Xinyu ‘Kimi’ Cheng

Mr. Adam P Newman

English 101

Dec.16th, 2013

Final Research \_ Big Data and People with Disabilities

Ⅰ.Introduction

Big data has become a buzzword overnight. With the rapid development of technology, we are able to deal with much larger amounts of information and data than we used to be able to. Big data, known as the huge amount of data which exceed the processing and analyzing ability of traditional database technologies, is currently in its golden age as the global trend of paradigm shift, since every single company and organization is trying to figure out the best strategies for their development under the help of data visualization. Consulting firms and technological corporations have integrated big data technology into a wide variety of industries to help improve the performance and decision making process, with the healthcare industry as one good example of this integration. Professional managers and analysts have foreseen the great potential of big data technology to revolutionize the healthcare industry. According to the reports from McKinsey & Company, the leading global consulting firm, this technology could not only help the government to reduce the annual healthcare budget but also help physicians to make better medical decisions. Though both big data and healthcare are hot topics recently, it seems the conversations have rarely focused on people with disabilities yet. For this research project, I will first examine the current debate over big data technology in healthcare industry and then evaluate the potential impact big data technology may have on people with disabilities.

Ⅱ.What is Big Data

Before we move on, we need to define and understand the pattern of “big data”. Back in 2003, Professor Francis Diebold from University of Pennsylvania first explained the academic definition of big data:

Data refers to the explosion in the quantity (and sometimes, quality) of available and potentially relevant data, largely the result of recent and unprecedented advancements in data recording and storage technology. In this new and exciting world, data accruing at the rate of several gigabytes per day are not uncommon (Diebold 115).

And now big data is always represented as three “V”s: Volume, Variety and Velocity. For example, VISA processes more than 172,800,000 card transactions each day; Facebook has more than 1.15 billion active users generating social interaction data; more than 5 billion people are calling, texting, tweeting and browsing websites on mobile phones. With careful analysis, this data could be fully utilized by corporations to get a better understanding of their market and their customers’ needs. The best example to explain superiority of big data is the “Target case”, as the renowned retailer figured out a teen girl was pregnant even before her father did. The retailer kept track of every customer’s buying list and noticing a change in the consumption pattern of a girl concluded she was pregnant. To promote its brand, the retailer sent the girl some necessities for pregnant. This kind of specific advertisement could help reduce huge amount of advertisement cost. Thus, if companies take fully advantage of these invaluable data by visualizing and analyzing them, big data technology will undoubtedly help companies to reduce cost; reduce time; make smarter decisions and develop greater products.

Ⅲ Current Debates over Big Data in the Healthcare Industry

Based on the reports on Big Data technology from leading consulting firms, and the personal perspectives of managers and professionals who work in the IT industries and consulting field[[1]](#footnote-1), big data is expected to play a pivotal role in healthcare industry in the future. The technology will be helpful both on the macro side as it can help reducing the overall healthcare budget and on the micro side as it helps each individual physician to make better medical decisions.

Big data could produce huge financial profit. According to McKinsey & Company’s report, the healthcare cost currently consists 17.6 percent of the overall US GDP and big data technology could help the government to reduce the annual budget by $450 billion. (McKinsey & Company, “The big-data revolution in US health care: Accelerating value and innovation”). With the Collection of the data from millions of patients over long periods, it will be much easier for the doctors and physicians to choose the most cost effective way of diagnosis. (Ifan Khan). In addition, for the individual treatments, with the establishment of the electronic health records of the patients, specialist will know clearly what tests their patients have already taken and are not going to order duplicate tests (US NEWS, U.S. Hospitals Triple Use of Electronic Health Records: Report). It could reduce thousands of cost since duplicate tests are really common. From an investigation over 87 patients who are transferred from one to another, 32% of them received duplicate tests (Michael Lanzberg).

Besides the financial benefit, big data technology could also improve physicians’ treatment process and lead to better care received by patients. Based on SAS’s definition of big data, “More data may lead to more accurate analyses. More accurate analyses may lead to more confident decision making (SAS, What is big data).” In the medical field, with the help of big data technology and electronic records, physicians are able to move towards to evidence-based medicine, which applies the mathematical model to analyzed the samples and thus estimate the risk and benefits of medical treatments, instead of making decisions based on their personal judgments (McKinsey & Company). With the visualization of electronic records, physicians will be able to view the previous treatments in statistical methods, instead of memorizing all the treatment decisions while under the physical records system. They will be able to keep track of the effectiveness of different treatments on a similar symptom so that they could decide the best one next time. Or perhaps a doctor in rural area has never met patients with specific symptoms before, but with the help of big data, he could make a reference from the patients with similar symptoms happened in the past and thus help him to make evidence-based medical decision.

Ⅳ Potential impacts for people with disabilities

It is a consensus that big data technology has a promising future in the healthcare industry. However, it seems that there haven’t been too many discussions on the technology’s potential benefits for people with disabilities in general, both medical and social side. On the medical side, big data would benefit people with disabilities as the technology helps the physicians in the decision making process. What’s more, the establishment of EHRs (Electronic Health Records) may present invaluable opportunities for preventing diseases or future disabilities before they happen. And on the social side, big data technology could also benefit people with disabilities a lot by creating tons of jobs available and thus give more opportunities to people with disabilities.

First, let’s examine the medical treatments. As is discussed earlier, big data could help the physicians’ decision-making processes since it enables them to move towards evidence-based medicine instead of making decisions on their own. This works even better on people with disabilities. Due to the special body conditions of people with disabilities like their limitations of physical abilities, the common treatments that can be applied to ordinary people are might not applied to them. So, even if they have a commonly seen cold, physicians might need to treat them carefully based on their specific body conditions. That makes the work harder for the physicians, as an individual physician may be not even know the specific symptom or never treat a patient with similar symptoms before. However, things become much easier when we have the database of the electronic health records of millions of patients. More than just individual based records, the system may allow us to look at the records of specific populations of patients. For example, when we scan the EHR of our patient, the system could automatically match those who have same conditions and symptoms of those patients across the country. So a physician could look over a series of past cases of similar symptoms and then make his decisions based on these cases rather than based on his own experience and knowledge. Currently, one of the leading consulting firms GE is working on a project of collecting gigabytes of information on injuries caused by explosions and battlefield trauma. The research could enables the injured veterans to receive better treatment and recovery based on their conditions and degree of injury, so that they can return faster to normal civilian lives (GE Reports). This kind of population based records just give us a good direction of where we could go in the future.

# However, the benefit of Electronic Health Records shall be far more than just the treatment process: It may also help us prevent diseases by identifying people with high risks. When we record certain diseases and treatments on EHRs, we must also record their causes, symptoms, and some predictive indicators before the disease actually happens. Thus, if we keep track of the EHRs, we may be able to discover some specific indicators of a certain disease. Moreover, we are able to find out people who are at high risks by regular examinations and help them to prevent the diseases before they happen. Some studies show that autism is caused by a genetic issue rather than environmental issue (Using Big Data to Solve Autism and Other Mysteries). If that is the case, there must be some similar patterns of the patients since they are born autistic. The database of EHRs can indeed help physicians to identify those at high risks and intervene as soon as possible. While at the same time, with the help of EHRs, we might be able to figure out the real cause of autism is whether genetic issue or environmental issue. To a larger point, the benefit of big data could also be in the research field, it could indeed help us to discover the cause of some disease and thus help us either prevent or cure the disease.

# Besides the benefits on medical treatments, big data can also provide more employment opportunities for people with disabilities. Since big data is really in its early age and is developing rapidly, there might be a shortage of talent in the near future. According to the report from McKinsey & Company, “By 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions( McKinsey & Company).” The large quantities of available positions might provide great employment opportunities for people with disabilities, as these jobs are usually not so physically demanding. They could even do their job on their PCs at home as long as they have the access to the databases, as it may not be that convenient for them to commute from home and company. So if they do have the specialty in data analysis, they must be treated equally and have great employment opportunities.

# Ⅴ Final Words

Even if big data is only in its early age, we can already see its promising future and great benefits for people with disabilities. But any great invention has its flaw. There is some argument that big data interferes with individual privacy. Even though the office of civil rights enforces HIPPA privacy rule earlier to protect individual’s medical privacy (HHS.gov), big data can make your privacy a thing of the past. With the establishment of EHRs, all your medical history will be open to the database. However, I would like to say that it is worthy for us to interfere as long as either the financial profits or medical profits are too large for us to consider the privacy issue. What we might need to do is getting to know people’s comfort zone and find a right balance between big data and privacy. And remember the superiority of big data is always finding better solutions based on the pre-existing information. So when we actually implement the project and carry on, we may figure out better ways for us to do and see greater profits.

# Works Cited

Diebold, F.X., "'[Big Data' Dynamic Factor Models for Macroeconomic Measurement and Forecasting](http://www.ssc.upenn.edu/~fdiebold/papers/paper40/temp-wc.PDF%22%20%5Ct%20%22_blank)" (Discussion of Reichlin and Watson papers), in M. Dewatripont, L.P. Hansen and S. Turnovsky (Eds.), Advances in Economics and Econometrics, Eighth World Congress of the Econometric Society. Cambridge: Cambridge University Press, 115-122. 2003

"What Is Big Data?" SAS. N.p., n.d. Web. 21 Nov. 2013.

Knott, David, Basel Kayyali, and Steve Van Kuiken. "Insights & Publications." The Big-data Revolution in US Health Care: Accelerating Value and Innovation. McKinsey & Company, Apr. 2013. Web. 11 Nov. 2013.

Khan, Irfan. "Why Big Data Breathes New Life into Health Care." Diginomica. N.p., 5 Sept. 2013. Web. 22 Nov. 2013.

Szymczak, Rafal. "News Challenge - How Can We Harness Data and Information for the Health of Communities? - Merge Big Data for Disability Protection." News Challenge. N.p., 31 Aug. 2013. Web. 22 Nov. 2013.

Bowman, Dan. "Big Data Privacy Concerns Linger despite Potential for Healthcare."FierceHealthIT. N.p., 31 May 2013. Web. 22 Nov. 2013.

Steuerle, Eugene. "Using Big Data to Solve Autism and Other Mysteries." Using Big Data to Solve Autism and Other Mysteries. N.p., n.d. Web. 11 Dec. 2013.

Manyika, James, Brad Brown, and Several Authors. "Insights & Publications." Big Data: The next Frontier for Innovation, Competition, and Productivity. N.p., n.d. Web. 08 Dec. 2013.

"Fire Wall: Researchers Tap Big Data to Protect Soldiers and Improve Treatment." GE Reports. N.p., 8 Nov. 2013. Web. 11 Dec. 2013.

*A Preliminary Look at Duplicate Testing Associated with Lack of Electronic Health Record Interoperability for Transferred Patients*. Rep. Michael Lanzberg, n.d. Web. 16 Dec. 2013.

1. Khan, Irfan. "Why Big Data Breathes New Life into Health Care."

 The Big-data Revolution in US Health Care: Accelerating Value and Innovation. McKinsey & Company [↑](#footnote-ref-1)