Privacy and the information black-out

Data leaks from social media sites have raised the question of curbs on the use of facts


John Sulston

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Data science has become an important part of resource engineering and could be pivotal in helping the earth optimise consumption and emissions. At the same time, data science has other uses, particularly for business. The disclosure that a firm which uses data mining, data brokerage and data analysis to advise political groups on strategy managed to access personal records of *Facebook* users has grown into a major crisis.

Data science is analysis using mathematics, along with computer utilities, for extracting useful information out of jumbled or apparently unrelated data. We now have the ability, with computers, to deal with complex computations on huge quantities of data. Scientific discoveries, till a few decades ago were the result of deep insight and experiments designed to test theories that could explain observed facts.

While large collection of data was still necessary, handling data was laborious and the data was analysed to look for specific patterns. A difference with the arrival of computers is that large quantities of data can now be handled fast and at low cost. Methods have hence been developed to exploit this ability and get computers to take data which has not been sorted or collected through a specific purpose and just discover trends and connections between components of data.

And with the increased ability to deal with large data, the raw data itself has become more valuable. Enterprises now design their operating processes so that data is collected at all stages and then made use of, generally by an automated system, to improve the processes for greater production and less cost. With the current proliferation of the Internet, the marketplace and advertising spaces have shifted to computer screens.

Individual purchase preferences or product interests can now be recorded every time a person logs in and makes a purchase or visits a website. This information can then be used to direct focused offers or information to the person for the benefit of the purchaser and the seller and the economy in general.

The rising market of computer advertising has thus led to demand for popular websites, as places where advertising panels can be placed. And among websites, social media platforms have a leading presence. As each user of the site connects with his or her friends and the friends in turn connect with their other friends, the number of persons that each user gets connected to grows exponentially. Businesses and institutions of all kinds now have specially trained social media personnel to develop networks through which advertising or special messages can be conveyed, to ever widening readership. And, as users do not come face-to-face with their friends, or many are friends only in the social media site, users have a sense of anonymity and they are often very forthcoming and communicative about their personal lives.

What happened in the current *Facebook* crisis is that a social sciences researcher in the UK developed an "app", a computer programme that runs on Android phones, and invited phone users to log in by sharing their *Facebook* accounts, in the process of completing surveys to receive personality ratings. *Facebook*, at the time, allowed such Android phone programmes to extract various bits of information.

While this may not, by itself, have been harmful, the researcher, who got his hands on the data of thousands of *Facebook* users, passed on the information to Cambridge Analytica, a data analysis firm. This firm specialises in analyses of data to extract trends of information and to classify individuals as suitable for specific messages, either product advertising or messages that have political bearing, to influence the receiver and also others with whom the receiver is connected.

It is reported that Cambridge Analytica used such information, as gathered from social media sources, to advise President Donald Trump in his 2016 election campaign. Even in Indian politics, different parties alleged that Cambridge Analytica had been engaged to advise or design election strategy. The revelation that personal information, which users had disclosed in the *Facebook* profiles, which they believed to be restricted to their circle of "friends", had been made public, caused great unease to users. There is a continuing rush now of users closing down their *Facebook* accounts and *Facebook* faces the possibility of revenue losses and is deposing before investigating bodies on how it allowed private data to go public. The main defense of *Facebook* is that the researcher whose app was allowed to collect data for research passed it on to Cambridge Analytica in violation of the terms in which he was allowed access to the data.

Cambridge Analytica also says that it has now deleted all the data accessed. But there are suspicions that this has not been done and also the question of many other Android apps that have accessed data and many that are still doing so. While the inquisition of *Facebook* goes on, states and different groups are examining the question of what safeguards need to be there, by statute, on information that users of different services share with the service provider. And then to place limits on the uses to which the service providers can make of the information that they become privy to. While there may be truth in the belief that data mining techniques can now extract from social media data even personal facts about users that they had not specifically shared, it has become important to consider what extent of use of data should be permitted.

Using the data for commercial advertisement targeting is an important source of revenue for websites that provide users with communication or other services free of charge. This apart, the information in popular websites is valuable for research in sociology and for planning and optimising public services, even crime prevention, without being personally intrusive. Excessive curbs on the information which can be mined from transactions over the Internet would hence deprive responsible organisations with an important resource.

The Indian Railways had once examined the possibility of using for commercial or other purposes the demographic data that gets captured every time a ticket is booked. While the idea is yet to be implemented, there could be the objection that the information of age and residential address, which a passenger shares while booking a ticket, is only for ensuring fair allotment of reserved space. It could be argued that personal information should hence not be shared, even with agencies that plan more useful provision of reserved space and certainly not with commercial firms for profit.

With current technical capability, the whole genetic information of a person could be collected every time a blood test, to check the sugar or haemoglobin level, is taken. This would be an invaluable resource for medical or demographic research. It would be unfortunate if the law said that the information should be deleted as soon as the limited, pathological purpose has been served.

The same month of March 2018, when the these questions of data privacy surfaced, also saw the passing of John Sulston, who shared the Nobel Prize for medicine in 2002 for work in genome sequencing. Sulston had been a campaigner for free sharing of science data, particularly genetic data that was sought to be controlled by drug companies. That information should be free was an article of faith with Sulston, who was one of those who stood bail for Julian Assange of Wikileaks fame.

The case for sharing results of research is fairly obvious. The same case could be made out to share, for public good, the huge personal information that gets generated in all transactions of modern living.

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Potential natural solution

Plastic-eating enzyme accidentally created by scientists could help solve pollution crisis

JOSH GABBATISS

Scientists have created a substance capable of "eating" plastic that could help tackle the world's pollution problem. The substance is based on an enzyme — a "biological catalyst" first produced by bacteria living in a Japanese recycling center that researchers suggested had evolved it in order to eat plastic.

Dubbed PETase for its ability to break down the PET plastic used to make drinks bottles, the enzyme accelerated a degradation process that would normally take hundreds of years.

Fine-tuning this naturally produced enzyme allowed a research team to produce something capable of digesting plastic more effectively than anything found in nature. By breaking down plastic into manageable chunks, the scientists suggest their new substances could help recycle millions of tonnes of plastic bottles. Plastic is notoriously resistant to natural degradation, and the discovery of the Japanese plastic-eating bacteria in 2016 was heralded by experts and commentators alike as a potential natural solution to plastic pollution.

While attempting to verify these claims, University of Portsmouth biologist Professor John McGeehan and his colleagues accidentally created a super-powered version of the plastic-eating enzyme.

"Serendipity often plays a significant role in fundamental scientific research and our discovery here is no exception," said Professor McGeehan. During an investigation of the enzyme's structure, the scientists made a slight tweak to the part thought to be involved with plastic digestion. Doing so ramped up the ability of the enzyme to degrade PET, and also gave it the ability to degrade an alternative form of PET known as PEF.

"Although the improvement is modest, this unanticipated discovery suggests that there is room to further improve these enzymes, moving us closer to a recycling solution for the ever-growing mountain of discarded plastics," he said. "Being able to see the inner workings of this biological catalyst provided us with the blueprints to engineer a faster and more efficient enzyme."

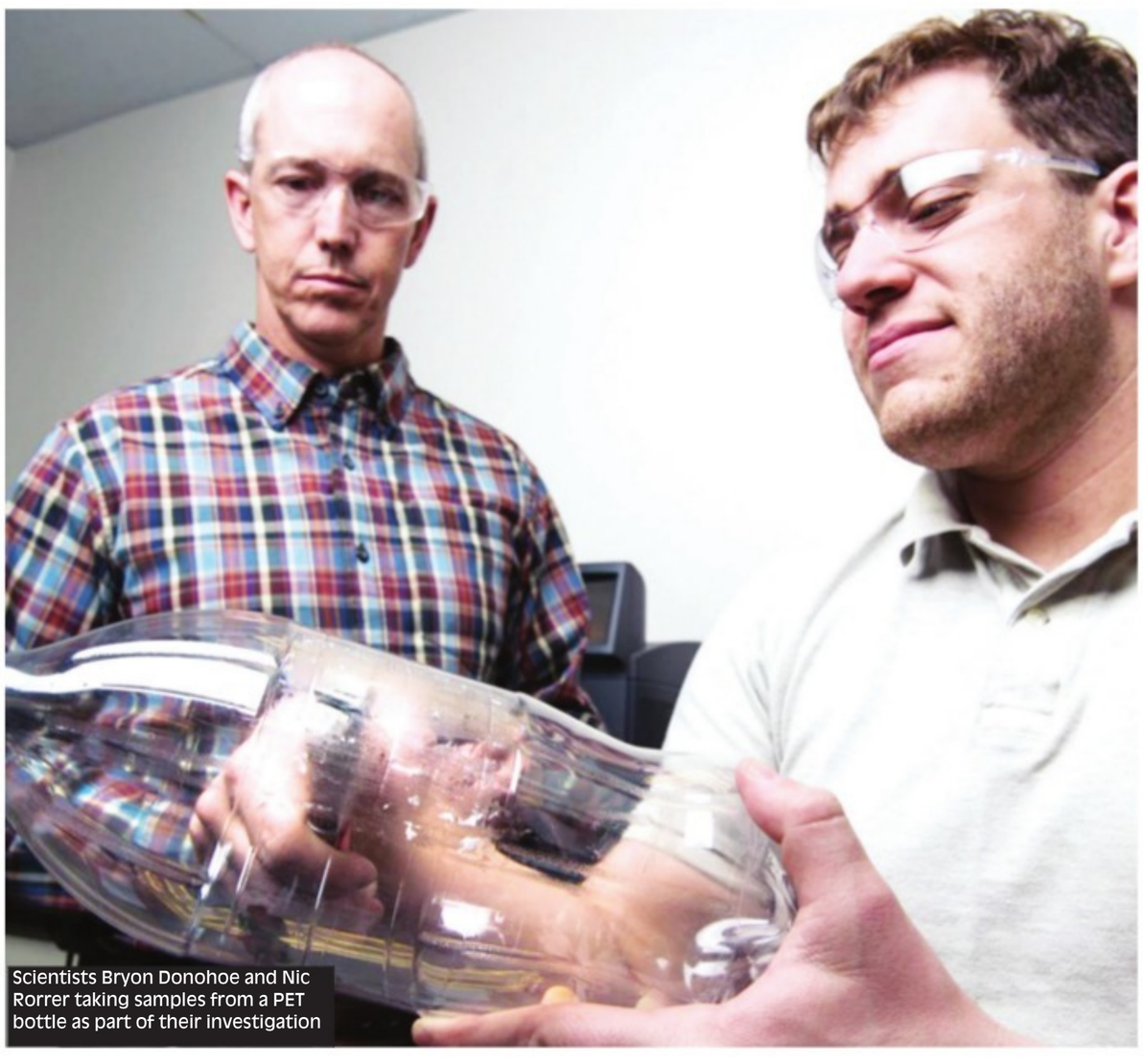
The research was led by postgraduate student Harry Austin, and published in the journal Proceedings of the National Academy of Sciences. Though simply breaking down larger pieces of plastic into smaller pieces is not in itself useful — and in fact creates microplastics of the type current causing damage to marine environments - the scientists suggest their method could be employed to make plastic recycling far more effective.

"This is a potentially useful technology to support recovery and recycling of plastics,"said Professor Nilay Shah, a chemical engineer at Imperial College London who was not involved in the work. The discovery has been welcomed enthusiastically by other scientists, who nevertheless cautioned there would be a long way to go before these enzymes are widely applied in the recycling industry. "Oil-derived plastics and polymers are resistant to degradation and their accumulation in the environment is an appalling problem," said Professor Douglas Kell, a bio-analytical scientist at the University of Manchester. "While there is still a way to go before you could recycle large amount of plastic with enzymes, and reducing the amount of plastic produced in the first place might, perhaps, be preferable, this is certainly a step in a positive direction and very exciting science to boot," said Dr Oliver Jones, an analytical chemist at RMIT University in Melbourne.

Awareness of plastic pollution has spiked in recent months, with communities across the UK implementing measures to cut down on plastic waste. These local efforts have been accompanied by Government policies to help tackle this "scourge", including the ban on microbeads and the introduction of a bottle deposit scheme.

However, Professor McGeehan noted the role that science must also play in developing novel solutions to fight against the tide of plastic. "Few could have predicted that since plastics became popular in the 1960s huge plastic waste patches would be found floating in oceans, or washed up on once pristine beaches all over the world," he said. "We can all play a significant part in dealing with the plastic problem, but the scientific community who ultimately created these 'wonder-materials', must now use all the technology at their disposal to develop real solutions."

The Independent


Scientists Bryon Donohoe and Nic Rorrer taking samples from a PET bottle as part of their investigation

PLUS POINTS

Violent collision

A fierce impact between Mars and another planet-sized object resulted in the birth of the Red Planet's two moons, according to a new study. The origin of Phobos and Deimos, the two small moons that orbit close to the surface of Mars, have been hotly debated by scientists for decades. While many have suggested they are asteroids that were captured intact by the planet's gravity long ago, the new research suggested an altogether more dramatic origin story. "Ours is the first self-consistent model to identify the type of impact needed to led to the formation of Mars' two small moons," said Dr Robin Canup, an astrophysicist at Southwest Research Institute, who led the study. The collision is comparable to the one that formed our moon another phenomenon Dr Canup is investigating, which is thought to have been formed when a Mars-sized object crashed into Earth 4.5 billion years ago. Compared to our moon, however, Phobos and Deimos are tiny (only 7.5 miles and 14 miles, respectively) and the scientists used their size to understand the kind of object that would need to strike the Red Planet to create them. When such an object, somewhere between 300 and 600 miles in size, smashed into the side of Mars, it produced a disc of orbiting debris that began to orbit the planetary body. Preparatory work such as this will be beneficial for future space expeditions aiming to investigate Mars and its moons, such as the Japan Aerospace Exploration Agency Mars Moons Exploration (MMX) mission. That spacecraft is set to launch in 2024, and will visit both Martian moons and collect samples before returning to Earth five years later.

The Independent

Underwater expedition

There is a peculiar spider crab with plates resembling ears that actually protect its eyes, hidden more than 1,000 m underwater along the Sunda Strait off the coast of Jakarta. It had not been seen for some 10 million years, till researchers from Singapore and Indonesia discovered it while trawling the depths of the sea in March. Researchers believe the 6cm-wide crab, dubbed "Big Ears", is from the Rochinia genus. More than a dozen new species of crustaceans were discovered on the pioneering expedition into the deep waters off the southern coast of West Java. In total, some 800 species from more than 200 families of sponges, jellyfish, molluscs, starfish, urchins, worms, crabs, prawns and fish were discovered, accounting for more than 12,000 individual animals. Professor Peter Ng, head of the Lee Kong Chian Natural History Museum at the National University of Singapore, and Professor Dwi Listyo Rahayu, senior research scientist at the Research Centre for Oceanography of the Indonesian Institute of Sciences, led the 31-member team on the 14-day trawling expedition. They sailed from Jakarta to the Sunda Strait, and waters off the Indonesian port of Cilacap, in the south-western part of Java.

The Straits Times

New form of DNA

A new DNA structure inside human cells known as the "i-motif", has been identified by scientists. This form resembles a twisted "knot" of DNA, instead of the well-known double helix first described by James Watson and Francis Crick. Lab work has previously suggested the existence of DNA in this form, but this is the first time it has been observed in living cells. The scientists are not exactly sure what the function the "i-motif is", but they suspect it is involved with the process of "reading" DNA sequences and converting them into useful substances. "When most of us think of DNA, we think of the double helix," said Professor Daniel Christ, a molecular biologist at the Garvan Institute of Medical Research, who co-led the study describing the new findings. The findings were published in the scientific journal Nature Chemistry. A conventional strand of DNA is made up of "base pairings". The building blocks of the double helix are substances called bases — adenine, thymine, cytosine and guanine. The probes were made using antibodies Y-shaped molecules that bind with specific substances. In this case, the antibody was engineered so that it would attach itself to i-motifs but not to any other form of DNA.

The Independent