EDITOR'S MESSAGE

EYE ON DATA ANALYTICS

Tan Teng Cheong
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The age of Data Analytics is here and now. Gone are the days when all we did with data was process it in transactions. Derived from the root words "data" and "analysis", data analytics is about aggregating, slicing, and dicing raw information to discern patterns and trends to foster business and industry growth.

Clearly an evolution from mere data processing, data analytics is made possible by the convergence of high-speed computing, large data storage, and electronic distribution through ubiquitous — and usually secured — networks, as well as modern applications that present data as more than just rows and columns of numbers.

Data analytics, which requires deep expertise, is an area suited to Singapore residents and companies here. This is why the Singapore government has identified it as a focus area for the infocomm industry. On our part, the SCS continues to keep abreast of technology trends to remain relevant to our members. Doing so also enables us to make this quarterly magazine a compelling read.

In this issue, for instance, we bring you an in-depth feature article by Dr Carol Hargreaves of NUS-ISS on how to drive growth and achieve better business outcomes by tapping Big Data Analytics and regarding it as our gold mine. In another themed article, Dr Ma Nang Laik of SMU uses a recent case study to show how predictive and prescriptive analytics helped smooth operations for an airport operator.

As well, Oliver Tian of Hutcabb Services gives us a peek at the next wave of robotics and analytics. In his uplifting article, Olivier de Rotalier of Ubisoft Singapore points out how Singapore has all the ingredients to produce the next breakthrough in the gaming industry. Additionally, Ong Whee Teck of PricewaterhouseCoppers Consulting shares his roadmap on learning.

Of course, this issue also comes with updates on our IT Youth Council and various Chapters and SIGs, as well as a quiz and peep at creative inventions.

Next year sees Singapore celebrating its 50th birthday and we've already started planning better and more engagements with you. Meanwhile, I wish all our members and readers A Very Happy Festive Period and A Wonderful New Year!

One other thing — please don't throw or stash this magazine away. Pass it on to someone else!

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SMU
SINGAPORE MANAGEMENT UNIVERSITY

School of Information

Business Leaders Need IT.

FEATURE

Turning to Analytics for Optimal Airport Efficiency

Dr Ma Nang Laik of SMU points to a recent case study to show how predictive and prescriptive analytics can help smooth operations for an airport operator.

Dr Ma Nang Laik
Director of MITB (Analytics)
Assistant Professor of Information Systems (Practice)
Singapore Management University

Growth in air traffic has been remarkable despite economic recession cycles. Air passenger traffic increased an average of about 6% worldwide in the third quarter of the twentieth century, which means the volume of air travel has doubled every 10 to 15 years. Airport terminals face a capacity issue as the number of air travellers increases.

Most airlines do not submit information about passenger load to airports in advance because sale of airline tickets continues till the day of departure. Most of this information is only available to airport operators a few hours before a flight departs or arrives. From the perspective of airport operators though, the number of passengers arriving at and departing from an airport is one of the most crucial factors required for planning and resource allocation. Without concrete figures, airport operators can only assign the number of check-in counters required daily based on "gut-feel" and experience. Overestimation of passenger load means that unnecessary resources, such as check-in counters with low utilisation will be wasted, and this wastage translates into higher operational costs. On the other hand, underestimation will result in long passenger queues at check-in counters and failure to meet service level agreements with the various airlines.

A major Asian airport operator is facing challenges of increasing passenger traffic, limited terminal resources to deal with check-ins, and long waiting time at check-in counters that result in falling passenger satisfaction levels. To solve these problems, the operator wants to use analytics to glean useful insights from past trends and travelling patterns to predict passenger loads and improve operational efficiency. For example, a forecast of passenger load can help determine the number of check-in counters that need to be opened during a particular period.

Our analytics team observed that passenger load varies according to day of the week, destination city and seasonality. We then built a passenger load forecast model using a decision tree with the following variables as input: day of week, destination city and month of the year. The model is then validated over one month using "live" data by observing the difference between actual passenger load and our predicted load. We have achieved a very high accuracy rate with root means squares error of 10% for all airlines.

However, our prediction model has two limitations: it assumes that past demand is a good estimation of current passenger load. The model also does not take into consideration external factors such as airline promotions, "long weekend" holidays, new destinations and airline growth.

The predicted passenger load from the model was also used as input in another simulation model that mimics the arrival pattern of airline passengers for departure process. The simulator can be used to predict the average waiting and serving time at each check-in counter — a very important factor to consider when meeting service level agreements. Airport operators can perform "what-if" analysis to identify the optimal number of check-in counters required to balance resources and queuing time, without breaching quality standards.

FEATURE

The model developed has been used by terminal managers in daily operations at the airport to better estimate each airline's passenger load, which is then used to better manage resources such as check-in counters more efficiently. The forecast passenger load was also used in other business decisions by various airlines using the airport. Through this project, predictive and prescriptive analytics has been applied very successfully in assisting the airport operator to utilise its terminal resources more effectively, thus reducing operational costs and improving passenger check-in experiences at the airport.

Understanding Different Analytics

Descriptive Analytics provides information on or a summary of a sample of data, using basic statistical measures. Some examples of descriptive analytics are finding mean, median, variance, standard deviation or histograms. It helps us to answer questions such as, what has happened, how, and why did it happen? It helps us to understand the current stage of art and business process, but doesn't tell us what will happen in future or be reactive.

Predictive Analytics involves advanced modelling, machine learning and data mining techniques to identify patterns in the data so that the decision makers can predict what is going to happen in the future. The models can find the relationships between the input factors, which are then used to predict the output (dependent) variables such as credit score in the financial industry, using customer demographic, incomes and spending.

Prescriptive Analytics is the final stage of analytics and specifies courses of action to achieve the predictive outcome. It involves using complex algorithms such as optimisation or simulation techniques to minimise risk or optimise resource utilisation or achieve the best outcome based on predictions or recommendations.

Learning Paramount in Fast Changing Environment

Infocomm professionals must continue to grow to stay relevant and having a roadmap on learning helps. Ong Whee Teck of PricewaterhouseCoopers Consulting shares his.

Ong Whee Teck

Senior Member, SCS
Partner
PricewaterhouseCoopers
Consulting

"Change is the only constant" – we know the cliché, however in the infocomm industry it's clear that the ability to learn, absorb new knowledge constantly is not a matter of thriving, but of survival. It has become crucial that all infocomm professionals create and maintain a personal strategy to upgrade themselves. I'd like to share my personal strategies on developing a set of new skills in an area that is completely out of my own comfort zone.

In 2012 I took time off work to pursue a new hobby, watercolour painting. Out of that experience from which I've exhibited twice — in May 2012 and August 2013 — and sold more than 80 paintings, I garnered experience in learning a new set of skills. Using this example that is non-ICT specific will avoid debates specific to the infocomm industry.

My strategy, which I coined Architecture of Adult Learning, is based on four stages, three processes and five elements of learning.

The phases of learning

In the beginning there is Ignorance (Unawareness of what we don't know) and, through a series of discoveries, we then get to the stage Awaken (Awareness of what we don't know). In the Learning phase (Awareness of what we know) and over time as we master a subject, we become a Master of the subject, which strangely requires us to become Unaware of what we know! These are the phases of a learner.

As a student of watercolour painting, I started the journey of learning how to paint without knowing what I do not know (Ignorance). However, as I read various books on drawings and paintings, I realised there was a series of key topics that I did not know anything about, such as Line Quality, Colour Theory and Edge Quality. Once you become aware that they are important aspects of a painting but you do not know anything about them, you move into the Awaken phase. This is an important process – we will discuss process next. What is