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Scope of Big Data and Its Applications

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ABSTRACT: Now a day's everyone has been speaking about Big Data for some time, but there is a lot of rumor and tire kicking by many in the industry. We wanted to evaluate how people are viewing Big Data today, how important it is, how to deal with it, what returns can be had from it…
Big data is the term for data sets so large and complicated that it becomes difficult to process using traditional data management tools or processing applications. It is already true that Big Data has drawn huge attention from researchers in information sciences, policy and decision makers in governments and enterprises. As the speed of information growth exceeds, excessive data is making great troubles to human beings. However, there are so much potential and highly useful values hidden in the huge volume of data. A large number of fields and sectors, ranging from economic and business activities to public administration, from national security to scientific researches in many areas, involve with Big Data problems. On the one hand, Big Data is extremely valuable to produce productivity in businesses and evolutionary breakthroughs in scientific disciplines, which give us a lot of opportunities to make great progresses in many fields. There is no doubt that the future competitions in business productivity and technologies will surely converge into the Big Data explorations. On the other hand, Big Data also arises with many challenges, such as difficulties in data capture, data storage, and data analysis and data visualization. This paper is aimed to demonstrate a close-up view about Big Data, including Big Data applications, Big Data opportunities and challenges, as well as the state-of-the-art techniques and technologies we currently adopt to deal with the Big Data problems.

INTRODUCTION

Big data is a popular term used to describe the exponential growth and availability of data, both structured and unstructured. And big data may be as important to business – and society – as the Internet has become. Data that is so large in volume, so assorted in variety or moving with such velocity, that traditional modes of data capture and analysis are insufficient The declining cost of collection, storage, and processing of data, combined with new sources of data like sensors, cameras, geospatial and other observational technologies, means that we live in a world of near-ubiquitous data collection. The volume of data collected and processed is unparalleled. This explosion of data from web-enabled appliances, wearable technology, and advanced sensors to monitor everything from vital signs to energy use to a jogger's running speed will drive demand for high-performance computing and push the capabilities of even the most sophisticated data management technologies.[1]
There is not only more data, but it also comes from a wider variety of sources and some data is "born digital," meaning that it is created specifically for digital use by a computer or data processing system. Examples include email, web browsing, or GPS location. Other data is "born analog," meaning that it emanates from the physical world, but increasingly can be converted into digital format. Examples of analog data include voice or visual information captured by phones, cameras or video recorders, or physical activity data, such as heart rate or perspiration monitored by wearable devices. With the rising capabilities of "data fusion," which brings together disparate sources of data, big data can lead to some remarkable insights.[2]

What are the sources of big data?

The sources and formats of data continue to grow in variety and complexity. A partial list of sources includes the public web; social media; mobile applications; and local records and databases; commercial databases that aggregate individual data from a spectrum of commercial transactions and public records; geospatial data; surveys; and traditional offline documents scanned by optical character recognition into electronic form. The advent of the more Internet-enabled devices and sensors expands the capacity to collect data from physical entities, including sensors and radiofrequency identification (RFID) chips. Personal location data can come from GPS chips, cell-tower triangulation of mobile devices, mapping of wireless networks, Furthermore, data collection and analysis is being conducted at a velocity that is increasingly approaching real time, which means there is a growing potential for big data analytics to have an immediate effect on a person's surrounding environment or decisions being made about his or her life. Examples of high-velocity data include click-

stream data that records users' online activities as they interact with web pages, GPS data from mobile devices that tracks location in real time, and social media that is shared broadly.[3] Customers and companies are increasingly demanding that this data be analyzed to benefit them instantly, a mobile mapping application is essentially useless if it cannot immediately and accurately identify the phone's location, and real-time processing is critical in the computer systems that ensure the safe operation of our cars.[4]

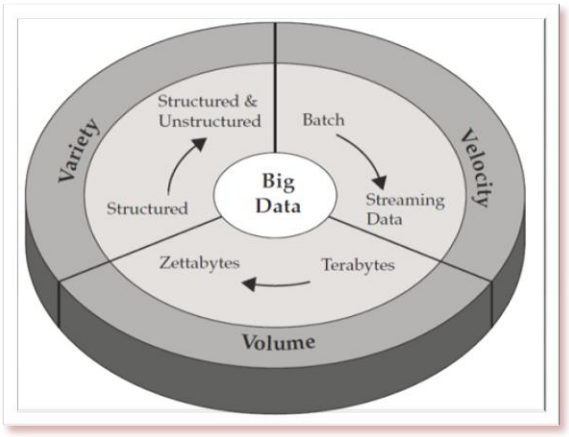

Figure: Big Data Image

Opportunities and Challenges

Big data technologies can derive value from large datasets in ways that were previously impossible in fact, big data can generate insights that researchers didn't even think to seek. But the technical capabilities of big data have reached a level of complexity and popularity that demands consideration of how best to balance the opportunities afforded by big data against the social and ethical questions these technologies raise. Used well, big data analysis can boost economic productivity, Examples include:

• Big data and the growing "Internet of Things" have made it possible to merge the industrial and information economies. Jet engines and delivery trucks can now be outfitted with sensors that monitor hundreds of data points and send automatic alerts when maintenance is needed. This makes repairs smoother, reducing maintenance costs and increasing safety.

• The Centers for Medicare and Medicaid Services have begun using predictive analytics software to flag likely instances of reimbursement fraud before claims are paid. The Fraud Prevention System helps identify the highest risk health care providers for fraud, waste and abuse in real time, and has already stopped, prevented or identified.

• One big data study synthesized millions of data samples from monitors in a neonatal intensive care unit to determine which newborns were likely to contract potentially fatal infections. By analyzing all of the data not just what doctors noted on their rounds the project was able to identify factors, like increases in temperature and heart rate, that serve as early warning signs that an infection may be taking root. These early signs of infection are not something even an experienced and attentive doctor would catch through traditional practices.

Big data technology also holds tremendous promise for better managing demand across electricity grids, improving energy efficiency, boosting agricultural productivity in the developing world, and projecting the spread of infectious diseases, among other applications. Unstructured text documents, email, video, audio, stock ticker data and financial transactions, managing, merging and governing different varieties of data.[5,6]

Why big data should matter to us

The real issue is not that we are acquiring large amounts of data. It's what we do with the data that counts. The hopeful vision is that organizations will be able to take data from any source, bind relevant data and analyze it to find answers that enable 1) cost reductions, 2) time reductions, 3) new product development and optimized offerings, and 4) smarter business decision making. For instance, by combining big data and high-powered analytics, it is possible to:

- Determine root causes of failures, issues and defects in near-real time, potentially saving billions of dollars annually.
- Optimize routes for many thousands of package delivery vehicles while they are on the road.
- Analyze millions of SKUs to determine prices that maximize profit and clear inventory.
- Generate retail coupons at the point of sale based on the customer's current and past purchases.
- Send tailored recommendations to mobile devices while customers are in the right area to take advantage of offers.
- Recalculate entire risk portfolios in minutes.
- Quickly identify customers who matter the most.
- Use click stream analysis and data mining to detect fraudulent behavior.

Big Data and Health Care Delivery

Data has long been a part of health care delivery. In the past several years, legislation has created incentives for health care providers to transition to using electronic health records, vastly expanding the volume of health data available to clinicians, researchers, and patients. Big data can identify diet, exercise, preventive care, and other lifestyle factors that help keep people from having to seek care from a doctor. Big data analytics can also help identify clinical treatments, prescription drugs, and public health interventions that may not appear to be effective in smaller samples, across broad populations, or using traditional research methods. From a payment perspective, big data can be used to ensure professionals who treat patients have strong performance records and are reimbursed on the quality of patient outcomes rather than the quantity of care delivered.

The emerging practice of predictive medicine is the ultimate application of big data in health. This powerful technology peers deeply into a person's health status and genetic information, allowing doctors to better predict whether individuals will develop a disease and how they might respond to specific therapies. Though medicine is changing, information about our health remains a very private part of our lives.

Big Data and Education

Students now access class materials, watch instructional videos, comment on class activities collaborate with each other, complete homework, and take tests online. Technology-based educational tools and platforms offer important new capabilities for students and teachers. After only a few generations of evolution, these tools provide real-time assessment so that material can be presented based on how quickly a student learns. Education technologies can also be scaled to reach broad audiences, enable continuous improvement of course content, and increase engagement among students. Beyond personalizing education, the availability of new types of data profoundly improves researchers' ability to learn about learning. Data from a student's experience in massive open online courses (MOOCs) or other technology-based learning platforms can be precisely tracked, opening the door to understanding how students move through a learning trajectory with greater fidelity, and at greater scale, than traditional education research is able to achieve. The big data revolution in education also raises serious questions about how best to protect student privacy as technology reaches further into the classroom.[7]

Protecting Children's Privacy in the Era of Big Data

Children today are among the first generation to grow up playing with digital devices even before they learn to read. Now a day's most of the children and teenagers are active users of mobile apps and social media platforms. As they use these technologies, granular data about them some of it sensitive is stored and processed online. This data has the potential to dramatically improve learning outcomes and open new opportunities for children, but could be used to build an invasive consumer profile of them once they become adults, or otherwise pose problems later in their lives. Although youth on average are typically no less, and in many cases more, cognizant of commercial and government use of data than adults, they often face scrutiny by parents, teachers, college admissions officers, military recruiters, and case workers.[8] Vulnerable youth, including foster children and homeless youth, who typically have little adult guidance, are also particularly susceptible to data misuse and identity theft. Struggling to find some privacy in the face of tremendous supervision, many youth experiment with various ways to obscure the meaning of what they share except to select others, even if they are unable to limit access to the content itself.

Analysis of big data

At the simplest level, advanced analytics allows us to develop models and then use them to ask what-if questions about your data. For example, developing a statistical model that associates buying behavior with customer profiles can then be applied to future behavior of customers. The application of that model is referred to as "scoring" and is the basis for predictive analytics.

That type of analysis is worlds away from traditional business intelligence, which is more about asking simple questions about data in one or two dimensions (e.g., how many clothes of Brand X do we have in stock?). That kind of analysis is fairly simple using a traditional database, needing only a small pipe to get the data in and out and a software component on the client to manage the interface.

Combining big data with predictive analytics can be a challenge for many industries, but high-performance analytics, which speeds the process of scoring and reporting, is helping customers in many areas like.

Detect, prevent and remediate financial fraud

Every day around the world, criminals are busily at work trying to defraud companies through a constantly evolving portfolio of schemes and strategies. As the volume and sophistication of these schemes increases, many organizations are turning to powerful analytics to sift through massive data volumes and uncover hidden patterns, trends and suspicious events that can indicate criminal fraud. In most instances, fraud detection involves analyzing the various attributes of transactions and making a determination about whether those orders should be flagged for further review.[9,10]

Calculate risk on a large crowd of loans

In the past few years, it's been anything but smooth sailing for financial services firms that have struggled to effectively manage their extensive consumer home loan portfolios. An industry wide failure to properly assess the latent risks lurking in thousands of substandard loans led to billions of dollars of losses,

Execute high-value marketing campaigns

The same financial services company faced similar big data challenges in its marketing operations as well. Financial services segments are increasingly competitive as institutions seek to offset the loss of fee income and minimize their own churn.[11]

CONCLUSION

We are living in the midst of a social, economic, and technological revolution. How we communicate, socialize, spend leisure time, and conduct business has moved onto the Internet. The Internet has in turn moved into our phones, into devices spreading around our homes and cities, and into the factories that power the industrial economy. The resulting explosion of data and discovery is changing our world. Big data technologies will be transformative in every sphere of life. The knowledge discovery they make possible raises considerable questions about how our framework for privacy protection applies in a big data ecosystem. Big data also raises other concerns. A significant finding of this report is that big data analytics have the potential to eclipse longstanding civil rights protections in how personal information is used in housing, credit, employment, health, education, and the marketplace.

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