

The impacts of Big Data on Society

Trevor Moore

Western Oregon University

Introduction:

Over the past several years we have seen the rise of a new information resource. One that has the potential to greatly impact our medical system, our education system and even the way that sport franchises choose who they want on their teams. This new information resource is big data. Big data is a collection of data from traditional and digital sources inside and outside your company that represents a source for ongoing discovery and analysis (Arthur, 2013). Companies use the information of what someone purchased and when in order to send that customer a customized list of other items that the person might also want to purchase. For example, if someone routinely purchases diapers and baby food every two weeks, stores can send them special offers on those items every two weeks as well as special offers on other related items like baby wipes and baby clothes. This increases the likelihood that the person will shop at their store. Big data can be used in almost any profession and it will positively impact our society and change the way that our society functions.

The focus of this essay is to show that when big data is used appropriately, it can impact various aspects of society in a positive way. In order to show how big data can impact a variety of aspects of society, this essay looks at how big data has impacted the medical field, professional sports, and education. Throughout this essay, the ideas of leading advocates of big data will be discussed to support the claim that big data will have a positive impact on society. These leading advocates are: Mayer-Schonberger & Cukier, 2013; Guthrie, 2013; Ranadive, 2014; Bustamante, Butte, Ashley & Hallmayer, 2013. In an attempt to refute this claim the ideas of leading critics of big data will be addressed. The leading critics that are discussed are: Assange, Applebaum, Mueller-Maguhn & Zimmerman, 2012; Lu, 2013; Snowden, 2013.

During the past several years, a debate has emerged about whether big data is having positive impacts on our society, or if it is detrimental to the way our society functions. It is the belief of some that big data is a great asset and that it will positively impact our society (Mayer-Schonberger & Cukier, 2013; Guthrie, 2013; Ranadive, 2014; Bustamante, Butte, Ashley & Hallmayer, 2013). When medical companies use the data correctly they are able to determine which prescriptions will work for a specific person and which will be more likely to cause the person to have negative side effects (Bustamante, Butte, Ashley & Hallmayer, 2013). The government would be able to harness vast amounts of data in order to determine where a disease outbreak is most likely to occur (Mayer-Schonberger & Cukier, 2013). They would then be able to supply that specific area with vaccinations for the disease so that it is less fatal as well as preventing it from spreading to surrounding areas. Sport teams would be able to collect large amounts of data on all of the players in their league in order to determine which players are most likely to perform the best so that they can target them and try to get to play for their team (Ranadive, 2014). Big data would provide teachers with the ability to personalize their lessons and activities for each individual student. Schools would be able to use big data in order to pinpoint which students are underachieving and who are at risk of dropping out (Guthrie, 2013). The schools would then be able to provide those students with extra support so that they begin performing at a higher level and so that they reduce the risk that they will drop out.

On the other side of the argument there are people like: Julian Assange, Edward Snowden and Adrienne Lu who believe that big data is not going to positively impact our society. They believe that big data will be extremely detrimental to people by taking away their privacy. With big data companies have the potential to possess every piece of personal

information on any person that visits their stores or shops on their websites. Governments can collect credit card data on every citizen that has a credit card in order to track what items they bought, where they bought the items and from whom they bought the items from. This would allow government to keep tabs on everybody at all times. They would be able to know exactly where a specific person is at any given time. Governments also have the ability to use big data in another way that strips their citizens of their privacy. Big data allows them to gather all of the telephone records of every person in the country in order to find out who they talked to, when they talked to them, how long they talked and how frequently they talked. It is the belief of Edward Snowden (2013) that if the government is gathering phone records then they are most likely listening to people's phone conversations as well. Many critics including Lu (2013) believe that big data will be very detrimental if it is used in the education system. They believe that by collecting the personal data of all of their students will put their student's private information at risk. If student data was accessed by people who meant to use it in inappropriate ways, the students would be at a greater risk of becoming victims of sexual predators. Also if a teacher saw that a student had a history of being a problem student, they may treat the student differently without ever having the student cause a problem in their class.

Advocates of Big Data:

One of the main arguments that advocates of big data have is that it can greatly impact the medical system and help some people from becoming very ill and even prevent deaths. Bustamante, Butte, Ashley and Hallmayer (2013) discuss how at Stanford University Medicine, they are studying large amounts of genome data in order to help heal people. They are attempting to figure out how to look at an individual's genomes and determine which

prescription drug will work best for that person Bustamante, Butte, Ashley and Hallmayer (2013). If there are two medications that a doctor could prescribe to a patient and they find that after looking at the patient's genomes that one of the medications will likely make them sick, they will be able to prescribe the other medication to the patient. This indicates that if this were to occur, it would take the guessing game out of the medical system. No longer would doctors have to make an educated guess as to which medication they should prescribe to their patients. They would be able to look at an individual's genomes and compare them to other people's genomes in order to determine which prescription will likely work best for that specific person. By comparing a patient's genomes with other people with similar genomes will allow doctors to select medications that will most likely work which will reduce the amount of people that have negative reactions to their medications. It will also reduce the amount of people who end up dying because they have a severe negative reaction to a medication that they are taking.

Another way that big data can be used to prevent people from becoming ill or dying is by collecting data from the internet in order to determine where a disease outbreak is likely to occur. Mayer-Schonberger and Cukier (2013) discuss how Google collects and stores all of the search terms that people search on their website. Google is able to determine where a disease outbreak is likely to occur based on what people in a certain region search for. For example, if large amounts of people in the Salem, Oregon, were searching terms like: medicine for cough and fever, Google would be able to determine that it is likely that there is a flu outbreak in the Salem, Oregon, area. By gathering and analyzing this data, the government would be able to determine where an outbreak is likely to occur and set precautions in place before it becomes

an epidemic. They would be able to put out service announcements that would inform the people of that area on how to prevent the spread of the illness. The government would also be able to supply that area with the vaccinations that would help prevent uninfected people from getting sick as well as ones that would help people who are sick get better. By knowing this information before the illness becomes a major issue, the government would be able to prevent large amounts of people of getting sick, they would prevent the spread of the illness and they would prevent a majority of deaths that are caused by the illness.

Advocates of big data also argue that it has the potential of greatly impacting professional sports. They believe that in the future, franchises will collect and analyze every piece of relevant data on every single player in their league in order to put together the best possible team. Mayer-Schonberger and Cukier (2013) discuss what is being done in the Oakland Athletics organization. They explain how Billy Beane, the general manager of the Oakland A's threw out the traditional way of analyzing and valuing a player and implemented a math-infused method that looks at the game in a different way. They describe how Billy Beane uses analytics to determine which players are going to be the best fit for his baseball team (Mayer-Schonberger and Cukier, 2013). Rather than looking at traditional statistics like batting average and home runs, he looks at statistics like how many runs they score, and what their on-base percentage is. By looking at players in a different way, Billy Beane was able to find players who were undervalued by every other team because they weren't great in the traditional sense. Because of this, he was able to put together a winning team that was made up of players that no other team wanted and he was able to do it with his team's very small budget.

After seeing the success that Billy Beane had in Oakland with using big data to evaluate players, another professional sports franchise in California began using big data to put together the best team that they could. Ranadive (2014) who is the majority owner of the Sacramento Kings explains, in an interview he did with Bloomberg TV, how he uses big data in all aspects of his franchise. Like Billy Beane, Ranadive (2014) uses analytics to determine what combination of players is most likely to perform well. He analyzes the skills of the players to determine how the players rank against each other, but he also determines what type of player each player is in order to select players who are likely to work well together. After he has put his team together he uses big data to help his players maximize their productivity. He is able to break down their skills and statistics to show them where they should be shooting from to be most successful. Ranadive also uses big data to analyze the other teams in the league in order to provide his team with information that will help them know what will be most effective in defending the other teams. Not only does Ranadive (2014) use big data to maximize his team's potential, he also uses it to maximize his team's profits. He is able to look at the data and determine who is buying tickets and who is buying merchandise. He then uses the data to determine when is the best time to make those people and offer on the items and in what form should those offers be made. By determining when to make special offers to his target audience, he is increasing the likelihood that more people will attend games and purchase merchandise, which helps support the economy.

Another argument that advocates of big data make is that big data has the potential of greatly impacting the educational system. Guthrie (2013) explains that with big data teachers now have the ability to gather and analyze data on every one of their students and be able to

create specific curriculum that will be customized to fit each individual's needs and ability levels. By customizing the curriculum for each individual student, the success rates of each student will likely increase. Instead of creating a general lesson that only targets the average ability students, the teacher would be able to simplify some of the materials so that the lower ability students would be successful and they would expand the material so that the high achieving students are challenged and continue to learn. This would reduce the amount of frustration among the lower achieving students and limit the risk of having students give up because the work is too challenging. It would also reduce the amount of high achieving students becoming bored during class because the material is not challenging them enough.

Guthrie (2013) also explains how big data has the potential of being very beneficial for schools to use to pinpoint the students who are underachieving and who are at risk of dropping out of school. If schools gathered information on all of their students and analyzed them in the correct ways, they would be able to determine which students who are below average. The schools would then be able to set up interventions for these students. These interventions would provide them with the extra support that they need in order to catch up with their classmates and begin performing on grade level. Schools would also be able to pinpoint which students are at risk of dropping out of school. Big data would allow them to target these students early enough so that they could try to help these students work through whatever these students may be having in school so that they are able to continue school and eventually graduate. Another example of how school systems use big data is through state testing. Test scores are used to determine which schools will continue to receive state and federal funding, which teachers and administrators will receive bonus payments, which schools will be closed,

which teachers will be fired and which students need to be prevented from moving on to the next grade.

Critics of Big Data:

Although there are many people believe that big data will greatly impact society in many ways, there are also many people who believe the opposite. Critics of big data believe that it will actually be detrimental to everyone in our society. With every piece of everybody's personal information being collected and stored, people will have no way of keeping any of their information private. Assange (2012) explains in *Cypherpunks: Freedom and the future of the internet*, how the government is taking away the privacy of every person who has and uses a credit card in the country. Every time a person uses their credit card the government collects and stores all of the information that is related to the purchase. By collecting this information, the government now knows what any person has bought, when they made the purchase, where they made the purchase and who they bought the item from. This information also allows the government to track all of their citizens. They are able to pinpoint exactly where a person was at a specific time by looking at where they were making purchases. This is potentially problematic for people. For example, if you purchase a car from someone who is known for being involved in illegal activities, the government may assume that you are involved in illegal activities as well, even if you are not.

Another way critics of big data feel that the government is taking away the privacy of its citizens is by gathering their phone records. In 2013 Edward Snowden leaked classified government documents that revealed details about global surveillance programs that were run by the NSA. Of those documents were ones that revealed that the U.S. government had been

collecting the phone records of the country's citizens. This information allowed the government to be able to track many things about any citizen that they want. The information that Snowden (2013) leaked showed that the government is able to see who that person talked to on the phone, how long they talked to them, when they talked to them, how frequently they talked to that person and where they were when they talked to that person. This information indicates that the government is able to see who specific people are associated with, which could lead them to predict what type of person they are based on who they talk to on the phone. By gathering this information also allows the government to track where people are at any given time. They would be able to look at when and where a person was when they used their phone which means that the government is able to know any persons precise location. Snowden (2013) also believes that if the government is going through the trouble of obtaining the phone records of its citizens, little is stopping them from recording everyone's phone conversations. Gaining access to this data would allow the government to know everything that is happening in everybody's lives.

Critics of big data also feel that big data will be detrimental to the educational system (Lu, 2013). Lu (2013) discusses that even though there are some benefits of collecting data on all students, it is not worth it because the student's personal information would be at risk. Most schools store all of their data on a cloud system which means that the data is being stored on servers that can be accessed on the internet. Lu (2013) also explains that most of these cloud servers are poorly understood and they are poorly governed by the schools. By having the student's personal information on a poorly governed cloud system means that if someone hacked into the school's system, they would have access to every student's information. This

would cause major problems for both the students and their families. If the student's personal information fell into the wrong hands, the students could potentially become victims of sexual predators. Another way that big data could be detrimental to students is that if teachers have access to detailed reports of students' past and they find that the students have been problems in the past or if they have low achievement levels, teachers may tend to write those students off. They may feel that those students are not worth the time and effort to try to catch them up with the rest of the class because they have proven that nothing has worked in the past.

Discussion:

There are some problems of collecting large amounts of data on every person in the country. By collecting our credit card records and telephone records governments are taking away a lot of our personal privacy. By collecting these records they are able to track where we are in the country at any time. For example, people who are trying to get away from a bad situation, this information falling into the hands of the wrong person could be life threatening. Also by collecting this data, the government is potentially making all of our purchases public. If someone leaked that information anybody in the world would have access to see what items any person purchased. This could create major issues for that person. For example, if a person is a leading supporter of anti-gun laws, information being leaked about that person purchasing a firearm would discredit that person's support.

Although collecting student information does potentially risk student information, there are some amazing benefits to collecting data on students. Big data would provide teachers with very useful information about how they could tailor their lessons for each individual student. They would be able to see what areas the student needs some more help in and create lessons

and activities that will provide the student with the extra practice they need. They would also be able to find areas that the student excels in and create lessons and activities that will challenge the student. For example, if a student excels at multiplying, the teacher could have the student try to find the area of the classroom. This type of activity would be both challenging and fun for the student. Collecting data on students would also provide schools with essential information that would allow them to target students who are performing below average. Schools could use this information to provide those students with extra support in the areas that they are struggling in. If a student is struggling with reading, the teacher could have the student do activities that would help them become a better reader. Schools would also be able to use big data to pinpoint students who are at risk of dropping out and try to help the students with whatever issues they are having so that they do not drop out and so that they can end up graduating.

Another area of society that big data has the potential to positively impact is professional sports. With big data, teams can collect information on every player in their league, analyze it and determine which players will be the best fit for their team. They will be able to step away from the traditional ways of analyzing a player's ability and use a scientific way of determining which players will work best together in order to put together a championship team. This would give players who have been overlooked for any number of reasons, a chance to prove that they belong in their league. This shows that you don't have to be the best to be able to effectively contribute to your job. It shows people that just because someone may be better in some aspects of your job, you shouldn't give up because you can still do your work effectively.

Another area of society that big data will have a large impact is in the medical field. Doctors will be able to look at a person's genomes and compare them with the genomes of other people in order to determine which medication will produce the best results. This will reduce the number of people who suffer from side effects that are caused by medications that do not work for them. The doctors would be able to prescribe the patient with the medication that will most likely work for them based on their genomes. Big data is also going to have great impacts on the medical field by reducing the number of people who become sick or even die when a disease outbreak occurs. Companies like Google collect all of the search terms that people put into their system. The government could use this information to determine where a disease outbreak is likely to occur and provide that area with the support they need. The government would be able to provide a service announcement that would explain how they could prevent the spread of the disease. The government would also be able to supply that area with vaccinations that would prevent uninfected people from obtaining the disease as well as help the infected people get better.

Conclusion:

This essay shows that when used appropriately, big data can have a great impact on many aspects of society. One impact that big data could have that is intriguing is the one that it could have on the medical system. It would be beneficial for everybody if doctors were able to use big data to determine which medications are likely to work best for each individual patient. This would reduce the risk of people having severe reactions or dying from taking a medication that was not the right one for them. It is also intriguing how big data could positively impact professional sports. Sports franchises could use big data to help them determine which

combination of players will work best together, which will allow the franchise to put the best team together. This is intriguing because if more teams begin to do this, more teams will become competitive, which will make more games more exciting to watch. Big data also has the potential to positively impact the school system. As a teacher, I can use big data to learn what content areas my students are struggling in and alter my lessons so that they target those areas and provide my students with the extra support that they need in those areas. It would also be very beneficial for school districts to use big data to determine which students are potentially at risk of not graduating or dropping out of school so that they could figure out what they could do to help those students catch up with their schoolwork and better understand the material so that they are able to graduate. If big data continues to gain acceptance and if it is used appropriately, it has the potential to have a great impact on society.

References

- Arthur, L. (2013, August 15) *What is Big Data?* Retrieved from <http://www.forbes.com/sites/lisaarthur/2013/08/15/what-is-big-data/>
- Assange, J., Appelbaum, J., Müller-Maguhn, A., & Zimmermann, J. (2012). *Cypherpunks: Freedom and the future of the internet*. New York, NY: OR Books.
- Bustamante, C., Butte, A., Ashley, E., & Hallmayer, J. (2013, May 14). *Using Big Data at Stanford Medicine*. Retrieved from <https://www.youtube.com/watch?v=bmq1xwRemhY>
- Guthrie, D. (2013, August 15). *The coming Big Data education revolution*. Retrieved from <http://usnews.com>
- Lu, A. (2013, December 17). *Protecting student privacy in the data age*. Retrieved from <http://centerdigitaled.com>
- Mayer-Schönberger, V., & Cukier, K. (2013). *Big Data: A revolution that will transform how we live, work, and think*. Boston, MA: Houghton Mifflin Harcourt.
- Ranadive, V. (2014, August 14). *Applying Big Data thinking to sports*. Retrieved from <http://bloomberg.com>
- (2013, June 13). *What is the NSA controversy and what did Edward Snowden leak?* Retrieved from <http://boomerangbeat.com>