Predicting how people think and behave

Dr Victor Joo Chuan Tong discusses two innovative social intelligence systems that can precisely forecast the attitudes and responses of individuals or groups from social media data.

To begin, can you outline the chief goals of your current study?

Social media and platforms are highly transformative, already disrupting industries and creating new economic sectors and opportunities. We feel that social computing is the next big thing for enterprises in the evolution of big data analytics. Our primary goal is to develop new research capabilities to address the challenges of this new ‘social era’. I also hope that we can apply our work in social innovation to build a more sustainable and inclusive world, in particular in Singapore, our home country.

Our scientific programme is structured into three inter-related research thrusts: Psychometrics and Decision Science, Consumer and Social Intelligence, and Cognitive and Social Systems Modelling. We fuse capabilities and know-how from multiple disciplines in computing, engineering and social-behavioural sciences. It is critical to properly fuse these elements to avoid the ‘garbage in, garbage out’ scenarios common to poorly managed multidisciplinary programmes.

Could you talk us through your role in the Social and Cognitive Computing Department at the Agency for Science, Technology and Research’s Institute of High Performance Computing?

Social computing refers to the study of social behaviour and social context using computational systems. Cognitive computing deals with intelligent computing methodologies and systems that mimic natural intelligence behaviours of the brain such as thinking, inference, learning and perceptions. We believe that both fields are converging.

My task is to look at how to best fuse these elements by emphasising the interdisciplinary aspects. We combine advanced data-driven analyses with theory- and hypothesis-driven approaches in social behavioural sciences. Thus, we deal with both hard and soft science. We now hope to nurture more researchers with a good knowledge of these disciplines, who can communicate well and have a good appreciation of what their colleagues are doing.

What are People Analytics (PA) and Sentiment Analytics (SentiMo)?

PA is a suite of technologies we are developing. It is capable of inferring individuals’ personalities, values and behavioural dispositions, given a small set of observed characteristics. Our modelling framework is based on localist-connectionist networks in which these integrated representations comprise generalised, de-individualised associative relationships (as heterogeneous links) between various attributes or dimensions (as nodes) and their idiosyncratic variations across individuals, such as personalities, attitudes, beliefs, preferences, interests, temperament and behavioural tendencies. The main psychographic inference algorithm has been validated on a set of human subject data collected about people’s perceptions of other people based on a few facts.

SentiMo is a psychographics-enhanced sentiment and emotion classification engine we are developing using fuzzy inference methods. The system is capable of fine grain sentiment and emotion analysis of social media data, able to recognise varying degrees of positive and negative sentiments, without the need for training datasets. This last feature is of particular importance for analysing unconstrained real-world data.

In which areas can PA and SentiMo be used?

PA has applications in finance and wealth management, consumer profiling, market segmentation, branding and human capital management. For example, it could be used for screening job candidates, making creditworthiness assessments and profiling consumers for product ranges.

SentiMo has applications in marketing, product innovation, customer relationship management and public relations. It could be used in competitor analysis, branding or policy formulation and understanding consumer preferences for different product features. Moreover, it can generate understanding of the attitudes and emotions of customers in real time and sense public sentiments for marketing campaigns.

Why are social computing and cognitive computing such useful tools?

Big data involving people can be used to generate insights of critical value for society. Social and cognitive computing tools put a human face on big data and enable innovations for better outcomes in everyday life.
Harnessing the power of big data in social networks

Multidisciplinary research at Singapore’s Agency for Science, Technology and Research develops next-generation social informatics and computing systems that can rapidly make sense of internet-enabled human interactions for a wide range of applications.

Users of Social media platforms, such as Facebook and Twitter, are able to constantly communicate personal news, as well as their likes and dislikes, to circles of friends, family and followers. As a result, a large industry has sprung up around this behaviour that attempts to mine information about potential consumer preferences and sell it to anyone interested in using it – for targeting advertisements or selling luxury products, for example.

As the internet becomes more open, the wealth of available data will grow. However, current data mining tools are relatively unsophisticated: “Organisations face a common challenge in unlocking the value of social data, interpreting the results reliably, and translating them into actionable insights to enhance operational efficiency,” states Dr Victor Joo Chuan Tong, Director of the Social and Cognitive Computing Department at the Institute of High Performance Computing (IHPC), Agency for Science, Technology and Research (A*STAR) Singapore.

Blending expertise in social and consumer psychology, behavioural analysis and economics, linguistics, intelligent systems, and social and cognitive science, Tong is developing two applications for mining big data to predict personal or social behaviour with high accuracy: People Analytics (PA) and Sentiment Analytics (SentiMo).

Predicting the Personal

PA is a modelling and inference suite that can be used to predict a person’s preferences, purchasing decision-making patterns and even job fit and performance from only a few known attributes. Integrating research findings on measures of human personality, behaviour and cognition, PA can report on the unobserved – and, most importantly, unobservable – character traits that drive a person’s motivations, values and tastes from very limited information.

Based on fuzzy logic and linguistic processing engines, SentiMo, on the other hand, can harness insights about people’s attitudes and emotions even when they use very different ways to express their thoughts on Twitter: “SentiMo is capable of fine-grained sentiment classification, and trend, influencer and geospatial analysis,” Tong explains.

SentiMo collects and classifies tweets – in different languages, topics and social contexts – as positive, negative, neutral or mixed. It then filters them by the dominant emotion they express, ranging from anger to anxiety and satisfaction. The results are displayed in near-real time in a descriptive graphical dashboard that reveals emerging trends: “Organisations can pick up changes in patterns or behaviour on the ground early, anticipate and respond to the consequences of change faster, better understand and respond to customer needs and thus enhance their marketing and public engagement capabilities,” Tong enthuses.

Fast Trend Monitoring

IHPC recently tested SentiMo as a means of leveraging the power of social networking systems to calibrate response measures and communicate risk during an outbreak of a communicable disease.

The trial analysed avian influenza A (H7N9)-related content shared on the popular Chinese Sina Weibo social networking and microblogging site during the 2013 outbreak in China, to determine how SentiMo might have helped with epidemiological monitoring. References to H7N9 were collected and compared against information obtained from public health reporting and information sites and news media at the time. SentiMo reported new cases of H7N9 significantly faster than the conventional channels and also provided richer information about the outbreak.

Tong has now validated the potential of SentiMo and PA with several organisations to better understand consumer behaviour and sentiments, and plans to upgrade their capabilities for more unconstrained analyses. He hopes to attract talented researchers to help with this, and new partners to participate in their productisation for market readiness.