Using Digital Genomics to Create an Intelligent Enterprise

By Mario Domingo

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Structured versus unstructured data: New techniques and vast opportunities

The data that we receive today is either structured or unstructured–structured data are those coming from transactions while unstructured data are generated from social media platforms and other websites. The majority of the world's data is structured, meaning that it appears in rows and columns and can be labelled. In recent times, however, there has been a rapid growth in unstructured, unlabelled data in the form of blogs, posts, texts, tweets, images, audios and videos.

While it is easy to recognise and interpret structured data, the same does not hold true for unstructured data. Unstructured data comes in many varieties such as images, video, audio, languages, and locations from GPS, iBeacon, WiFi and mobile networks. New technologies such as object and facial recognition, emotion detection, as well as advanced methods of classification are required to understand images and videos. There are similar issues with audio files where modern voice and language recognition along with inflection detection are needed to analyse sounds.

Converting unstructured data into structured and searchable forms is just the beginning of the problem for computers and analysts. The power of Big Data lies in the ability to collate, compare, analyse and interpret this rapidly accumulating heterogeneous volume of data to reveal trends and patterns so that it can be used in decision-making. The question then arises: Are there technologies that can help us?

Even until just a few years ago, we did not have the capability to efficiently and affordably isolate patterns and fashion data to fit a company's processes and audience. Owing to strides in technological innovation, some advanced Big Data platforms are now equipped with features that allow them to draw inferences that extrapolate from the gathered information. Big Data technology allows companies to analyse images and manipulate them to deliver a differentiated customer experience. For instance, Ikea allows its customers to download a mobile app that takes pictures of its products like furniture, and virtually position them in their living room as augmented reality. Simply put, these platforms do some of the thinking for you.

Digging for digital gold

I like to compare Big Data analytics to gold mining. We have a rich seam of gold deposits and we need to cut through the rocks and boulders and sieve

What makes Big Data 'big'?

Big Data is a term used to describe the availability of massive amounts of structured and unstructured data generated through business and social interactions. The **'three Vs'** that make data **'big'** are:

Volume

The sheer volume of data being generated today challenges businesses to determine its relevance and how to analyse it. The Internet has been a single most important contributing factor to this trend.

Velocity

Data is streaming in at unprecedented speed through multiple channels, with the total quantity of accessible data doubling every one and a half years. This triggers the need for businesses to react quickly to deal with bulks of incoming information in real time.

Variety

Data can be found in a variety of forms— documents, audio, video, e-mail, financial transactions, and social media, among others. This poses the difficulty of comparing apples with oranges, and businesses are faced with the challenge of collating, governing and merging the various types of data to be analysed and interpreted.

Source: SAS, "Big data: What it is and why it matters"

Every business knows that it needs to leverage customer data, but few know the potential it has to transform business processes, decisions and performance.

We live on the cusp of a new age in machine intelligence. At no point in history has data processing been so affordable and algorithms, formulated years ago, so readily applicable to day-to-day problems. Today we have the capability to take big leaps in digital intelligence-driven business innovation.

Machine generated data is exploding. Big Data is a much-quoted term today, and more and more companies are looking for useful applications of the volumes of data they generate daily. Many enterprises also struggle with this trend, as traditionally they have not captured data that is generated in the course of doing business. As companies look for ways to differentiate themselves in their markets, efficiency in using Big Data has become a central basis of competition.

For businesses that are more data savvy, the dawn of new techniques in data mining and analytics is beginning to help them respond to their consumers' needs more accurately. Enterprises are also starting to use these technologies to enhance their value chain and internal operations to new levels of efficiency. Recognising its importance, telecommunication companies have become more guarded with their data as over-the-top (OTT) service providers (companies who emulate the subscription services of a telecom) like Viber, Line and WhatsApp look for ways to build a stronger bond with the same customers. By lapping up a rapidly growing share of loyal customers, Internet players such as AirBnB, Uber and Lazada are giving hotel chains, car rental companies and department stores with traditional business models a run for their money.

Traditional approaches in feature detection and data prediction that use modelling and optimisation are steadily being taken over by machine intelligence—allowing for multiple layering of knowledge and evolved learning—ultimately leading to more accurate insight for making business decisions. Digital genomics is a key tool in developing such intelligence.

Digital Genomics: Taking smart analytics to the next level

Genomics—the study of genes and their inter relationships with the aim of identifying their combined influence on the growth and development of the organism—dates back to 1995, when the first free living organism was sequenced using new computing tools by The Institute for Genomic Research.[1] Digital genomics, as the name suggests, gets its inspiration from concepts in natural science and applies it to the world of digital data. A digital genome, or profile of any person or object, is created through algorithms that encode hundreds of traits or characteristics of a person or object based on the digital content that has been left behind through interactions in the virtual world (refer to Figure 1).

Similar to deciphering a chromosomal map, much can be learned by first mapping digital trails and then merging them with transactional data to determine or identify the traits and behaviours of people and things that are most significant in particular situations or contexts.

Although the task seems complex, technological advancements in Big Data analytics—finding concealed patterns, correlations and commonalities within huge datasets, often with the aid of advanced Big Data platforms—make this possible. Advanced Big Data platforms work similar to the Insights tab for Facebook pages and the Insights feature of blogs, with enhanced functionality and the ability to make educated inferences about users from the patterns found within the data. The rationale behind their functions may be complex, but using them is easy.

Big Data analytics

In movies, secret agents and super spies are always after delicate pieces of information, whether it is for snooping on the plans of villains or preventing disaster. Remarkably, the same precept applies to a business that is getting to know its customers' tastes, preferences and spending habits, or trying to improve its processes to cater to the needs of those customers. As such, the concept of data on customer information is not new; businesses have always been generating, collecting and using information from their interaction with customers, both formally and informally. What is different today is that the volume, velocity and variety of this data have significantly increased with the ubiquitous use of the Internet and other machines that rely on sensors.

THE PROCESS OF CREATING A DIGITAL GENOME

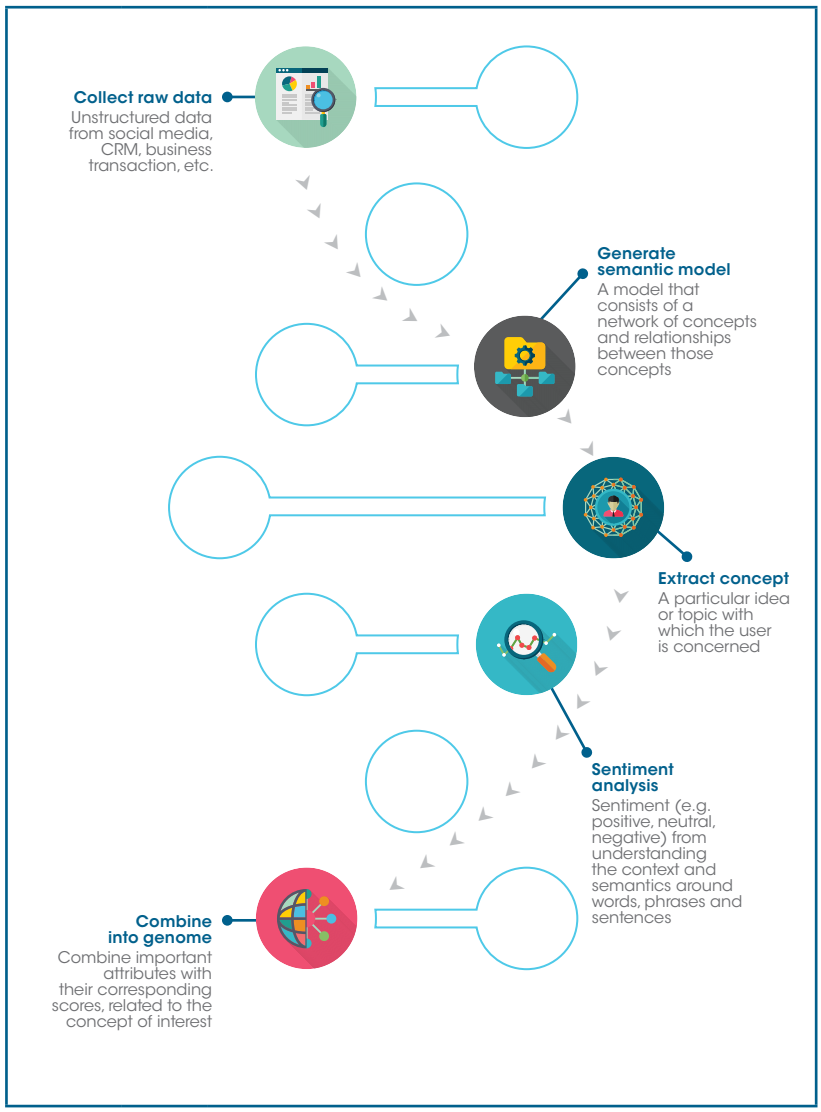

FIGURE 1 *Source: Iloopp™ Natual Intelligence Solutions*

FACEBOOK: DYNAMIC ADAPTATION

One of the most evident uses of smart inferencing is the Facebook algorithm. This programme is responsible for what Facebook users see on their news feeds every time they check their accounts on a device. The algorithm is able to detect patterns in a user's behaviour by screening the friends and pages the user engages with frequently, the types of content the user responds to regularly, and the places the user is usually at or often visits.

For instance, when the algorithm detects that the user expresses interest in another user's posts, or begins to interact with another party more frequently, the news feed will begin to show more of the other user's content and activities, which are perceived as points of interest.

through the rubble to reach the gold buried underneath.

Today, social media is one the most significant digital resources for market-related information. Individuals share personal information and their likes and dislikes through their regular engagement with social media, be it on Facebook, Twitter or Instagram. When this information is organised and interpreted, useful inferences can be drawn about the interests, hobbies, dislikes and preferred brands of people who belong to a certain demographic (age, gender, location, etc). For a business looking to learn about its existing and potential customers, this seemingly mundane data becomes a wealth of actionable information to better target its customers, and the use of Big Data platforms makes this possible.

The power of Big Data lies in the ability to collate, compare, analyse and interpret this rapidly accumulating heterogeneous volume of data to reveal trends and patterns so that it can be used in decision-making.

Take the example of an online news portal in the Philippines, which uses digital genomes to match reader preferences to content, generating customised news and advertisements for each registered user. In this case, a digital genome can be created in two ways. First, if the user registers with the news portal through Facebook, then the Big Data platform is immediately able to churn out a digital profile of the person based on Facebook content–personal details, photographs, locations, likes and dislikes, friend groups, etc. These data prompts are then matched to the news content. So, for example, under the health section of the news site, a nutritionist may receive news and features tailored around diets, recipes and alternate remedies, while a sports buff may receive articles on fitness and exercise. In case the user does not sign up through Facebook, the digital genome is created with the help of some personal details that are required at the time of registration and then, through a dynamic process, the genome 'learns' and enhances the profile of the user by tracking the type of content the user reads more frequently.

The potential of this technology for businesses is enormous. Digital genomics has become a powerful tool for marketers looking to better understand their customers and develop intimacy with them. A department store can use transactional and browsing data to profile a customer. For instance, a young lady buying infant clothes, white textiles and cotton swabs may be registered as 'pregnant' in the store's database. With this information, the store can offer customised products and promotions in the customer's virtual and non-virtual worlds, bearing in mind her budget, information on which is also gleaned and predicted from the price points of past purchases.

Tesco, the British grocery retailer, attributes its business success in part to insights generated through Big Data and advanced analytics. As early as the 1990s, Tesco used its loyalty card

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as a tool to systematically collect and analyse customer data. The company has since, in addition, mined online and social media information, using a breadth of advanced analytics—encompassing more than 20 analytical tools—to support day-to-day decision making. Tesco's insight-driven commercial strategy has contributed to its performance: Since 2000, the retailer has improved its profitability every year, more than tripling its profits between 2000 and 2012.[2]

Individual digital genomes can also be re-processed and aggregated into group genomes. By understanding the interrelationships between individual attributes, cohort analysis can be done in order to create a deeper understanding of individual personas and how they relate to other personas. This is very helpful in designing group offers or member-get-member marketing campaigns (refer to Figure 2). Moreover, understanding the group sentiment and being able to influence that sentiment is an important step in managing social networks.

The applications of Big Data analytics goes beyond understanding the customer; it can be used internally to monitor operations data and offer suggestions on how to improve business processes—from how goods move through the supply chain to how operations are carried out on the factory floor and in the back offices. This is made possible by developing digital genomes for specific products, objects or functions. For instance, a company may be looking to reduce costs and improve the efficiency of its warehousing function.

UNDERSTANDING MARKETING SENTIMENT THROUGH COHORT ANALYSIS

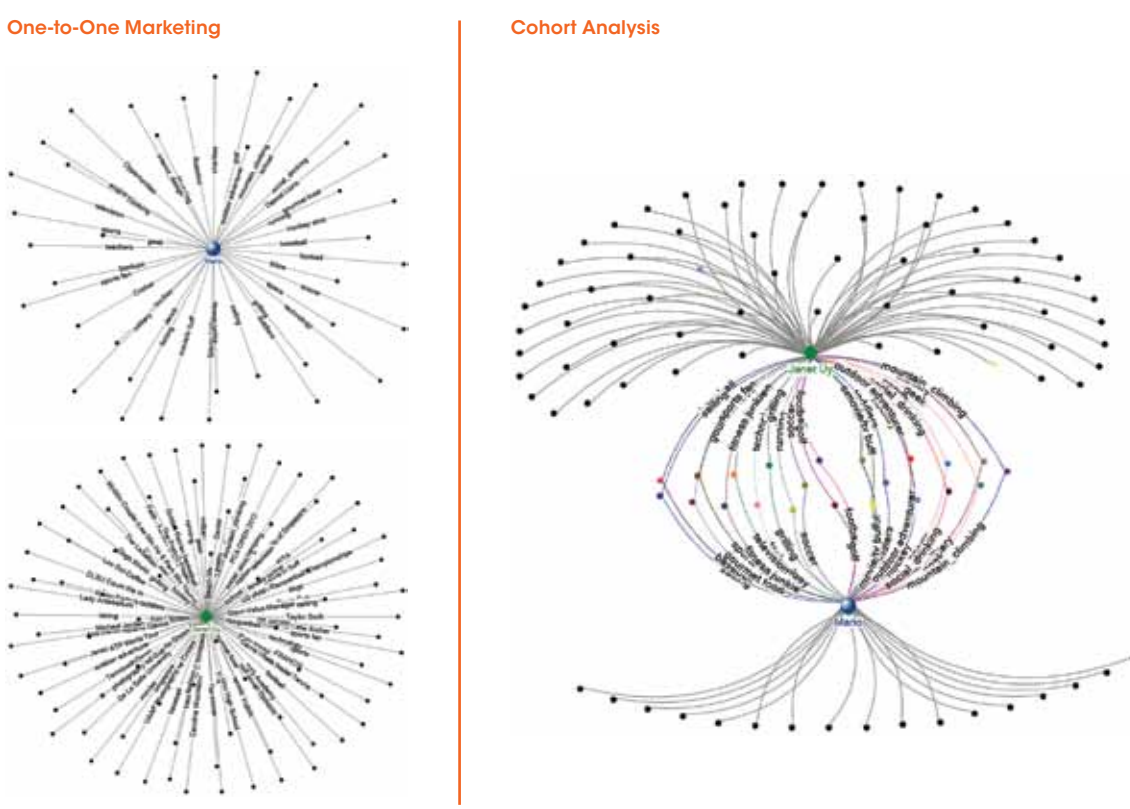

FIGURE 2

Source: Iloopp™ Natual Intelligence Solutions

A digital footprint of the warehouse–which would include features such as the floor area, number of gallantries, pallets and forklifts, number of stock-keeping units, number of workers, as well as a schedule of movement of cargo, its frequency and timing–works wonders in understanding the existing processes and determining which processes could be improved upon, added or removed to enhance efficiency. The solution is equally relevant for seaports that track marine fleets and handle cargo shipments, as well as airports that deal with hundreds of flights a day.

Employers can leverage data analytics to understand not only the turnover rate of their employees, but also the reasons for their departure. Predictive analytics can also determine the length of time an employee is likely to spend with the company before leaving. The company, then, is able to structure programmes to prevent employee attrition, saving time and resources devoted to training. Given the same data combined with personality tests, companies can also hire better and more efficiently.

Digital genomics based on Big Data analytics have proven useful for different business models, spanning nearly every type of industry, be it telecommunications, airlines, marine, retail, or hotels and hospitality. Even governments have begun to leverage the masses of data they collect to build efficient, sustainable communities. Information is taken real-time, allowing users to act and react to any scenario. The Los Angeles Police Department uses data analytics to predict crimes and catch criminals red-handed. Adding Big Data to its operations has actually lowered the crime rate in the state.

Companies such as Google, Facebook, Amazon and Netflix have grown to become among the largest and most valued businesses, primarily because of their understanding of a crucial truth that data is everything.

Similarly, digital threat maps are being used in the Philippines to improve response times in emergencies stemming from natural disasters.

Building an intelligent enterprise

Information is the gold of the future. Already companies such as Google, Facebook, Amazon and Netflix have grown to become among the largest and most valued businesses, primarily because of their understanding of a crucial truth that data is everything. The functions of Big Data are versatile and can be adapted to address each market and each operation. Simply put, the proper use of Big Data will be a game changer for businesses as they begin to leverage it in sales and marketing, supply chain management, and other back-office functions.

Digital genomics is one of the frontier technologies in machine intelligence that is being applied to improving business performance. But this is just the beginning. The technological possibilities are illimitable. Further advancements in information technology will enable the use of even more sophisticated analytics and task automation. We have already seen the advent of smart drones and robotics, the gradual switch from artificial intelligence to natural intelligence, and the beginnings of deep learning solutions. These, I think, will be topics that we will have to address in the very near future.

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