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TACKLING SOCIETAL CHALLENGES

This is a monthly series on SMU research which aims to create significant impact by addressing these five societal challenges: Economies & Financial Markets, Social Fabric & Quality of Life, Boundaries & Borders, Sustainability, Innovation & Technology.

In this issue, SMU researchers offer insights on tackling the societal challenge of advancing innovation & technology.

Digging deeper for social media insights

Professor Lim Ee Peng, SMU Lee Kong Chian Professor of Information Systems, has developed new models of analysing social media data

Professor Lim Ee Peng

The wealth of content generated on social media platforms is a virtual gold mine for businesses looking to better engage their target audiences and enhance their marketing efforts.

Professor Lim Ee Peng, who is also the Director of Living Analytics Research Centre at SMU's School of Information Systems, has developed new analytics models and techniques for analysing different types of social media data that can be used for a variety of applications.

Specifically, the aim is to enable organisations to analyse small data (short messages), large data (collection of tweets from one user) or very large data (information generated by a community) and overcome the challenges associated with analysing these three types of data.

Using small data for geolocation

When it comes to small data, Prof Lim's study tackles the problem of determining the location of social media users based on their social media activity. Performing such "fine-grained geolocation" is very challenging given the many possible locations of users.

However, being able to do so has many useful applications. For example, if it is possible to automatically determine that the post "Oh no, my bus has not shown up after 20 minutes' wait" was posted at a bus stop outside Tanah Merah Ferry Terminal, the user would then be able to receive immediate suggestions for alternative transport options.

As a single social media post contains very little content, the research proposes using content from the other social media posts of the same user to enhance the accuracy of geolocation.

These include posts that are generated around the same time as the original one, which are likely to be from nearby locations, as well as posts that contain keywords possibly used at repeatedly visited venues. For example, it is quite common to find people mentioning "office" when they are at work places.

Using this technique, the target post can be more accurately matched with words that are likely to be found in other posts generated from the posting venues. This approach has been shown to improve accuracy over other advanced solutions by 15%, reveals Prof Lim.

Accurate profiling with large data

Social media content can also be analysed by aggregating all data generated by one user to create a profile for the purpose of personalising product recommendation, job search, and content suggestion applications.

Prof Lim's study found that a significant proportion of users may disclose only selective information about themselves – a practice known as "selective self-disclosure" – by not generating any content or generating very little content, as well as by suppressing specific topics or opinions.

However, the research showed that an accurate profile of a user can still be generated by using information about the user's neighbours and behaviour on social media. "Organisations that wish to establish good relationships and communication platforms with audiences through social media have to realise that they should profile their audiences by not only focusing on what they say or disclose on social media, but also how they behave and who they choose to interact with to derive a more accurate judgement of consumer needs and preferences," says Prof Lim.

Prof Lim's research also developed a model for selecting suitable social media influencers for marketing campaigns.

This involves automatically discovering "topic-specific influencers" by determining which social media user accounts generate good content on a certain topic and attract followers and follower interaction on that topic.

Analysing large data without human labelled data

Analysing social media data at the community level within a single social media platform or across multiple platforms is known as analytics with very large data. Unlike the cases of small and large data, however, the analysis of such data must take into account the possibility of users operating multiple accounts across different social media sites. Overcoming this "user identity linkage problem" will require matching user accounts from different social media platforms that belong to the same users.

Prof Lim's research has developed solutions that do not require human experts to identify known accounts belonging to the same user, also known as "human labelled data".

"By combining similarities between accounts measured by different account features such as bio description or user name, our proposed solution can achieve better accuracy than some state-of-the-art solutions that require human labelled data," says Prof Lim.

He adds: "In the experiments, our proposed solution has also shown to correctly find for a given target user account on one social media platform, say, Facebook, the matching account from another social media platform, say, Twitter, more than half the time; an accuracy level sufficient for many real world applications."

Scan the QR Code to view the video on this topic

Persuading the crowd to back your innovation

Associate Professor of Marketing Hannah Chang investigates why some crowdfunding pitches do better than others

Associate Professor Hannah Chang

If you've ever wondered how to design the pitch in your crowdfunding video, a new study from SMU may have the answer for you. Recent research by Associate Professor Hannah Chang from SMU's Lee Kong Chian School of Business shows that having more than one person communicate your new product innovation helps persuade consumers to fund your entrepreneurial venture. Prof Chang calls this phenomenon the "voice numerosity effect". The effect is more pronounced if the information provided in the pitch is not overly complex; when the audience is not distracted and can process what is being said in the video; and when those listening to the pitch "enjoy thinking".

Analysing real-world data using multiple methodologies

These findings were established through a series of experiments and real-world Kickstarter data, involving video pitches on the crowdfunding platform. Several experiments studied audience reactions to videos under varying conditions, while another study used recent advances in deep learning models to analyse all product pitch videos on Kickstarter since its inception in April 2009 till February 2017.

These models – which leverage machine learning and natural language processing technology – were used to measure the number of speakers in each video, transcribe the audio in each video, and analyse the visual information presented in the video.

Fine tuning your product innovation pitch

Businesses can use the research findings to improve their product pitches and increase the amount of funding they garner, says Prof Chang. For example, if the product is something that is relatively simple to understand, such as is the case with continuous innovations that are often introduced to the marketplace, then it would be better to have it described by multiple communicators.

This also applies to advertisements. For instance, Honda's 2017 Super Bowl commercial, "Yearbooks", featured no less than nine celebrities. Likewise, online political campaigns in the United States often showcase multiple American voters advocating for one candidate; whether it was Barack Obama's presidential campaign advertisements "It Begins with Us" and "Main Street" in 2012, or Hillary Clinton's "Getting Started" in 2016. Previous studies have shown that people tend to like messages with multiple speakers because they pay attention to the message each time a new speaker appears.

However, if the product or service being hawked is something more complex to understand, such as is the case with disruptive innovations, then it would be better to have it described by just one communicator. This is because having multiple speakers deliver a spiel on a complex topic reduces the audiences' ability to process the information. On Kickstarter, for instance, product-pitch videos usually cover a wide range of topics such as the features of a new product, the management team, and post-purchase service, thus leading to a more "complex information environment".

"This suggests that people might not be able to take advantage of more information beyond a certain threshold. Empirical findings show that when people have too much information, they can experience information overload, leading to counterproductive outcomes," explains Prof Chang. Such outcomes can include increased confusion, delay of decision making, decreased motivation to choose, and reduced consumption quantity. "Our findings suggest that having multiple communicators present information about a new product can enhance persuasion or funding under certain conditions," she says.

Communicating effectively in the modern marketplace

Earlier studies failed to completely capture the voice numerosity phenomenon because they were conducted in laboratory conditions and looked at simpler information environments. For example, one early study asked participants to evaluate a restaurant based on four pieces of information: "fast dining service", "high quality cheese", "free soft drinks with each order", and "reliable home delivery".

In the real-world, however, consumers often consider products based on more comprehensive information. In the modern marketplace, new products are often presented using various media, including text, audio, and video. The SMU study used real-world data and a substantially larger sample, enabling the research team to quantify the substantive economic consequences of the voice-numerosity effect.

Says Prof Chang: "Digital technology has transformed the marketplace and brought about new behavioural phenomenon, such as online crowdfunding and the popularity of product videos. There is an emerging area of research that started to look into these new contexts enabled by digital technology. These studies usually are more descriptive in nature, rather than pinpointing the causal behavioural mechanisms and the psychological processes underlying consumer behaviour. Therefore, prior studies stop short of offering prescriptive advice to entrepreneurs and crowdfunding platforms. By studying the psychological underpinnings of consumer behaviour – the building blocks of market demand for new product innovations – we aim to generate practical and actionable insights for today's businesses and entrepreneurs."

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