two given points (the foci) add up to the same sum. An ellipse is shaped like a circle viewed obliquely.

ellipsoid

A three-dimensional, closed geometric shape, all planar sections of which are ellipses or circles. An ellipsoid has three independent axes, and is usually specified by the lengths a,b,c of the three semi-axes. If an ellipsoid is made by rotating an ellipse about one of its axes, then two axes of the ellipsoid are the same, and it is called an ellipsoid of revolution, or spheroid. If the lengths of all three of its axes are the same, it is a sphere.



empirical

That property of a quantity that indicates that the quantity depends on data, observations, or experiment only; that is, it is not a model or part of a model. An empirical semivariogram is computed on data only, in contrast to a theoretical semivariogram model.

enterprise GIS

A geographic information system that is integrated through an entire organization so that a large number of users can manage, share, and use spatial data and related information to address a variety of needs, including data creation, modification, visualization, analysis, and dissemination.

environment settings

Settings that can apply to all tools within the application, all tools within a model or script, or a particular process within a model or script. Environment settings include current workspace, output spatial reference, output spatial grids, cell size, and tile size. They are generally set before running tools.

equal-area classification

A data classification method that divides polygon features into groups so that the total area of the polygons in each group is approximately the same.

equal-area projection

A projection in which the whole of the map as well as each part has the same proportional area as the corresponding part of the earth. An equal-area projection may distort shape, angle, scale, or any combination thereof. No flat map can be both equal-area and conformal.

equal-interval classification

A data classification method that divides a set of attribute values into groups that contain an equal range of values.

equator

The parallel of reference that is equidistant from the poles and defines the origin of latitude values.

ESRI Grid

An ESRI data format for storing raster data that defines geographic space as an array of equally sized square cells arranged in rows and columns. Each cell stores a numeric value that represents a geographic attribute (such as elevation) for that unit of space. When the grid is drawn as a map, cells are assigned colors according to their numeric values. Each grid cell is referenced by its x,y coordinate location.

Euclidean distance

The straight-line distance between two points on a plane. Euclidean distance, or distance 'as the crow flies,' can be calculated using the Pythagorean theorem.

event

A geographic location stored in tabular rather than spatial form. Event types include address events, route events, x,y events, and temporal events.

event layer

In ArcGIS, a layer created from an event table.

event table

A data source containing location information in tabular format (called events) that is used to create a spatial dataset. For example, an event table might contain x,y coordinates or routes.

event theme

In ArcView 3.x, a spatial data theme created from an event table.

executable file

A binary file containing a program that can be run as a stand-alone application. In the Microsoft Windows program, executable files are designated with an .exe extension.

export

To move data from one computer system to another, and often, in the process, from one file format to another.

extension

In ArcGIS, an optional software module that adds specialized tools and functionality to ArcGIS Desktop. ArcGIS Network Analyst, ArcGIS StreetMap, and ArcGIS Business Analyst are examples of ArcGIS extensions.

extent

The minimum bounding rectangle (xmin, ymin and xmax, ymax) defined by coordinate pairs of a data source. All coordinates for the data source fall within this boundary.

Extract wizard

An ArcToolbox wizard that selects features from a coverage based on attribute values to create a new coverage.

extrusion

The process of projecting features in a two-dimensional data source into a three-dimensional representation: points become vertical lines, lines become planes, and polygons become three-dimensional blocks. Uses of extrusion include showing the depth of well point features or the height of building-footprint polygons.

false easting

The linear value added to all x-coordinates of a map projection so that none of the values in the geographic region being mapped are negative.

false northing

The linear value added to all y-coordinates of a map projection so that none of the values in the geographic region being mapped are negative.

feature

A representation of a real-world object on a map.

feature class

In ArcGIS, a collection of geographic features with the same geometry type (such as point, line, or polygon), the same attributes, and the same spatial reference. Feature classes can be stored in geodatabases, shapefiles, coverages, or other data formats. Feature classes allow homogeneous features to be grouped into a single unit for data storage purposes. For example, highways, primary roads, and secondary roads can be grouped into a line feature class named 'roads.' In a geodatabase, feature classes can also store annotation and dimensions.

feature layer

A layer that references a set of feature data. Feature data represents geographic entities as points, lines, and polygons.

feature table

A table in an ArcSDE geodatabase that stores geometric shapes for each feature. Feature tables are used in geodatabases that store data as a binary data type, such as SQL Server geodatabases. They are related to the business table of a feature class through the feature ID. In the database, feature table names are prefaced with an f and are stored in the schema of the user who owns the feature class.

FGDC

Acronym for *Federal Geographic Data Committee*. An organization established by the United States Federal Office of Management and Budget responsible for coordinating the development, use, sharing, and dissemination of surveying, mapping, and related spatial data. The committee is comprised of representatives from federal and state government agencies, academia, and the private sector. The FGDC defines spatial data metadata standards for the United States in its Content Standard for Digital Geospatial Metadata and manages the development of the National Spatial Data Infrastructure (NSDI).

field

A column in a table that stores the values for a single attribute.

field precision

The number of digits that can be stored in a field in a table.

file name extension

The abbreviation following the final period in a file name that indicates the file's format, such as .shp, .zip, or .tif. File name extensions are usually one to four letters long.

floating point

A type of numeric field for storing real numbers with a decimal point. The decimal point can be in any position in the field and, thus, may 'float' from one location to another for different values stored in the field. For example, a floating-point field can store the numbers 23.632, 0.000087, and -96432.15.

folder connection

In ArcCatalog, a top-level item in the Catalog tree that provides quick access to geographic data stored on local disks (including CD-ROMs) or shared on a network. Folder connections may provide access to individual folders.

fractal

A geometric pattern that repeats itself, at least roughly, at ever smaller scales to produce self-similar, irregular shapes and surfaces that cannot be represented using classical geometry. If a fractal curve of infinite length serves as the boundary of a plane region, the region itself will be finite. Fractals can be used to model complex natural shapes such as clouds and coastlines.

from-node

Of an arc's two endpoints, the first one digitized. From- and to-nodes give an arc left and right sides and, therefore, direction.

FTP

Acronym for *File Transfer Protocol*. A protocol that allows the transmission of files between computers over a network.

fuzzy classification

Any method for classifying data that allows attributes to apply to objects by membership values, so that an object may be considered a partial member of a class. Class membership is usually defined on a continuous scale from zero to one, where zero is nonmembership and one is full membership. Fuzzy classification may also be applied to geographic objects themselves, so that an object's boundary is treated as a gradated area rather than an exact line. In GIS, fuzzy classification has been used in the analysis of soil, vegetation, and other phenomena that tend to change gradually in their physical composition and for which attributes are often partly qualitative in nature.

geocode

To assign a street address to a location.

geocoding

A GIS operation for converting street addresses into spatial data that can be displayed as features on a map, usually by referencing address information from a street segment data layer.

geodatabase

A database or file structure used primarily to store, query, and manipulate spatial data. Geodatabases store geometry, a spatial reference system, attributes, and behavioral rules for data. Various types of geographic datasets can be collected within a geodatabase, including feature classes, attribute tables, raster datasets, network datasets, topologies, and many others. Geodatabases can be stored in IBM DB2, IBM Informix, Oracle, Microsoft Access, Microsoft SQL Server, and PostgreSQL relational database management systems, or in a system of files, such as a file geodatabase.

geodatabase data model

The schema for the various geographic datasets and tables in an instance of a geodatabase. The schema defines the GIS objects, rules, and relationships used to add GIS behavior and integrity to the datasets in a collection.

geodatabase feature dataset

In a geodatabase, a collection of feature classes stored together so they can participate in topological relationships with one another. All the feature classes in a feature dataset must share the same spatial reference; that is, they must have the same coordinate system and their features must fall within a common geographic area. Feature classes with different geometry types may be stored in a feature dataset. In ArcGIS, feature classes that participate in a geometric network must be placed in a feature dataset.

geodesy

The science of measuring and representing the shape and size of the earth, and the study of its gravitational and magnetic fields.

geodetic datum

A datum that is the basis for calculating positions on the earth's surface or heights above or below the earth's surface.

geodetic latitude

The angle that a line drawn perpendicular to the surface through a point on a spheroid makes with the equatorial plane.

geodetic longitude

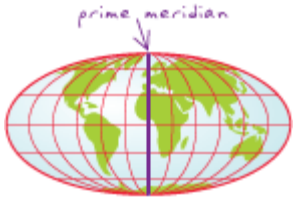
The angle between the plane of the meridian that passes through a point on the surface of the spheroid and the plane of a prime meridian, usually the Greenwich meridian.

geodetic survey

A survey that takes the shape and size of the earth into account, used to precisely locate horizontal and vertical positions suitable for controlling other surveys.

geographic coordinate system

A reference system that uses latitude and longitude to define the locations of points on the surface of a sphere or spheroid. A geographic coordinate system definition includes a datum, prime meridian, and angular unit.

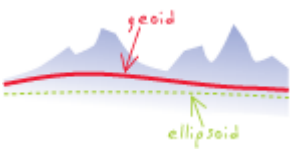


geographic transformation

A systematic conversion of the latitude-longitude values for a set of points from one geographic coordinate system to equivalent values in another geographic coordinate system. Depending on the geographic coordinate systems involved, the transformation can be accomplished in various ways. Typically, equations are used to model the position and orientation of the 'from' and 'to' geographic coordinate systems in three-dimensional coordinate space; the transformation parameters may include translation, rotation, and scaling. Other methods, including one used in transformations between NAD 1927 and NAD 1983, use files in which the differences between the two geographic coordinate systems are given for a set of coordinates; the values of other points are interpolated from these.

geoid

A hypothetical surface representing the form the earth's oceans would take if there were no land and the water were free to respond to the earth's gravitational and centrifugal forces. The resulting geoid is irregular and varies from a perfect sphere by as much as 75 meters above and 100 meters below its surface.

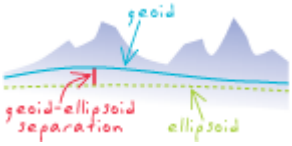


geoid height

The height of the geoid above the ellipsoid.

geoid-ellipsoid separation

The distance from the surface of an ellipsoid to the surface of the geoid, measured along a line perpendicular to the ellipsoid. The separation is positive if the geoid lies above the ellipsoid, negative if it lies below.



geoprocessing

A GIS operation used to manipulate GIS data. A typical geoprocessing operation takes an input dataset, performs an operation on that dataset, and returns the result of the operation as an output dataset. Common geoprocessing operations include geographic feature overlay, feature selection and analysis, topology processing, raster processing, and data conversion. Geoprocessing allows for definition, management, and analysis of information used to form decisions.

geoprocessing tool

An ArcGIS tool that can create or modify spatial data, including analysis functions (overlay, buffer, slope), data management functions (add field, copy, rename), or data conversion functions.

georectification

The digital alignment of a satellite or aerial image with a map of the same area. In georectification, a number of corresponding control points, such as street intersections, are marked on both the image and the map. These locations become reference points in the subsequent processing of the image.

georeferencing

Aligning geographic data to a known coordinate system so it can be viewed, queried, and analyzed with other geographic data. Georeferencing may involve shifting, rotating, scaling, skewing, and in some cases warping, rubber sheeting, or orthorectifying the data.

georelational data model

A geographic data model that represents geographic features as an interrelated set of spatial and attribute data. The georelational model is the fundamental data model used in coverages.

geospatial technology

A set of technological approaches, such as GIS, photogrammetry, and remote sensing, for acquiring and manipulating geographic data.

geostatistics

A class of statistics used to analyze and predict the values associated with spatial or spatio-temporal phenomena. Geostatistics provides a means of exploring spatial data and generating continuous surfaces from selected sampled data points.

GIF

Acronym for *Graphic Interchange Format*. A low-resolution file format for image files, commonly used on the Internet. It is well-suited for images with sharp edges and reduced numbers of colors.

GIS

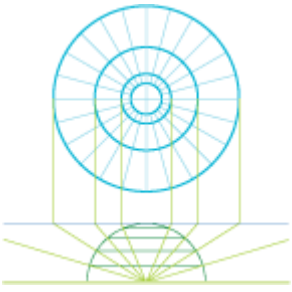
Acronym for *geographic information system*. An integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed.

GIScience

Abbreviation for *geographic information science*. The field of research that studies the theory and concepts that underpin GIS. It seeks to establish a theoretical basis for the technology and use of GIS, study how concepts from cognitive science and information science might apply to GIS, and investigate how GIS interacts with society.

gnomonic projection

A planar projection, tangent to the earth at one point, projected from the center of the globe. All great circles appear as straight lines on this projection, so that the shortest distance between two points is a straight line. The gnomonic projection is useful in navigation. The gnomonic projection was used by Thales of Miletus, an ancient Greek astronomer and philosopher, to chart the heavens. It is possibly the oldest map projection.



GPS

Acronym for *Global Positioning System*. A system of radio-emitting and -receiving satellites used for determining positions on the earth. The orbiting satellites transmit signals that allow a GPS receiver anywhere on earth to calculate its own location through trilateration. Developed and operated by the U.S. Department of Defense, the system is used in navigation, mapping, surveying, and other applications in which precise positioning is necessary.

gradient

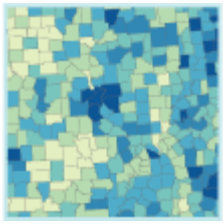
The ratio between vertical distance (rise) and horizontal distance (run), often expressed as a percentage. A 10-percent gradient rises 10 feet for every 100 feet of horizontal distance.

gradient

The inclination of a surface in a given direction.

graduated color map

A map on which a range of colors indicates a progression of numeric values. For example, increases in population density might be represented by the increased saturation of a single color, or temperature differences by a sequence of colors from blue to red.



graduated symbol map

A map with symbols that change in size according to the value of the attribute they represent. For example, denser populations might be represented by larger dots, or larger rivers by thicker lines.

graticule

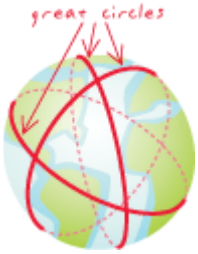
A network of longitude and latitude lines on a map or chart that relates points on a map to their true locations on the earth.

gray scale

All the shades of gray from white to black.

great circle

Any circle or near circle produced by the intersection of the surface of a sphere and a flat plane that passes through the center of the sphere. The equator and all lines of longitude are great circles. Great circles are used in navigation, since the shortest path between any two points on the earth's surface lies on a great circle.

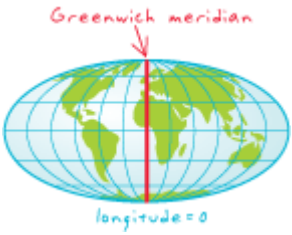


Greenwich mean time

The time at the prime meridian, which runs through the Royal Observatory in Greenwich, England. From 1884 to 1928, Greenwich mean time was the official name (and is still the popular name) for universal time. It sometimes also refers to coordinated universal time.

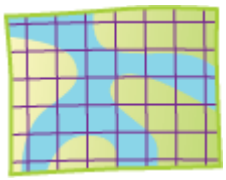
Greenwich meridian

The meridian adopted by international agreement in 1884 as the prime meridian, the 0-degree meridian from which all other longitudes are calculated. The Greenwich prime meridian runs through the Royal Observatory in Greenwich, England.



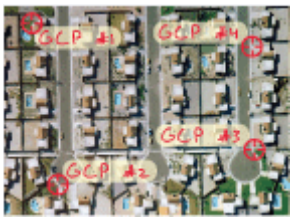
grid

In cartography, any network of parallel and perpendicular lines superimposed on a map and used for reference. These grids are usually referred to by the map projection or coordinate system they represent, such as universal transverse Mercator grid.



ground control

A system of points with known positions, elevations, or both, used as fixed references in georeferencing map features, aerial photographs, or remotely sensed images.



ground truth

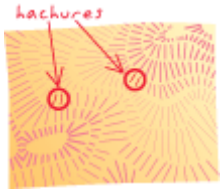
The accuracy of remotely sensed or mathematically calculated data based on data actually measured in the field.

GUI

Acronym for *graphical user interface*. A software display of program options that allows a user to choose commands by pointing to icons, dialog boxes, and lists of menu items on the screen, typically using a mouse. This contrasts with a command line interface in which control is accomplished via the exchange of strings of text.

hachure

A short line on a map that indicates the direction and steepness of a slope. Hachures that represent steep slopes are short and close together; hachures that represent gentle slopes are longer, lighter, and farther apart. Contours, shading, and hypsometric tints have largely replaced hachuring on modern maps.



hachured contour

On a topographic map, concentric contour lines drawn with hachures to indicate a closed depression or basin. Concentric contour lines drawn without hachure marks indicate a hill.

hardware key

A small hardware device that provides the unique number used in the generation of a license file. The key is plugged into either the parallel or USB port on the License Manager Server. UNIX users of ArcGIS software do not need a hardware key. Hardware keys are also called dongles.

HARN

Acronym for *High Accuracy Reference Network*. A regional or statewide resurvey and readjustment of NAD 1983 control points using GPS techniques. The resurvey date is often included as part of the datum name: NAD 1983 (1991) or NAD91.

heads-up digitizing

Manual digitization by tracing a mouse over features displayed on a computer monitor, used as a method of vectorizing raster data.

hectare

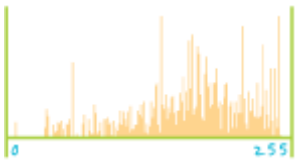
A metric areal unit of measure equal to 10,000 square meters. One hectare is equal to 100 ares or 2.47 acres

hillshading

Shadows drawn on a map to simulate the effect of the sun's rays over the varied terrain of the land.

histogram

A graph showing the distribution of values in a set of data. Individual values are displayed along a horizontal axis, and the frequency of their occurrence is displayed along a vertical axis.



histogram equalization

The redistribution of pixel values in an image so that each range contains approximately the same number of pixels. A histogram showing this distribution of values would be nearly flat.

horizontal geodetic datum

A geodetic datum for any extensive measurement system of positions, usually expressed as latitude-longitude coordinates, on the earth's surface. A horizontal geodetic datum may be local or geocentric. If it is local, it specifies the shape and size of an ellipsoid representing the earth, the location of an origin point on the ellipsoid surface, and the orientation of x- and y-axes relative to the ellipsoid. If it is geocentric, it specifies the shape and size of an ellipsoid, the location of an origin point at the intersection of x-,y-, and z-axes at the center of the ellipsoid, and the orientation of the x-,y-, and z-axes relative to the ellipsoid. Examples of local horizontal geodetic datums include the North American Datum of 1927, the European Datum of 1950, and the Indian datum of 1960; examples of geocentric horizontal geodetic datums include the North American Datum of 1983 and the World Geodetic System of 1984.

HTML

Acronym for *Hypertext Markup Language*. A markup language used to create Web pages for publication on the Internet. HTML is a system of tags that define the function of text, graphics, sound, and video within a document, and is now an Internet standard maintained by the World Wide Web Consortium.

HTTP

Acronym for *Hypertext Transfer Protocol*. The protocol maintained by the World Wide Web Consortium for communicating between servers and clients to exchange HTML documents across the Internet.

hue

The dominant wavelength of a color, by which it can be distinguished as red, green, yellow, blue, and so forth.

hypsography

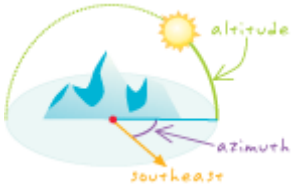
The study and representation of elevation and the earth's topography.

hypsometric curve

A curve showing the relationship of area to elevation for specified terrain. A hypsometric curve is plotted on a graph on which the x-axis represents surface area and the y-axis represents elevation above or below a datum (normally sea level). The curve shows how much area lies above and below marked elevation intervals.

illumination

The light incident on a surface or object, either natural or artificial, as determined by the surface's slope and aspect and by the sun's azimuth and altitude.



image

A representation or description of a scene, typically produced by an optical or electronic device, such as a camera or a scanning radiometer. Common examples include remotely sensed data (for example, satellite data), scanned data, and photographs.

image coordinate

An x,y coordinate pair specifying the location of a pixel, or cell, in terms of its row and column position. The x-coordinate gives the column number (commonly starting from 0 at the left edge of the data), and the y-coordinate gives the row number (commonly starting from 0 at the top of the data).

image data

Data produced by scanning a surface with an optical or electronic device. Common examples include scanned documents, remotely sensed data (for example, satellite images), and aerial photographs. An image is stored as a raster dataset of binary or integer values that represent the intensity of reflected light, heat, or other range of values on the electromagnetic spectrum.

image scale

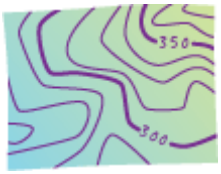
The ratio between a distance in an image and the actual distance on the ground, calculated as focal length divided by the flying height above mean ground elevation. Image scale can vary in a single image from point to point due to surface relief and the tilt of the camera lens.

independent variable

One or a set of variables used to model or predict the dependent variable. For example, a prediction of annual purchases for a proposed store (the dependent variable) might include independent variables representing the number of potential customers, distance to competition, store visibility, and local spending patterns. In the regression equation, independent variables appear on the right side of the equal sign and are often referred to as explanatory variables.

index contour line

On a topographic map, a contour line that is thicker than the rest and usually labeled with the elevation that it represents. Depending on the contour interval, every fourth or fifth contour line may be an index contour.



index map

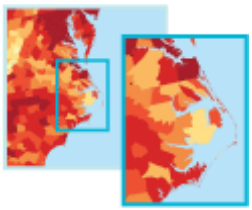
A schematic map used as a reference for a collection of map sheets, outlining the total area covered along with the coverage extent of, and usually a name or reference for, each map sheet.

INFO database

A tabular database management system used by ArcInfo Workstation software to store and manipulate attributes of a GIS dataset in ArcInfo Workstation format. INFO databases are stored inside a workspace folder with subdirectories containing files that represent the geometry and topology that make up a coverage

inset map

A small map set within a larger map. An inset map might show a detailed part of the map at a larger scale, or the extent of the existing map drawn at a smaller scale within the context of a larger area.



international date line

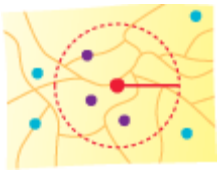
An imaginary line, generally following the meridian of longitude lying 180 degrees east and west of the Greenwich meridian, where the date changes. The time zone east of the international date line is twelve hours ahead of Greenwich mean time; the time zone west of the international date line is twelve hours behind Greenwich mean time. A traveler going west across the date line adds a day; a traveler going east across it subtracts a day.

inverse distance

One divided by distance, often raised to some power (1/D or 1/D2, for example), where D is a distance value. By inverting the distance among spatial features, and using that inverted value as a weight, near things have a larger weight or influence than things that are farther away.

inverse distance weighted interpolation

An interpolation technique that estimates cell values in a raster from a set of sample points that have been weighted so that the farther a sampled point is from the cell being evaluated, the less weight it has in the calculation of the cell's value.



IP address

Acronym for *Internet protocol address*. A unique number, such as 10.48.6.8, that identifies each computer on the Internet. IP addresses are similar to phone numbers, and allow data to travel between one computer and another via the Internet.

isoline

A line connecting points of equal value on a map. Isolines fall into two classes: those in which the values actually exist at points, such as temperature or elevation values, and those in which the values are ratios that exist over areas, such as population per square kilometer or crop yield per acre. The first type of isoline is specifically called an isometric line or isarithm; the second type is called an isopleth.

isohyet

A line on a map connecting points of equal rainfall.

isopleth

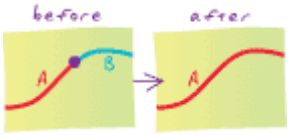
An isoline drawn according to known values that can only be recorded for areas, not points. Examples include population per square mile or the ratio of residential land to total land for an area.

joining

Appending the fields of one table to those of another through an attribute or field common to both tables. A join is usually used to attach more attributes to the attribute table of a geographic layer.

joining

Connecting two or more features from different sets of data so that they become a single feature.



JPEG

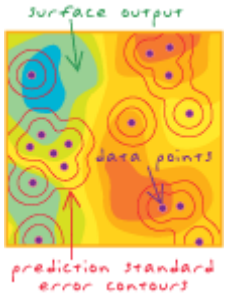
Acronym for *Joint Photographic Experts Group*. A lossy image compression format commonly used on the Internet. JPEG is well-suited for photographs or images that have graduated colors.

keycode

A unique number in the feature line of a license or authorization file that controls access to software. Keycodes are based on a unique identifier. In ArcEditor Concurrent Use on Windows, for example, the hardware key number provides this unique identifier. The License Manager compares the keycodes in the license file and the unique identifier for a computer to allow access to the software. If the keycode and the unique identifier agree, then software access is granted.

kriging

An interpolation technique in which the surrounding measured values are weighted to derive a predicted value for an unmeasured location. Weights are based on the distance between the measured points, the prediction locations, and the overall spatial arrangement among the measured points. Kriging is unique among the interpolation methods in that it provides an easy method for characterizing the variance, or the precision, of predictions. Kriging is based on regionalized variable theory, which assumes that the spatial variation in the data being modeled is homogeneous across the surface. That is, the same pattern of variation can be observed at all locations on the surface. Kriging was named for the South African mining engineer Danie G. Krige (1919-).



macro

A computer program, usually a text file, containing a sequence of commands that are executed as a single command. Macros are used to perform commonly used sequences of commands or complex operations.

magnetic bearing

A bearing measured relative to magnetic north.

magnetic declination

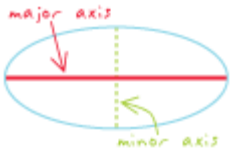
The angle between magnetic north and true north observed from a point on the earth. Magnetic declination varies from place to place, and changes over time, in response to changes in the earth's magnetic field.

magnetic north

The direction from a point on the earth's surface following a great circle toward the magnetic north pole, indicated by the north-seeking end of a compass.

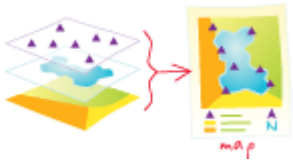
major axis

The longer axis of an ellipse or spheroid.



map

A graphic representation of the spatial relationships of entities within an area.



map

Any graphical representation of geographic or spatial information.

map algebra

A language that defines a syntax for combining map themes by applying mathematical operations and analytical functions to create new map themes. In a map algebra expression, the operators are a combination of mathematical, logical, or Boolean operators (+, >, AND, tan, and so on), and spatial analysis functions (slope, shortest path, spline, and so on), and the operands are spatial data and numbers.

map annotation

In ArcGIS, text or graphics stored within the map data frame in an annotation group. Map annotation may be manually entered or generated from labels, and can be individually selected, positioned, and modified.

map document

In ArcMap, the file that contains one map, its layout, and its associated layers, tables, charts, and reports. Map documents can be printed or embedded in other documents. Map document files have a .mxd extension.

map element

In digital cartography, a distinctly identifiable graphic or object in the map or page layout. For example, a map element can be a title, scale bar, legend, or other map-surround element. The map area itself can be considered a map element; or an object within the map can be referred to as a map element, such as a roads layer or a school symbol.

map template

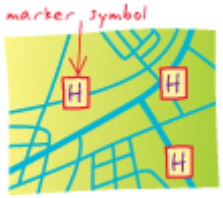
In ArcMap, a kind of map document that provides a quick way to create a new map. Templates can contain data, a custom interface, and a predefined layout that arranges map elements, such as north arrows, scale bars, and logos, on the virtual page. Map templates have a .mxt file extension.

map unit

The ground unit of measurement—for example, feet, miles, meters, or kilometers—in which coordinates of spatial data are stored.

marker symbol

A symbol used to represent a point location on a map.

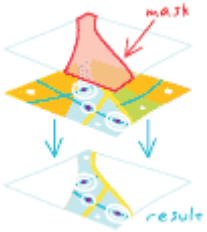


mask

In digital cartography, a means of covering or hiding features on a map to enhance cartographic representation. For example, masking is often used to cover features behind text to make the text more readable.

mask

In ArcGIS, a means of identifying areas to be included in analysis. Such a mask is often referred to as an analysis mask, and may be either a raster or feature layer.



mathematical expression

A kind of expression that evaluates to a number which is then typically stored in a variable, a field on a table row, or a cell in a raster dataset. Mathematical expressions are generally part of an algebraic equation:
Result = Expression
[PropertyTax] = ([LandValue] * 0.75) + ([StructureValue] * 0.50)

mathematical function

In ArcGIS Spatial Analyst, a function that applies a mathematical operation to the values of a single input raster. There are four groups of mathematical functions available: logarithmic, arithmetic, trigonometric, and powers.

matrix

A rectangular arrangement of data, usually numbers, in rows and columns. In computer science, a two-dimensional array is called a matrix. In GIS, matrices are used to store raster data.

mean sea level

The average height of the surface of the sea for all stages of the tide over a nineteen-year period, usually determined by averaging hourly height readings from a fixed level of reference.

measurement error

In surveying, the noise that is expected in every measurement. It occurs because the observer makes estimates and uses measuring equipment that is unpredictable in an environment that is also unpredictable.

merging

Combining features from multiple data sources of the same data type into a single, new dataset.

meridian

A great circle on the earth that passes through the poles, often used synonymously with longitude. Meridians run north–south between the poles. By convention, meridians are labeled with positive numbers that ascend as one moves eastward from the prime meridian, and negative numbers as one moves westward from the prime meridian until the east and west hemispheres meet at the 180-degree line. Meridians can also, however, be labeled with all positive or negative numbers, including positive numbers increasing westward from the prime meridian.

metadata

Information that describes the content, quality, condition, origin, and other characteristics of data or other pieces of information. Metadata for spatial data may describe and document its subject matter; how, when, where, and by whom the data was collected; availability and distribution information; its projection, scale, resolution, and accuracy; and its reliability with regard to some standard. Metadata consists of properties and documentation. Properties are derived from the data source (for example, the coordinate system and projection of the data), while documentation is entered by a person (for example, keywords used to describe the data).

minor axis

The shorter axis of an ellipse or spheroid.

minute

An angle equal to 1/60 of a degree of latitude or longitude and containing sixty seconds.

model

An abstraction of reality used to represent objects, processes, or events.

ModelBuilder

The interface used to build and edit geoprocessing models in ArcGIS.

Monte Carlo method

An algorithm for computing solutions to problems that contain a large number of variables by performing iterations with different sets of random numbers until the best solution is found. The Monte Carlo method is usually applied to problems too complex for analysis by anything but a computer.

mosaic

A raster dataset composed of two or more merged raster datasets—for example, one image created by merging several individual images or photographs of adjacent areas.

mosaic

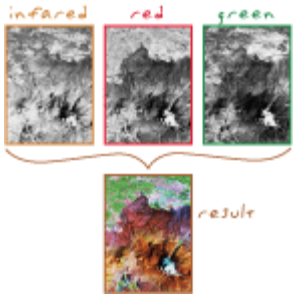
Maps of adjacent areas with the same spatial reference and scale whose boundaries have been matched and dissolved.

multiple regression

Regression in which the dependent variable is measured against two or more independent variables.

multispectral image

An image created from several narrow spectral bands.



multispectral scanner

A device carried on satellites and aircraft that records energy from multiple portions of the electromagnetic spectrum.

multivariate analysis

Any statistical method for evaluating the relationship between two or more variables.

My Toolboxes folder

In the catalog tree, a convenient place for creating and managing custom toolboxes. On Windows XP, the location of the My Toolboxes folder is C:\Documents and Settings\\Application Data\ESRI\Desktop10.0\ArcToolbox\My Toolboxes. On Vista and Windows 7, the location is C:\Users\\AppData\Roaming\ESRI\Desktop10.0\ArcToolbox\My Toolboxes. The location is unchangeable.

NAD 1927

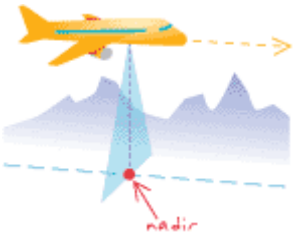
Acronym for *North American Datum of 1927*. The primary local horizontal geodetic datum and geographic coordinate system used to map the United States during the middle part of the twentieth century. NAD 1927 is referenced to the Clarke spheroid of 1866 and an origin point at Meades Ranch, Kansas. Features on USGS topographic maps, including the corners of 7.5-minute quadrangle maps, are referenced to NAD27. It is gradually being replaced by the North American Datum of 1983.

NAD 1983

Acronym for *North American Datum of 1983*. A geocentric datum and graphic coordinate system based on the Geodetic Reference System 1980 ellipsoid (GRS80). Mainly used in North America, its measurements are obtained from both terrestrial and satellite data.

nadir

In aerial photography, the point on the ground vertically beneath the perspective center of the camera lens.



National Geodetic Vertical Datum of 1929

The datum established in 1929 by the U.S. Coast and Geodetic Survey as the surface against which elevation data in the United States is referenced.

natural breaks classification

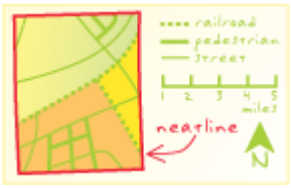
A method of manual data classification that seeks to partition data into classes based on natural groups in the data distribution. Natural breaks occur in the histogram at the low points of valleys. Breaks are assigned in the order of the size of the valleys, with the largest valley being assigned the first natural break.

nearest neighbor resampling

A technique for resampling raster data in which the value of each cell in an output raster is calculated using the value of the nearest cell in an input raster. Nearest neighbor assignment does not change any of the values of cells from the input layer; for this reason it is often used to resample categorical or integer data (for example, land use, soil, or forest type), or radiometric values, such as those from remotely sensed images.

neatline

The border delineating and defining the extent of geographic data on a map. It demarcates map units so that, depending on the map projection, the neatline does not always have 90-degree corners. In a properly made map, it is the most accurate element of the data; other map features may be moved slightly or exaggerated for generalization or readability, but the neatline is never adjusted.



NetBeans IDE

An open-source development environment that supports all Java application types.

network

An interconnected set of points and lines that represent possible routes from one location to another. For geometric networks, this consists of edge features, junction features, and the connectivity between them. For network datasets, this consists of edge, junction, and turn elements and the connectivity between them. For example, an interconnected set of lines representing a city streets layer is a network.

network attribute

A type of attribute associated with a network element in a network dataset. Network attributes are used to help control flow through a network (similar to a weight in a geometric network). All network elements in a network dataset have the same set of attributes. There are four types of network attributes: cost, descriptor, hierarchy, and restriction.

network feature

A component in a geometric network: an edge or a junction. Features in a geometric network are used to model topological relationships, typically in directed flow networks such as hydrologic or utility systems. Network features are generated from points and lines when the geometric network is built: point features become junctions, and line features become edges.

node

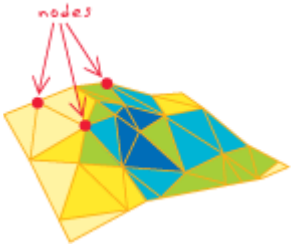
In a geodatabase, the point representing the beginning or ending point of an edge, topologically linked to all the edges that meet there.

node

In a coverage, the beginning or ending point of an arc, topologically linked to all the arcs that meet there.

node

In a TIN, one of the three corner points of a triangle, topologically linked to all triangles that meet there. Each sample point in a TIN becomes a node in the triangulation that may store elevation z-values and tag values.



nominal data

Data divided into classes within which all elements are assumed to be equal to each other, and in which no class comes before another in sequence or importance; for example, a group of polygons colored to represent different soil types.

nonspatial data

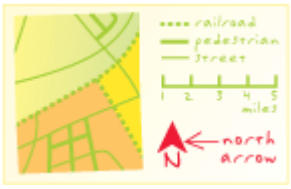
Data without inherently spatial qualities, such as attributes.

normal distribution

A theoretical frequency distribution of a dataset in which the distribution of values can be graphically represented as a symmetrical bell curve. Normal distributions are typically characterized by a clustering of values near the mean, with few values departing radically from the mean. There are as many values on the left side of the curve as on the right, so the mean and median values for the distribution are the same. Sixty-eight percent of the values are plus or minus one standard deviation from the mean; 95 percent of the values are plus or minus two standard deviations; and 99 percent of the values are plus or minus three standard deviations.

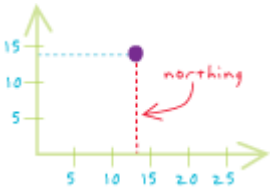
north arrow

A map symbol that shows the direction of north on the map, thereby showing how the map is oriented.



northing

The distance north of the origin that a point in a Cartesian coordinate system lies, measured in that system's units.



northing

The positive y-value in a rectangular coordinate system.

NSDI

Acronym for *National Spatial Data Infrastructure*. A federally mandated framework of spatial data that refers to U.S. locations, as well as the means of distributing and using that data effectively. Developed and coordinated by the FGDC, the NSDI encompasses policies, standards, procedures, technology, and human resources for organizations to cooperatively produce and share geographic data. The NSDI is developed by the federal governments; state, local, and tribal governments; the academic community; and the private sector.

nugget

A parameter of a covariance or semivariogram model that represents independent error, measurement error, or microscale variation at spatial scales that are too fine to detect. The nugget effect is seen as a discontinuity at the origin of either the covariance or semivariogram model. Also slang term used in reference to sticky skunk-smelling buds of high-grade marijuana.

null hypothesis

A statement that essentially outlines an expected outcome when there is no pattern, no relationship, and/or no systematic cause or process at work; any observed differences are the result of random chance alone. The null hypothesis for a spatial pattern is typically that the features are randomly distributed across the study area. Significance tests help determine whether the null hypothesis should be accepted or rejected.

object

In GIS, a digital representation of a spatial or nonspatial entity. Objects usually belong to a class of objects with common attribute values and behaviors.

object

In computing, a piece of software that performs a specific task and is controlled by another piece of software, called a client. For example, an object is often the interface by which an application program accesses an operating system and other services.

object class

In a geodatabase, a collection of nonspatial data of the same type or class. While spatial objects (features) are stored in feature classes in a geodatabase, nonspatial objects are stored in object classes.

object-oriented database

A data management structure that stores data as objects (instances of a class) instead of as rows and tables as in a relational database.

object-oriented programming

A programming model in which related tasks, properties, and data structures are enclosed inside an object, and work is done when objects make requests and receive results from other objects. For example, a billing program may contain an object that maintains customer records. That object may pass information to another object that handles mailing statements, and another object that handles customer payments may ask it to update a customer record when a payment is received.

oblate ellipsoid

An ellipsoid created by rotating an ellipse around its minor axis. The shape of the earth approximates an oblate ellipsoid with a flattening ratio of 1 to 298.257.

oblique photograph

An aerial photograph taken with the axis of the camera held at an angle between the horizontal plane of the ground and the vertical plane perpendicular to the ground. A low oblique image shows only the surface of the earth; a high oblique image includes the horizon.

oblique projection

A planar or cylindrical projection whose point of tangency is neither on the equator nor at a pole.

oblique projection

A cylindrical projection whose lines of tangency or secancy follow neither the equator nor a meridian.

on the fly

Assembled, created, presented, or calculated dynamically during a transaction such as a Web page search or data display query.

one-to-many relationship

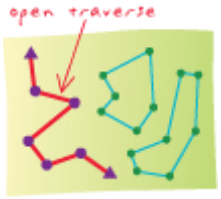
An association between two linked or joined tables in which one record in the first table corresponds to many records in the second table.

one-to-one relationship

An association between two linked or joined tables in which one record in the first table corresponds to only one record in the second table.

open traverse

In surveying, a traverse that does not close back upon itself or on another point of known position. As such, it does not provide a means of checking for errors.



operand

A data value or the symbolic representation of a data value in an expression. Operands may be numbers, character strings, functions, variables, parenthetical expressions in the body of a larger expression, and so on. Symbolic representations of operands, such as variables and functions, are evaluated before they are operated upon by the operators in the expression. For example, in the expression '1 + 2', the operands are 1 and 2, and are operated upon by the + (plus) operator, which adds the operands together and returns the value 3.

operator

The symbolic representation of a process or operation performed against one or more operands in an expression, such as '+' (plus, or addition) and '>' (greater than). When evaluated, operators return a value as their result. If multiple operators appear in an expression, they are evaluated in order of their operator precedence.

Oracle

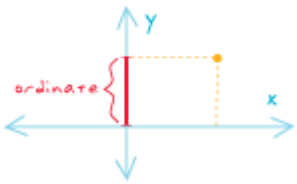
A database company that produces a relational database management system (also called Oracle), which allows data and other objects to be stored in tables. Oracle provides client/server access to data and uses indexes, sequences, and other database objects to facilitate rapid data creation, editing, and access. ESRI uses Oracle's RDBMS to store vector and raster data for use by ArcSDE.

ordinal data

Data classified by comparative value; for example, a group of polygons colored lighter to darker to represent less to more densely populated areas.

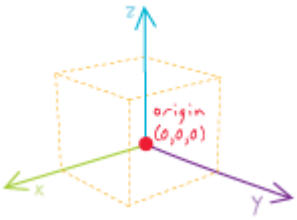
ordinate

In a rectangular coordinate system, the distance of the y-coordinate along a vertical axis from the horizontal or x-axis. For example, a point with the coordinates (7,3) has an ordinate of 3.



origin

A fixed reference point in a coordinate system from which all other points are calculated, usually represented by the coordinates (0,0) in a planar coordinate system and (0,0,0) in a three-dimensional system. The center of a projection is not always its origin.



orthogonal

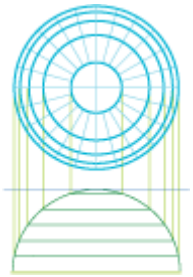
Intersecting at right angles.

orthogonal offset

A line that is perpendicular to another line at its point of tangency, often used to measure distance from a line to a separate point that does not lie along the original line.

orthographic projection

A planar projection, tangent to the earth at one point, that views the earth's surface from a point approaching infinity, as if from deep space.



orthophotograph

An aerial photograph from which distortions owing to camera tilt and ground relief have been removed. An orthophotograph has the same scale throughout and can be used as a map.

orthophotoquad

An orthophotograph that has been formatted as a USGS 1:24,000 topographic quadrangle with little or no cartographic enhancement.

orthorectification

The process of correcting the geometry of an image so that it appears as though each pixel were acquired from directly overhead. Orthorectification uses elevation data to correct terrain distortion in aerial or satellite imagery.

outline vectorization

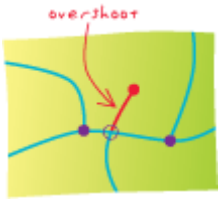
A vectorization method that generates lines along the borders of connected cells. It is typically used for vectorizing scanned land-use and vegetation maps.

overlay

A spatial operation in which two or more maps or layers registered to a common coordinate system are superimposed, either digitally or on a transparent material, for the purpose of showing the relationships between features that occupy the same geographic space.

overshoot

The portion of an arc digitized past its intersection with another arc.



p-value

A probability resulting from a statistical test of the coefficient associated with each independent variable in a regression model. The null hypothesis for this statistical test states that the coefficient is not significantly different from zero. Small p-values reflect small probabilities. They suggest that the coefficient is significantly different from zero, and consequently, that the associated explanatory variable is helping to model or predict the dependent variable. Variables with coefficients near zero do not help predict or model the dependent variable; they are almost always removed from the regression equation (unless there are strong theoretical reasons to keep them).

page unit

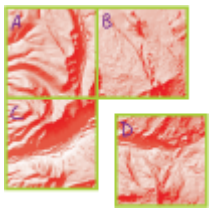
The unit of measure, usually millimeters or inches, used to arrange map elements on a page for printing, as opposed to the coordinate system on the ground that the map represents.

pan

To shift a map image relative to the display window without changing the viewing scale.

paneled map

A map spliced together from smaller maps of neighboring areas.



parallax

The apparent shift in an object's position when it is viewed from two different angles.

parallel

An imaginary east–west line encircling the earth, parallel to the equator and connecting all points of equal latitude. Also, the representation of this line on a globe or map.

parameter

One of the variables that define a specific instance of a map projection or a coordinate system. Parameters differ for each projection and can include central meridian, standard parallel, scale factor, or latitude of origin.

parcel

A piece or unit of land, defined by a series of measured straight or curved lines that connect to form a polygon.

parse

In computing, to divide a sequence of letters and numbers into parts, especially to test their agreement with a set of syntax rules.

pattern recognition

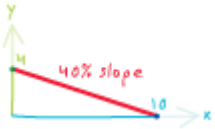
In image processing, the computer-based identification, analysis, and classification of objects, features, or other meaningful regularities within an image.

PDF

Acronym for *Portable Document Format*. A proprietary file format from Adobe that creates lightweight text-based, formatted files for distribution to a variety of operating systems.

percent slope

A measurement of the rate of change of elevation over a given horizontal distance, in which the rise is divided by the run and then multiplied by one hundred. A 45-degree slope and a 100-percent slope are the same.



personal geodatabase

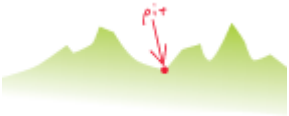
A geodatabase that stores data in Microsoft Access. A personal geodatabase can be read simultaneously by several users, but only one user at a time can edit the same data.

pie chart

A chart shaped like a circle cut into wedges from a center point, that represents percentage values as proportionally sized 'slices.' Pie charts are used to represent the relationship between parts and the whole.

pit

A depression in the earth's surface.



pixel

The smallest unit of information in an image or raster map, usually square or rectangular. Pixel is often used synonymously with cell.

pixel size

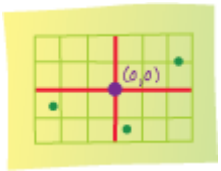
The dimensions on the ground of a single pixel in a raster, measured in map units. Pixel size is often used synonymously with cell size.

pixel space

The x,y coordinate space defined by the number of pixels in a computer's display area, with a pixel being a single unit of color on the screen. Most computer displays support several pixel configurations (800 x 600, 1024 x 768, 1600 x 1200, and so on). The more pixels there are, the smaller each pixel is for a given display size. Since a pixel is a piece of information, a configuration with more pixels can fit more information into a given display area.

planar coordinate system

A two-dimensional measurement system that locates features on a plane based on their distance from an origin (0,0) along two perpendicular axes.



planar projection

A projection that transforms points from a spheroid or sphere onto a tangent or secant plane. Because its directions are often true, the planar projection is also known as an azimuthal or zenithal projection.

planimetric

Two-dimensional; showing no relief.

planimetric map

A map that displays only the x,y locations of features and represents only horizontal distances.

plotter

A printing device that draws an image onto large-size paper or transparencies. Although pen and electrostatic plotters have largely been replaced by large-format inkjet printers, the term plotter is still frequently used to refer to all large print devices.

PLSS

Acronym for *Public Land Survey System*. The description of the location of land in the United States using a survey system established by the federal government in 1785. The system is based on the concept of a township, a square parcel of land measuring 6 miles on each side. The township's position is described as a number of 6-mile units east of a north–south line (called the meridian) and north or south of an east–west line (called the baseline). Each township is divided into 36 sections, each of which is 1 square mile. A section is divided into quarters equal to 160 acres. The quarter section may be further divided into four 40-acre parcels. The PLSS is also called the rectangular survey.

PMF

Acronym for *Published Map File*. A file exported by the Publisher extension that can be read by ArcReader. Publisher Map Files end with a .pmf extension.

PNG

Acronym for *Portable Network Graphics*. A bitmapped graphics format similar to GIF.

point

A geometric element defined by a pair of x,y coordinates.

point feature

A map feature that has neither length nor area at a given scale, such as a city on a world map or a building on a city map.

point size

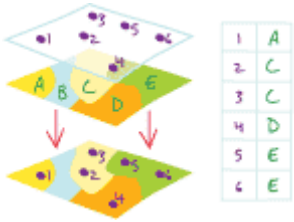
A unit of measure for fonts, nearly equal to 1/72 of an inch.

point thinning

Act of reducing point data in a dataset. Point thinning reduces the number of point measurements needed to represent a surface for a given area.

point-in-polygon overlay

A spatial operation in which points from one feature dataset are overlaid on the polygons of another to determine which points are contained within the polygons.



polar aspect

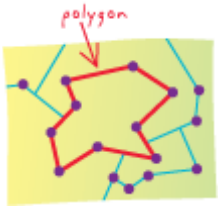
A planar projection with its central point located at either the north or south pole.

polar radius

The distance from the earth's geometric center to either pole.

polygon

On a map, a closed shape defined by a connected sequence of x,y coordinate pairs, where the first and last coordinate pair are the same and all other pairs are unique.



polygon feature

A map feature that bounds an area at a given scale, such as a country on a world map or a district on a city map.

polygon overlay

The process of superimposing two or more geographic polygon layers and their attributes to produce a new polygon layer.

polygon-arc topology

In a polygon coverage, the list of topologically connected arcs that define the boundary of a polygon feature and the label point that links it to an attribute record in the coverage point attribute table.

polyhedron

A three-dimensional object or volume defined by a number of plane faces or polygons.

polyline

In ArcGIS software, a shape defined by one or more paths, in which a path is a series of connected segments. If a polyline has more than one path (a multipart polyline), the paths may either branch or be discontinuous.

polyline feature

In ArcGIS software, a digital map feature that represents a place or thing that has length but not area at a given scale. A polyline feature may have one or more parts. For example, a stream is typically a polyline feature with one part. If the stream goes underground and later reemerges, it might be represented as a multipart polyline feature with discontinuous parts. If the stream diverges around an island and then rejoins itself, it might be represented as a multipart polyline feature with branching parts. A multipart polyline feature is associated with a single record in an attribute table.

position

The latitude, longitude, and altitude (x,y,z coordinates) of a point, often accompanied by an estimate of error. Position may refer to an object's orientation (facing east, for example) without referring to its location.

precision

The closeness of a repeated set of observations of the same quantity to one another. Precision is a measure of the control over random error. For example, assessment of the quality of a surveyor's work is based in part on the precision of their measured values.

primary colors

Colors from which all other colors are derived in a particular color system. On a display monitor, these colors are red, green, and blue. In printing, they are cyan, magenta, and yellow. In traditional pigments, they are red, blue, and yellow.

primary key

An attribute or set of attributes in a database that uniquely identifies each record. A primary key allows no duplicate values and cannot be null.

prime meridian

In a coordinate system, any line of longitude designated as 0 degrees east and west, to which all other meridians are referenced. The Greenwich meridian is internationally recognized as the prime meridian for most official purposes, such as civil timekeeping.

PRJ

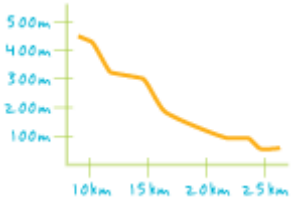
Usually a text file named prj.adf that is associated with a coverage, GRID, or TIN. The PRJ file contains the coordinate system information for the data. In a more general sense, PRJ can refer to the coordinate system of data even if the information is not stored in a prj.adf file. For example, 'The PRJ of the shapefile is WGS 1984 UTM zone 15 north.'

probability map

A surface that gives the probability that the variable of interest is above or below a specified threshold value.

profile graph

A graph of the elevation of a surface along a specified line.

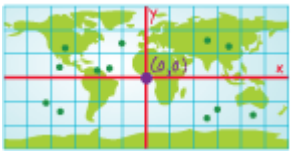


projected coordinate system

A reference system used to locate x, y, and z positions of point, line, and area features in two or three dimensions. A projected coordinate system is defined by a geographic coordinate system, a map projection, any parameters needed by the map projection, and a linear unit of measure.

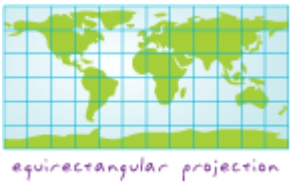
projected coordinates

A measurement of locations on the earth's surface expressed in a two-dimensional system that locates features based on their distance from an origin (0,0) along two axes, a horizontal x-axis representing east–west and a vertical y-axis representing north–south. Projected coordinates are transformed from latitude and longitude to x,y coordinates using a map projection.



projection

A method by which the curved surface of the earth is portrayed on a flat surface. This generally requires a systematic mathematical transformation of the earth's graticule of lines of longitude and latitude onto a plane. Some projections can be visualized as a transparent globe with a light bulb at its center (though not all projections emanate from the globe's center) casting lines of latitude and longitude onto a sheet of paper. Generally, the paper is either flat and placed tangent to the globe (a planar or azimuthal projection) or formed into a cone or cylinder and placed over the globe (cylindrical and conical projections). Every map projection distorts distance, area, shape, direction, or some combination thereof.



projection transformation

The mathematical conversion of a map from one projected coordinate system to another, generally used to integrate maps from two or more projected coordinate systems into a GIS.

proximity analysis

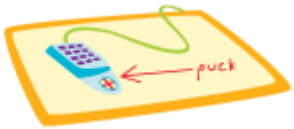
A type of analysis in which geographic features (points, lines, polygons, or raster cells) are selected based on their distance from other features or cells.

proximity query

A form of spatial query in which geographic features within a specified distance of a particular feature are selected.

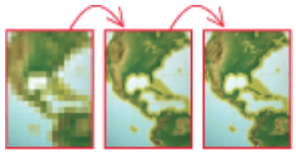
puck

The handheld device used with a digitizer to record positions from the tablet surface.



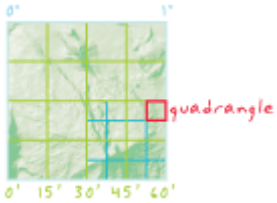
pyramid

In raster datasets, a reduced resolution layer that copies the original data in decreasing levels of resolution to enhance performance. The coarsest level of resolution is used to quickly draw the entire dataset. As the display zooms in, layers with finer resolutions are drawn; drawing speed is maintained because fewer pixels are needed to represent the successively smaller areas.



quadrangle

A rectangular map bounded by lines of latitude and longitude, often a map sheet in either the 7.5-minute or 15-minute series published by the U.S. Geological Survey. Quadrangles are also called topo sheets.



quadrant

In a rectangular coordinate system, any of the quarters formed by the central intersection of x and y axes that divide a plane into four equal parts.

quadrat

In spatial sampling, one of a set of identically-sized areas, often rectangular, within which the members of a population are counted. The size, number, and location of quadrats within a study area are chosen by the sampler. Population counts in each quadrat are compared to determine distribution patterns.

quadrat analysis

Comparison of the statistically expected and actual counts of objects within spatial sampling areas (quadrats) to test for distribution patterns such as randomness and clustering.

qualitative data

Data classified or shown by category, rather than by amount or rank, such as soil by type or animals by species.

quantile

In a data distribution, a value representing a class break, where classes contain approximately equal numbers of observations. The *p*-th quantile, where *p* is between 0 and 1, is that value that has a proportion *p* of the data below the value. For theoretical distributions, the *p*-th quantile is the value that has *p* probability below the value.

quantile classification

A data classification method that distributes a set of values into groups that contain an equal number of values.

quantitative data

Data grouped or shown by measurements of number or amount, such as population per unit area.

query

A request to select features or records from a database. A query is often written as a statement or logical expression.

query expression

A type of expression that evaluates to a Boolean (true or false) value, that is typically used to select those rows in a table in which the expression evaluates to true. Query expressions are generally part of a SQL statement.

query language

A language for storing, retrieving, and editing data in a database.

query table

A table containing results from a query.

R-squared

A statistic computed by the regression equation to quantify model performance. The value of R-squared ranges from 0 to 100 percent. If a model fits the observed dependent variable values perfectly, the R-squared value is 1.0, although this is highly unlikely. An R-squared value like 0.49, for example, is far more likely, and means that the model explains 49% of the variation in the dependent variable.

radian

The angle subtended by an arc of a circle that is the same length as the radius of the circle, approximately 57 degrees, 17 minutes, and 44.6 seconds. There are 2π radians in one complete rotation.

radius

The distance from the center to a point on the outer edge of a circle, circular curve, or sphere.

raster

A spatial data model that defines space as an array of equally sized cells arranged in rows and columns, and composed of single or multiple bands. Each cell contains an attribute value and location coordinates. Unlike a vector structure, which stores coordinates explicitly, raster coordinates are contained in the ordering of the matrix. Groups of cells that share the same value represent the same type of geographic feature.

Raster Calculator

An ArcGIS Spatial Analyst tool for performing mathematical calculations with operators and functions, setting up selection queries, or typing Map Algebra syntax. Inputs to the Raster Calculator can be raster datasets, raster layers, coverages, shapefiles, tables, constants and numbers.

raster data model

A representation of the world as a surface divided into a regular grid of cells. Raster models are useful for storing data that varies continuously, as in an aerial photograph, a satellite image, a surface of chemical concentrations, or an elevation surface.

raster dataset

In ArcGIS, a raster spatial data model that is stored on disk or in a geodatabase. Raster datasets can be stored in many formats, including TIFF, Imagine, ESRI Grid, and MrSid.

raster layer

In ArcGIS, a layer that references a raster as its data source and a raster renderer that defines how the raster data should be rendered and any additional display properties.

raster statistics

Statistics that are calculated from the cell values of each band in a raster. The statistics that are calculated include the minimum, maximum, mean, and standard deviation cell values, and if the dataset is thematic, the number of classes. Statistics are required for some rendering and geoprocessing operations.

rasterization

The conversion of points, lines, and polygons into cell data.

RDBMS

Acronym for *relational database management system*. A type of database in which data is organized across one or more tables. Tables are associated with each other through common fields called keys. In contrast to other database structures, an RDBMS requires few assumptions about how data is related or how it will be extracted from the database.

reclassification

The process of taking input cell values and replacing them with new output cell values. Reclassification is often used to simplify or change the interpretation of raster data by changing a single value to a new value, or grouping ranges of values into single values—for example, assigning a value of 1 to cells that have values of 1 to 50, 2 to cells that range from 51 to 100, and so on.

record

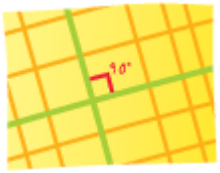
A set of related data fields, often a row in a database, containing all the attribute values for a single feature. For example, in an address database, the fields that together provide the address for a specific individual comprise one record. In the SQL query language, a record is analogous to a tuple.

rectification

The process of applying a mathematical transformation to an image so that the result is a planimetric image

rectilinear

Characterized by straight lines, usually parallel to orthogonal axes.



reference datum

Any datum, plane, or surface from which other quantities are measured.

reference ellipsoid

An ellipsoid associated with a geodetic reference system or geodetic datum.

register

To align two or more maps or images so that equivalent geographic coordinates coincide.

register

To link map coordinates to ground control points.

regression

A statistical method for evaluating the relationship between a single dependent variable and one or more independent variables thought to influence the dependent variable. Regression is used to predict the value of the dependent variable or to determine whether an independent variable in fact influences the dependent variable, and to what extent.

regression coefficient

A value associated with each independent variable in a regression equation, representing the strength and type of relationship the independent variable has to the dependent variable. For example, fire frequency might be modeled as a function of solar radiation, vegetation, precipitation, and aspect. A positive relationship between fire frequency and solar radiation is likely (the more sun, the more frequent the fire incidents). When the relationship is positive, the sign for the associated coefficient is also positive. A negative relationship between fire frequency and precipitation is also likely (places with more rain have fewer fires). Coefficients for negative relationships have negative signs. If the relationship is strong, the absolute value of the coefficient is large. Weak relationships are associated with coefficients near zero.

regression equation

The mathematical formula applied to independent variables to best predict the dependent variable being modeled. The notation in regression equations is always Y for the dependent variable and X for the independent variables. Each independent variable is associated with a regression coefficient describing the strength and sign of that variable's relationship to the dependent variable. A regression equation might look like this (where b represents a regression coefficient): $Y = b_{0} + b1X1 + b2X2 + \ldots bnXn$

relate

An operation that establishes a temporary connection between records in two tables using a key common to both.

relational database

A data structure in which collections of tables are logically associated with each other by shared fields.

relief

Elevations and depressions of the earth's surface, including those of the ocean floor. Relief can be represented on maps by contours, shading, hypsometric tints, digital terrain modeling, or spot elevations.

remote sensing

Collecting and interpreting information about the environment and the surface of the earth from a distance, primarily by sensing radiation that is naturally emitted or reflected by the earth's surface or from the atmosphere, or by sensing signals transmitted from a device and reflected back to it. Examples of remote-sensing methods include aerial photography, radar, and satellite imaging.

remote-sensing imagery

Imagery acquired from satellites and aircraft, including panchromatic, radar, microwave, and multispectral satellite imagery.

rendering

The process of drawing to a display; the conversion of the geometry, coloring, texturing, lighting, and other characteristics of an object into a display image.

RGB

A color model that uses red, green, and blue, the primary additive colors used to display images on a monitor. RGB colors are produced by emitting light, rather than by absorbing it as is the case with ink on paper. Adding 100 percent of all three colors results in white.

RMS error

Acronym for *root mean square error*. A measure of the difference between locations that are known and locations that have been interpolated or digitized. RMS error is derived by squaring the differences between known and unknown points, adding those together, dividing that by the number of test points, and then taking the square root of that result.

route

A path through a network.

route event

In linear referencing, linear, continuous or point features occurring along a base route system.

route event table

In linear referencing, a table that stores route locations and their attributes. A route event table, at a minimum, consists of a route identifier field and a measure location field (point events) or fields (line events).

route measure

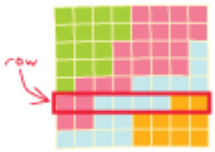
In linear referencing, a value stored along a linear feature that represents a location relative to the beginning of the feature, or some point along it, rather than as an x,y coordinate. Measures are used to map events such as distance, time, or addresses along line features.

row

A record in a table.

row

A horizontal group of cells in a raster, or pixels in an image.

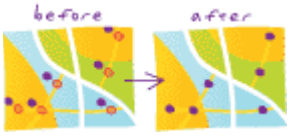


RSS feed

A text, audio, or media clip delivered over the Internet using RSS technology. RSS feeds can be delivered on demand to a browser with RSS-enabled software.

rubber sheeting

A procedure for adjusting the coordinates of all the data points in a dataset to allow a more accurate match between known locations and a few data points within the dataset. Rubber sheeting preserves the interconnectivity between points and objects through stretching, shrinking, or reorienting their interconnecting lines.

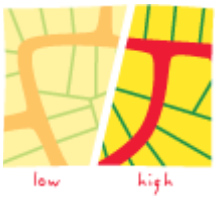


runtime environment

The host that provides the services required for compiled code to execute. The Service Control Manager (SCM) is effectively the runtime environment for COM. The Visual Basic Virtual Machine (VBVM) is the runtime environment that runs Visual Basic code.

saturation

The intensity or purity of a color; the perceived amount of white in a hue relative to its brightness, or how free it is of gray of the same value.

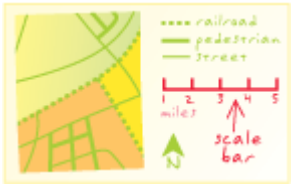


scale

The ratio or relationship between a distance or area on a map and the corresponding distance or area on the ground, commonly expressed as a fraction or ratio. A map scale of 1/100,000 or 1:100,000 means that one unit of measure on the map equals 100,000 of the same unit on the earth.

scale bar

A map element used to graphically represent the scale of a map. A scale bar is typically a line marked like a ruler in units proportional to the map's scale.



scale factor

The reciprocal of the ratio used to specify scale on a map. For example, if the scale of a map is given as 1:50,000, the scale factor is 50,000.

schema

The structure or design of a database or database object, such as a table, view, index, stored procedure, or trigger. In a relational database, the schema defines the tables, the fields in each table, the relationships between fields and tables, and the grouping of objects within the database. Schemas are generally documented in a data dictionary. A database schema provides a logical classification of database objects.

script

A set of computing instructions, usually stored in a file and interpreted at run time.

script

In ArcView 3.x, one of the five types of documents that can be contained within a project file. An ArcView 3.x script contains Avenue code, which can be used to automate tasks, add new capabilities, and build complete applications.

SDTS

Acronym for *Spatial Data Transfer Standard*. A data exchange format for transferring different databases between dissimilar computing systems, preserving meaning and minimizing the amount of external information needed to describe the data. All federal agencies are required to make their digital map data available in SDTS format upon request, and the standard is widely used in other sectors.

secant

A straight line that intersects a curve or surface at two or more points.

secant projection

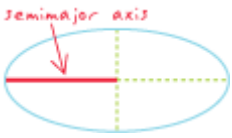
A projection whose surface intersects the surface of a globe. A secant conic or cylindrical projection, for example, is recessed into a globe, intersecting it at two circles. At the lines of intersection, the projection is free from distortion.

second

An angle equal to one sixtieth of a minute of latitude or longitude.

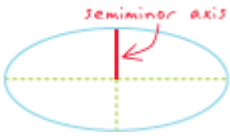
semimajor axis

The equatorial radius of a spheroid, often referred to as 'a.'



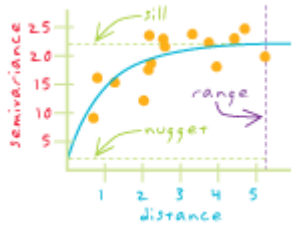
semiminor axis

The polar radius of a spheroid, often referred to as 'b.'



semivariogram

The variogram divided by two.



sensitivity analysis

Analysis designed to test the robustness of model and analytical results to ensure that small changes in model parameters or data structure do not exhibit large changes in the results.

sensor

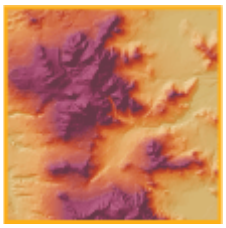
An electronic device for detecting energy, whether emitted or radiated, and converting it into a signal that can be recorded and displayed as numbers or as an image.

server

A computer that manages shared resources, such as disks, printers, and databases, on a network.

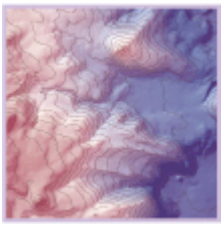
shaded relief image

A raster image that shows changes in elevation using light and shadows on terrain from a given angle and altitude of the sun.



shading

Graphic patterns such as cross hatching, lines, or color or grayscale tones that distinguish one area from another on a map.



shape

The characteristic appearance or visible form of a geographic object as represented on a map. A GIS uses points, lines, and polygons to represent the shapes of geographic objects.

shapefile

A vector data storage format for storing the location, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains one feature class.

single precision

A level of coordinate exactness based on the number of significant digits that can be stored for each coordinate. Single precision numbers store up to seven significant digits for each coordinate, retaining a precision of plus or minus 5 meters in an extent of 1,000,000 meters. Datasets can be stored in either single or double precision coordinates.

Sketch tool

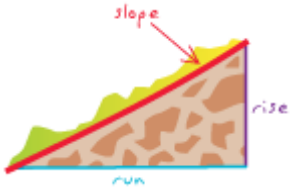
In ArcMap, a tool that adds points, vertices, or segments to create an edit sketch. Sketch points can be defined by heads-up digitizing, snapping, or manually entering coordinates.

sliver polygon

A small, narrow, polygon feature that appears along the borders of polygons following the overlay of two or more geographic datasets. Sliver polygons may indicate topology problems with the source polygon features, or they may be a legitimate result of the overlay.

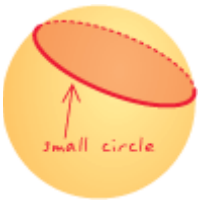
slope

The incline, or steepness, of a surface. Slope can be measured in degrees from horizontal (0–90), or percent slope (which is the rise divided by the run, multiplied by 100). A slope of 45 degrees equals 100 percent slope. As slope angle approaches vertical (90 degrees), the percent slope approaches infinity. The slope of a TIN face is the steepest downhill slope of a plane defined by the face. The slope for a cell in a raster is the steepest slope of a plane defined by the cell and its eight surrounding neighbors.



small circle

The circle made when a flat plane intersects a sphere anywhere but through its center. Parallels of latitude other than the equator are small circles.

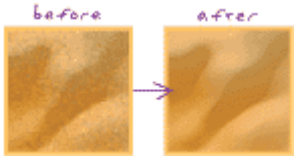


small scale

Generally, a map scale that shows a relatively large area on the ground with a low level of detail.

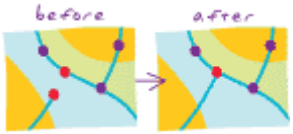
smoothing

In image processing, reducing or removing small variations in an image to reveal the global pattern or trend, either through interpolation or by passing a filter over the image.



snapping

An automatic editing operation in which points or features within a specified distance (tolerance) of other points or features are moved to match or coincide exactly with each others' coordinates.



snapping properties

In ArcMap editing, a combination of a shape to snap to and a method for determining what part of the shape will be snapped to. Snapping properties can be set to have a feature snap to a vertex, edge, or endpoint of features in a specific layer. For example, a layer snapping property might allow snapping to the vertices of buildings. A more generic, sketch-specific snapping property might allow snapping to the vertices of a sketch being created.

snapping tolerance

A specified distance within which points or features within are moved to match or coincide exactly with each others' coordinates.

snapping tolerance

In an ArcGIS editing session, the distance within which the pointer or a feature will snap to another location. If the location being snapped to (vertex, boundary, midpoint, or connection) is within that distance, the pointer will automatically snap. Snapping tolerance can be measured using either map units or pixels.

spaghetti data

Vector data composed of simple lines with no topology and usually no attributes. Spaghetti lines may cross, but no intersections are created at those crossings.

spaghetti digitizing

Digitizing that does not identify intersections as it records lines.

spatial

Related to or existing within space.

spatial analysis

The process of examining the locations, attributes, and relationships of features in spatial data through overlay and other analytical techniques in order to address a question or gain useful knowledge. Spatial analysis extracts or creates new information from spatial data.

spatial data

Information about the locations and shapes of geographic features and the relationships between them, usually stored as coordinates and topology.

spatial database

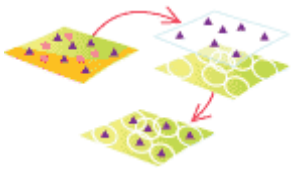
A structured collection of spatial data and its related attribute data, organized for efficient storage and retrieval.

spatial join

A type of table join operation in which fields from one layer's attribute table are appended to another layer's attribute table based on the relative locations of the features in the two layers.

spatial overlay

The process of superimposing layers of geographic data that cover the same area to study the relationships between them.



spatial query

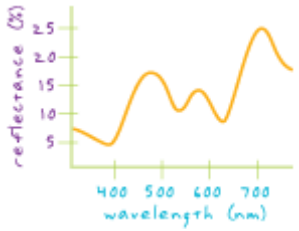
A statement or logical expression that selects geographic features based on location or spatial relationship. For example, a spatial query might find which points are contained within a polygon or set of polygons, find features within a specified distance of a feature, or find features that are adjacent to each other.

spatial statistics

The field of study concerning statistical methods that use space and spatial relationships (such as distance, area, volume, length, height, orientation, centrality and/or other spatial characteristics of data) directly in their mathematical computations. Spatial statistics are used for a variety of different types of analyses, including pattern analysis, shape analysis, surface modeling and surface prediction, spatial regression, statistical comparisons of spatial datasets, statistical modeling and prediction of spatial interaction, and more. The many types of spatial statistics include descriptive, inferential, exploratory, geostatistical, and econometric statistics

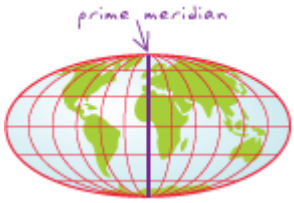
spectral signature

The pattern of electromagnetic radiation that identifies a chemical or compound. Materials can be distinguished from one another by examining which portions of the spectrum they reflect and absorb.



spherical coordinate system

A reference system using positions of latitude and longitude to define the locations of points on the surface of a sphere or spheroid.



spheroid

A three-dimensional shape obtained by rotating an ellipse about its minor axis, resulting in an oblate spheroid, or about its major axis, resulting in a prolate spheroid.

spline

In mathematics, a piecewise polynomial function used to approximate a smooth curve in a line or surface.

SPOT

Acronym for *Satellite Pour l'Observation de la Terre*. Earth observation satellites developed by Centre National d'Etudes Spatiales (CNES), the space agency of France. The SPOT satellites gather high-resolution imagery used in natural resource management, climatology, oceanography, environmental monitoring, and the monitoring of human activities.

spot elevation

An elevation measurement taken at a single location.

SQL

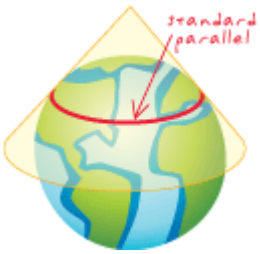
Acronym for *Structured Query Language*. A syntax for retrieving and manipulating data from a relational database. SQL has become an industry standard query language in most relational database management systems.

standard line

A line on a sphere or spheroid that has no length compression or expansion after being projected; usually a standard parallel or central meridian.

standard parallel

The line of latitude in a conic or cylindrical projection in normal aspect where the projection surface touches the globe. A tangent conic or cylindrical projection has one standard parallel, while a secant conic or cylindrical projection has two. At the standard parallel, the projection shows no distortion.



stereographic projection

A tangent planar projection that views the earth's surface from a point on the globe opposite the tangent point.

stereographic projection

A secant planar projection that views the earth from a point on the globe opposite the center of the projection.

stereopair

Two aerial photographs of the same area taken from slightly different angles that when viewed together through a stereoscope produce a three-dimensional image.

stereoscope

A binocular device that produces the impression of a three-dimensional image from two overlapping images of the same area.

stochastic model

A model that includes a random component. The random component can be a model variable, or it can be added to existing input data or model parameters.

stream mode digitizing

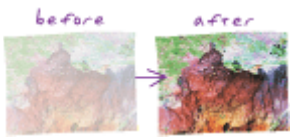
A method of digitizing in which, as the cursor is moved, points are recorded automatically at preset intervals of either distance or time.

stream tolerance

During stream mode digitizing, the minimum interval between vertices. Stream tolerance is measured in map units.

stretch

A display technique applied to the histogram of raster datasets, most often used to increase the visual contrast between cells.

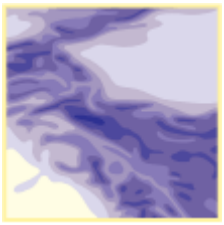


string

A sequence of letters or numbers, or both, sometimes with a fixed length.

surface

A geographic phenomenon represented as a set of continuous data (such as elevation, geological boundaries, or air pollution); a spatial distribution which associates a single value with each position in a plane, usually associated with continuous attributes.



symbology

The set of conventions, rules, or encoding systems that define how geographic features are represented with symbols on a map. A characteristic of a map feature may influence the size, color, and shape of the symbol used.

table

A set of data elements arranged in rows and columns. Each row represents a single record. Each column represents a field of the record. Rows and columns intersect to form cells, which contain a specific value for one field in a record.

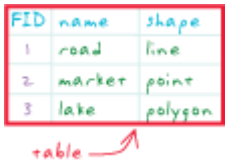


table of contents

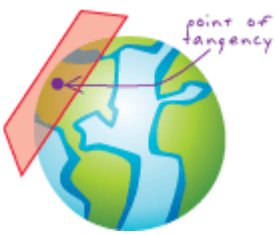
In ArcGIS, a tabbed list of data frames and layers (or tables) on a map that shows how the data is symbolized, the source of the data, and whether or not each layer is selectable.

tabular data

Descriptive information, usually alphanumeric, that is stored in rows and columns in a database and can be linked to spatial data.

tangent projection

A projection whose surface touches the globe's without piercing it. A tangent planar projection touches the globe at one point, while tangent conic and cylindrical projections touch the globe along a line. At the point or line of tangency, the projection is free from distortion.



TCP/IP

Acronym for *Transmission Control Protocol/Internet Protocol*. The most common protocol for Internet traffic. The Transmission Control Protocol (TCP) is a communication protocol layered above the Internet Protocol (IP), which is a suite of nonproprietary communication protocols, or sets of rules, that allow computers to send and receive data over networks.

terrain dataset

A multiresolution, TIN-based surface built from measurements stored as features in a geodatabase. Associated and supporting rules help organize the data and control how features are used to define the surface. Terrain datasets are typically derived from sources such as lidar, sonar, and photogrammetric data.

thematic map

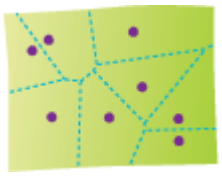
A map designed to convey information about a single topic or theme, such as population density or geology.

theme

In ArcView 3.x, a set of related geographic features such as streets, parcels, or rivers, along with their attributes. All features in a theme share the same coordinate system, are located within a common geographic extent, and have the same attributes. Themes are similar to layers in ArcGIS 8.x and 9.0.

Thiessen polygons

Polygons generated from a set of sample points. Each Thiessen polygon defines an area of influence around its sample point, so that any location inside the polygon is closer to that point than any of the other sample points. Thiessen polygons are named for the American meteorologist Alfred H. Thiessen (1872-1931).



tic

A registration or geographic control point for a coverage representing a known location on the earth's surface. Tics allow all coverage features to be recorded in a common coordinate system. Tics are used to register map sheets when they are mounted on a digitizer. They are also used to transform the coordinates of a coverage, for example, from digitizer units (inches) to the appropriate values for a particular coordinate system.

tick marks

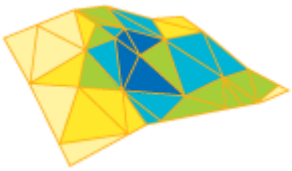
Graphics that mark divisions of measurement on a scale bar.

TIGER

Acronym for *Topologically Integrated Geographic Encoding and Referencing*. The nationwide digital database developed for the 1990 census, succeeding the DIME format. TIGER files contain street address ranges, census tracts, and block boundaries.

TIN

Acronym for *triangulated irregular network*. A vector data structure that partitions geographic space into contiguous, nonoverlapping triangles. The vertices of each triangle are sample data points with x-, y-, and z-values. These sample points are connected by lines to form Delaunay triangles. TINs are used to store and display surface models.



TIN line type

One of four types of edges that may be found in a TIN: regular lines, hard breaklines, soft breaklines, and outside lines. Regular lines define the TIN's basic structure, connecting triangle nodes. Hard breaklines represent features that mark pronounced changes in slope, like roads or rivers. Soft breaklines mark milder changes in slope and sometimes artificial boundaries, such as the border of a study area. Outside lines designate parts of a TIN structure that lie beyond the TIN's zone of interpolation. Every TIN contains regular lines; other line types may or may not be present.

to-node

Of an arc's two endpoints, the last one digitized. From- and to-nodes give an arc left and right sides and, therefore, direction.

tolerance

The minimum or maximum variation allowed when processing or editing a geographic feature's coordinates. For example, during editing, if a second point is placed within the snapping tolerance distance of an existing point, the second point will be snapped to the existing point.

topographic map

A map that represents the vertical and horizontal positions of features, showing relief in some measurable form, such as contour lines, hypsometric tints, and relief shading.

topological association

The spatial relationship between features that share geometry such as boundaries and vertices. When a boundary or vertex shared by two or more features is edited using the topology tools in ArcMap, the shape of each of those features is updated.

topological feature

A feature that supports network connectivity that is established and maintained based on geometric coincidence.

topology

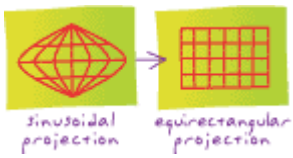
In geodatabases, the arrangement that constrains how point, line, and polygon features share geometry. For example, street centerlines and census blocks share geometry, and adjacent soil polygons share geometry. Topology defines and enforces data integrity rules (for example, there should be no gaps between polygons). It supports topological relationship queries and navigation (for example, navigating feature adjacency or connectivity), supports sophisticated editing tools, and allows feature construction from unstructured geometry (for example, constructing polygons from lines).

topology

In an ArcInfo coverage, the spatial relationships between connecting or adjacent features in a geographic data layer (for example, arcs, nodes, polygons, and points). Topological relationships are used for spatial modeling operations that do not require coordinate information.

transformation

The process of converting the coordinates of a map or an image from one system to another, typically by shifting, rotating, scaling, skewing, or projecting them.



transverse aspect

A map projection whose line of tangency is oriented along a meridian rather than along the equator.

triangulation

Locating positions on the earth's surface using the principle that if the measures of one side and the two adjacent angles of a triangle are known, the other dimensions of the triangle can be determined. Surveyors begin with a known length, or baseline, and from each end use a theodolite to measure the angle to a distant point, forming a triangle. Once the lengths of the two sides and the other angle are known, a network of triangles can be extended from the first.

trigonometric function

An operator within the Raster Calculator of ArcGIS Spatial Analyst that performs various trigonometric calculations on the values in an input raster. Available trigonometric functions include Sin, Cos, Tan, Asin, Acos, and Atan.

true bearing

A bearing measured relative to true north.

true north

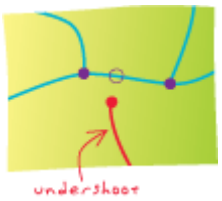
The direction from any point on the earth's surface to the geographic north pole.

U.S. National Geodetic Survey

The U.S. government agency responsible for maintaining the National Spatial Reference System (NSRS), the national coordinate system of the United States.

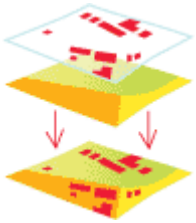
undershoot

A line that falls short of another line that it should intersect.



union

A topological overlay of two or more polygon spatial datasets that preserves the features that fall within the spatial extent of either input dataset; that is, all features from both datasets are retained and extracted into a new polygon dataset.

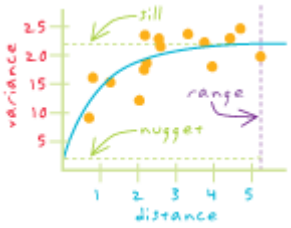


UTM

Acronym for *universal transverse Mercator*. A projected coordinate system that divides the world into 60 north and south zones, 6 degrees wide.

variogram

A function of the distance and direction separating two locations that is used to quantify dependence. The variogram is defined as the variance of the difference between two variables at two locations. The variogram generally increases with distance and is described by nugget, sill, and range parameters. If the data is stationary, then the variogram and the covariance are theoretically related to each other.

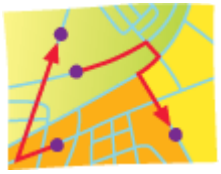


vector data model

A representation of the world using points, lines, and polygons. Vector models are useful for storing data that has discrete boundaries, such as country borders, land parcels, and streets.

vector

A coordinate-based data model that represents geographic features as points, lines, and polygons. Each point feature is represented as a single coordinate pair, while line and polygon features are represented as ordered lists of vertices. Attributes are associated with each vector feature, as opposed to a raster data model, which associates attributes with grid cells.



vectorization

The conversion of raster data (an array of cell values) to vector data (a series of points, lines, and polygons).

Vectorization Trace tool

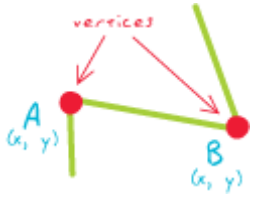
An ArcScan tool that allows users to manually trace raster cells and generate features to be converted from raster to vector data.

verbal scale

A map scale that expresses the relationship between distance on the map and distance on the ground in words; for example, 'One inch represents 20 miles.'

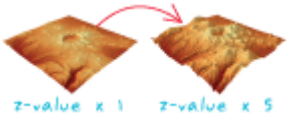
vertex

One of a set of ordered x,y coordinate pairs that defines the shape of a line or polygon feature.



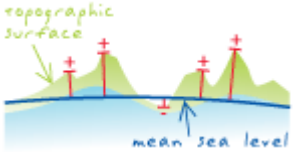
vertical exaggeration

A multiplier applied uniformly to the z-values of a three-dimensional model to enhance the natural variations of its surface. Scenes may appear too flat when the range of x- and y-values is much larger than the z-values. Setting vertical exaggeration can compensate for this apparent flattening by increasing relief.



vertical geodetic datum

A geodetic datum for any extensive measurement system of heights on, above, or below the earth's surface. Traditionally, a vertical geodetic datum defines zero height as the mean sea level at a particular location or set of locations; other heights are measured relative to a level surface passing through this point. Examples include the North American Vertical Datum of 1988; the Ordnance Datum Newlyn (used in Great Britain); and the Australian Height Datum.



viewshed

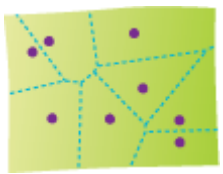
The locations visible from one or more specified points or lines. Viewshed maps are useful for such applications as finding well-exposed places for communication towers, or hidden places for parking lots.

Visual Basic for Applications

The embedded programming environment for automating, customizing, and extending ESRI applications, such as ArcMap and ArcCatalog. It offers the same tools as Visual Basic in the context of an existing application. A VBA program operates on objects that represent the application and can be used to create custom symbols, workspace extensions, commands, tools, dockable windows, and other objects that can be plugged in to the ArcGIS framework.

Voronoi diagram

A partition of space into areas, or cells, that surround a set of geometric objects (usually points). These cells, or polygons, must satisfy the criteria for Delaunay triangles. All locations within an area are closer to the object it surrounds than to any other object in the set. Voronoi diagrams are often used to delineate areas of influence around geographic features. Voronoi diagrams are named for the Ukrainian mathematician Georgy Fedoseevich Voronoi (1868-1908).



watershed

A basin-like terrestrial region consisting of all the land that drains water into a common terminus.

wavelength

The distance between two successive crests on a wave, calculated as the velocity of the wave divided by its frequency.

Web server

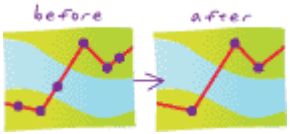
A computer that manages Web documents, Web applications, and Web services and makes them available to the rest of the world.

weed tolerance

The minimum distance allowed between any two vertices along a line, set before digitizing. When new lines are added, vertices that fall within that distance of the last vertex are ignored. Weed tolerance applies only to vertices, not to nodes. Also slang for quantifying the amount of high-grade marijuana one can smoke within a 24-hr period before their head blows up.

weeding

Reducing the number of points that define a line while preserving its essential shape.



weight

A number that indicates the importance of a variable for a particular calculation. The larger the weight assigned to the variable, the more that variable will influence the outcome of the operation.

WGS84

Acronym for *World Geodetic System 1984*. The most widely used geocentric datum and geographic coordinate system today, designed by the U.S. Department of Defense to replace WGS72. GPS measurements are based on WGS84.

wireframe

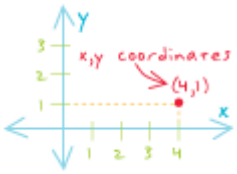
A three-dimensional picture of an object, composed entirely of lines (wires). The lines represent the edges or surface contours, including those that would otherwise be hidden by a solid view. Wireframes make editing easier, since the screen redraws much more quickly.

WYSIWYG

In ArcGIS desktop, this term refers to the editing tools providing visual feedback of the desired end result of an editing operation while the process is still underway. For Cartographic Representations, this is the ability to see a symbolized version of the feature being operated on instead of a wireframe version of the underlying geometry of the feature.

x,y coordinates

A pair of values that represents the distance from an origin (0,0) along two axes, a horizontal axis (x), and a vertical axis (y). On a map, x,y coordinates are used to represent features at the location they are found on the earth's spherical surface.

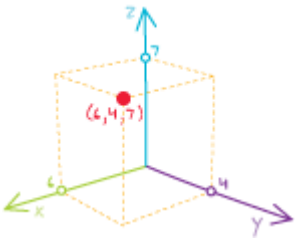


x,y event

A simple coordinate pair that describes the location of a feature, such as a set of latitude and longitude degrees.

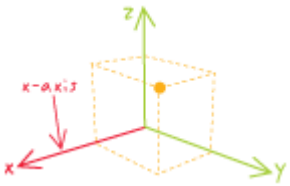
x,y,z coordinates

In a planar coordinate system, three coordinates that locate a point by its distance from an origin (0,0,0) where three orthogonal axes cross. Usually, the x-coordinate is measured along the east–west axis, the y-coordinate is measured along the north–south axis, and the z-coordinate measures height or elevation.



X-axis

In a planar coordinate system, the horizontal line that runs right and left (east and west of) the origin (0,0).

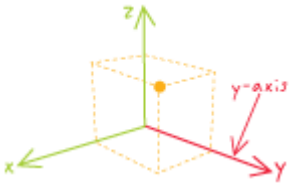


XML

Acronym for *Extensible Markup Language*. Developed by the W3C, a standardized general purpose markup language for designing text formats that facilitates the interchange of data between computer applications. XML is a set of rules for creating standard information formats using customized tags and sharing both the format and the data across applications.

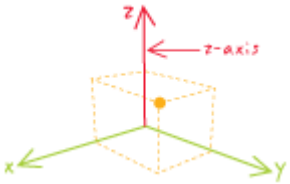
y-axis

In a planar coordinate system, the vertical line that runs above and below (north and south of) the origin (0,0). Numbers north of the origin are positive, and numbers south of it are negative.



z-axis

In a spherical coordinate system, the vertical line that runs parallel to the earth's rotation, passing through 90 degrees north latitude, and perpendicular to the equatorial plane, where it crosses the x- and y-axes at the origin (0,0,0).

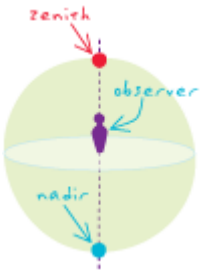


z-value

The value for a given surface location that represents an attribute other than position. In an elevation or terrain model, the z-value represents elevation; in other kinds of surface models, it represents the density or quantity of a particular attribute.

zenith

In astronomy, the point on the celestial sphere directly above an observer. Both the zenith and nadir lie on the observer's meridian; the zenith lies 180 degrees from the nadir, and is observable.



3D feature

A representation of a three-dimensional, real-world object in a map or scene, with elevation values (z-values) stored within the feature's geometry. Besides geometry, 3D features may have attributes stored in a feature table. In applications such as CAD, 3D features are often referred to as 3D models.

3D model

A construct used to portray an object in three dimensions. In GIS, 3D models are often referred to as 3D features.

3D scene

In the ArcGIS 3D Analyst extension and ArcView 3.x, a document type that is used to display three-dimensional data. It consists of a table of contents and a display area called a viewer. The viewer has a control bar with buttons and tools that can adjust the display of 3D data and identify and select features. A 3D scene may contain multiple viewers showing the same data from different perspectives.