BIZ ANALYTICS

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Introduction

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This issue highlights how organisations leverage four types of analytics to aid decision making

The proliferation of data and the strong desire to stay at the forefront of competition have driven many organisations to tap on analytics to aid in decision making, such that the field of data science has become increasingly needed in today's industries. Statistical and computational models have transitioned into a pivotal role surrounding business operations. Organisations are now embracing analytics to make data-driven and evidence-based decisions in reshaping and improving their business processes. As such, analysts play a vital role by leveraging data to generate meaningful insights that had previously been unknown, helping organisations to make sense of their data.

Efficiency and Effectiveness

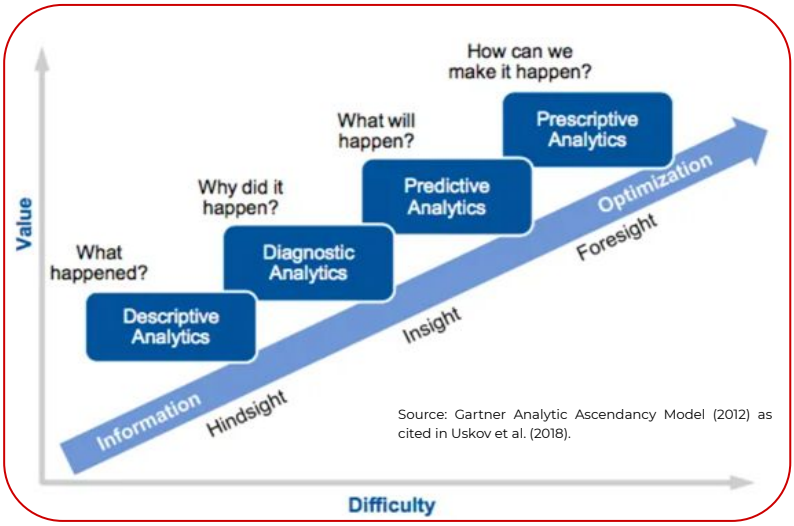
In the pursuit of solving real-world problems, it is imperative to ensure that the approach encapsulates the essence of efficiency and effectiveness. Efficiency refers to the act of doing things right, while effectiveness entails the act of doing the right things. To illustrate this concept, brief scenarios are exemplified with context as shown below.

Industry	Efficiency	Effectiveness
Healthcare	Utilising less resources in treating patients	Predicting a patient's recovery accurately
Manufacturing	Using less raw materials and labour hours to manufacture products	Identifying defective products successfully
Telecommunications	Employing cost-efficient methods in broadcasting network coverage	Providing mobile plans that align with customer needs

With the insights gained, organisations can obtain more cost-efficient and effective solutions, increasing their revenues with the ultimate aim of improving their profits. Having said that, non-commercial organisations can also tap on analytics to improve the effectiveness and efficiency of their operations amongst other things.

There are different types of analytics that can help organisations to better achieve their business objectives. They will be elaborated in the next page.

Four Types of Business Analytics



Source: Gartner Analytic Ascendancy Model (2012) as cited in Uskov et al. (2018).

Uskov, V. L., Bakken, J. P., Shah, A., Krock, T., Uskov, A., Syamala, J., Rachakonda, R. (2018, June). Smart Learning Analytics: Conceptual Modeling and Agile Engineering. In International KES Conference on Smart Education and Smart E-Learning (pp. 3-16). Springer, Cham.

continued from previous page

1. Descriptive Analytics

'What is Happening in My Business?'

Descriptive analytics refers to a field of data mining that focuses on gathering and summarising raw data for the analyst to understand the underlying phenomena more easily. In general, the analyst uses descriptive analytics to interpret the historical evidence. This can be used in many industries, covering a range of purposes, from tracking inventory to benchmarking yearly revenues or sales. Essentially, descriptive analytics seeks to find out what has happened without performing a complex analysis, which is required in other types of analytics.

So, WHAT exactly does descriptive analytics tell you? In context, it provides the analyst with a perspective of the key metrics and measures going on in the business, for example, the products with the highest sales in the past one month. Likewise, it provides information on customers by describing and summarizing data to understand their demographics - for example, 25% of our customers are students. In addition, it reconfigures data into easily understandable or readable formats, where the information underlying the data is enhanced when effective visualisation tools are employed.

A Case Study of Descriptive Analytics: Analyzing the Epidemiological Outbreak of COVID-19: A Visual Exploratory Data Analysis Approach

Dey et al. (2020) conducted an exploratory data analysis with visualisations to better understand the number of cases reported (for confirmed, death, and recovered) in different provinces of China and outside of China. The authors observed an interesting pattern in the cases reported based on the different datasets of COVID-19, which enabled them to suggest that more epidemiological and serological studies were needed. They also investigated early indications that the pandemic was being addressed in China and worldwide, based on the decrease in detection time and rapid management of internationally identified travel-related cases. The analysis provided a comparative analysis of all the cases reported inside and outside of China.

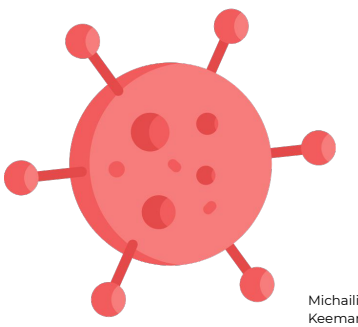
Dey, S. K., Rahman, M. M., Siddiqi, U. R., & Howlader, A. (2020). Analyzing the epidemiological outbreak of COVID-19: A visual exploratory data analysis approach. Journal of Medical Virology, 92(6), 632-638.

2. Diagnostic Analytics

'Why Is It Happening?'

Diagnostics analytics takes a deeper look at data to understand the root causes of the events of interest. It is helpful in determining what factors have contributed to the outcome. Diagnostics analytics aims to find out why something happens by examining the relationship between key variables, for example, beer is often bought with diapers in the famous Walmart case. It uses various methods such as correlation analysis and clustering. Understanding the reason(s) a certain phenomenon is happening can help companies to improve decision-making. Some of the applications of diagnostic analytics include product bundling, customer profiling and assessment of a rehabilitation programme.

A Case Study of Diagnostic Analytics: Association Analysis Identifies 65 New Breast Cancer Risk Loci



Breast cancer risk is influenced by rare coding variants as well as many common, mainly non-coding variants. However, much of the genetic contribution to breast cancer risk remains unknown. With the use of association analysis, Michailidou et al. (2017) identified 65 new loci associated with overall breast cancer based on 122,977 cases and 105,974 controls of European ancestry and 14,068 cases and 13,104 controls of East Asian ancestry. These results provide further insight into genetic susceptibility to breast cancer and with this, improvement to the utility of genetic risk scores for individualised screening and prevention can be made.

Michailidou, K., Lindström, S., Dennis, J., Beesley, J., Hui, S., Kar, S., Lemaçon, A., Soucy, P., Glubb, D., Rostamianfar, A., Bolla, M. K., Wang, Q., Tyrer, J., Dicks, E., Lee, A., Wang, Z., Allen, J., Keeman, R., Eilber, U., French, J. D., ... Easton, D. F. (2017). Association analysis identifies 65 new breast cancer risk loci. Nature, 551(7678), 92–94. https://doi.org/10.1038/nature24284

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3. Predictive Analytics

'What is Likely to Happen?'

Predictive analytics leverages data to make predictions about the future, through the use of machine learning. It attempts to answer, "WHAT is likely to happen?". The essence of predictive analytics is to devise models based on the existing data that allow the organisations to extrapolate the findings to future occurrences. In summary, it can help organisations to identify and exploit patterns within the data that are previously unknown to the organisations.

One of the common applications of predictive analytics is sentiment analysis, where all the opinions posted on social media are collected and analyzed (using text mining) to predict sentiments on a particular subject as being positive, negative or neutral (future prediction). Other applications include prediction of customer churn, manufacturing defects, and patients' readmissions.

A Case Study of Predictive Analytics: An Approach for Predicting Employee Churn by Using Data Mining

Yiğit & Shourabizadeh (2017) applied classification methods on a set of Human Resource (HR) data with the aim to predict employee churn. The authors also used a feature selection method, and the results were evaluated with those without feature selection. The models using data based on the features selected had considerably higher accuracy and precision for almost all classification methods. The results can help companies predict their employees' churn status and consequently help them to reduce their human resource costs through better retention strategies.

Yiğit, İ. O., & Shourabizadeh, H. (2017, September). An Approach for Predicting Employee Churn by Using Data Mining. In 2017 International Artificial Intelligence and Data Processing Symposium (IDAP) (pp. 1-4). IEEE

4. Prescriptive Analytics

'What Do I Need to Do?'

Prescriptive analytics use optimization and simulation algorithms to identify the best action in a scenario, from a given set of data. It attempts to answer, "HOW can we make this happen?" given the predicted outcomes generated from a predictive model. Prescriptive analytics also uses a strong feedback system that constantly learns and updates the relationship between the action and the scenario. An example of prescriptive analytics includes booking a taxi online, the application uses the Global Positioning System (GPS) to connect you to the correct driver from among a number of drivers found nearby. Hence, it optimises the distance for faster arrival time. Because of its power to suggest the best course of action, prescriptive analytics is an extended frontier of advanced analytics.

A Case Study of Prescriptive Analytics: Leveraging Data and Algorithms for Self-driving Cars

Waymo is an autonomous driving technology company with a mission to make it safe and easy for people and things to get where they are going. The cars use sensors to gather data on the real-time surroundings, which are then analysed to implement learning algorithms with the aim to improve the cars' driving ability. For example, a car can learn to better differentiate between a round bottle and a rolled newspaper and incorporate that learning in future situations. It can also identify when a pedestrian is ready to cross the road by observing such behaviour repeatedly. Algorithms will then rank these data in terms of their importance, so that the car will learn to brake at the appropriate time and situation. In this way, the car uses both predictive as well as prescriptive analytics to improve its ability to recognise and react to its surroundings.

(Extracted from https://digital.hbs.edu/platform-digit/submission/google-x-leveraging-data-and-algorithms-for-self-driving-cars/ on 25 March 2021)

PREPARED BY

BENNY LIM JIN XIONG | NICHOLE TAM JIE TING | WOO KAI WEN