

# Hong Kong's potential in big data analytics



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The era of big data is upon us. With emerging technologies like smartphones, IoT, smart dust and client-cloud architectures pervading our society, they are creating an unprecedented explosion of data, often referred to as big data.

According to Gartner, big data is characterized by four Vs: volume, variety, velocity and veracity. A fifth 'V' that is also being derived from big data – and perhaps the most important one – is value.

The value of data is derived from analytics, which is defined as the discovery and communication of meaningful patterns in data. But it requires techniques and technologies in data mining, machine learning and operational research. When these technologies work well, big data analytics benefits diverse applications, ranging across sectors such as education, energy, environmental preservation, finance, healthcare and logistics.

Many governments are recognizing the benefits of big data analytics and funding relevant research initiatives. In the US, over US\$200 million is committed to big data R&D. The European Commission has also recently announced its new strategy towards building a data-driven economy. Locally, we are also exploring a few exciting and important developments in big data analytics.

## eHR goes beyond healthcare services

The Hong Kong Hospital Authority has been developing a patient-oriented eHR (electronic Health Records). Apart from providing integrated private-public healthcare services, such information infrastructure also brings a holistic view of the state of health of citizens.

Looking into the future, the eHR repository can also support advanced epidemiological research, particularly in population surveillance. Such initiatives can open up a valuable opportunity for research to better understand disease patterns and facilitate effective public health management by anticipating disease outbreaks and implementing intervention strategies.

Research in such a direction should be a priority. But privacy issues pose a challenge. To maintain data privacy, patient records must be carefully handled and anonymized. For example, rare occurrences must not be identifiable through cross-referencing or triangulation among peripheral yet related evidence.

## From pollution to public healthcare

Another major area where Hong Kong can benefit from big data analytics research is air pollution.

According to the World Health Organization, air pollution is the world's single largest environmental health risk, which led to one in eight of total deaths in 2012. By understanding the spatial pattern and temporal characteristics of air pollutants, we can derive the relationship between exposure to air pollutants and susceptibility to various diseases.

The Big Data Decision Analytics Research Center at The Chinese University of Hong Kong is making some headway in this direction. We need to perform joint analysis of meteorological and air pollution data, as well as to explore the relationship between environmental conditions and public health. Our investigation is also mindful of Hong Kong's unique environment, where street level pollutants (such as nitrogen oxides) are generated at high concentrations due to a high density of vehicles, yet numerous high-rise buildings prevent the dispersion of such pollutants.

In addition, our experiment is also looking to include portable sensors that measure individuals' exposure to air pollutants, including indoor air quality. More investigation in these areas is necessary to devise environmental policies to protect human health.

Big data analytics has emerged as a new, important field with numerous challenges and abundant opportunities that can transform our world. We must embrace data as an asset and attempt to collect and manage them. We must also train data scientists to fulfill the talent needs across diverse industries.

Now is the golden moment for academia, government and industry to work in close collaboration. Together we can achieve technological breakthroughs and innovative solutions that benefit our society, our region and our world. ◀

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