

Statement of Research

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Broadly, my research focuses on applying big data analytical techniques to domains that have spatio-temporal dimensions, including social sciences. I also do research in other domains as they are relevant and important in my field of research, particularly applied research, including natural language processing (NLP), artificial intelligence, machine learning, computer vision on satellite images, storage systems (NOSQL, spatio-temporal data modeling and indexing structures), and science gateways.

While my computer science research is not limited to the communication domain, I will emphasize my social media related research in this statement. My research utilizes social media data--particularly tweets from twitter--that has a lot of potential, prevalent, and close to us in which it is undeniable that everybody mostly interacts with these days. Because of that fact, we utilize these social media data from crowd-sourcing efforts in order to consolidate data to support analyses in our research. Specifically, we use streaming tweet data captured from real people for modeling using the approach of Internet-of-Things such that individual devices on the ground are treated as data input devices (social sensors) combined with NLP and modeling and computational methods to predict potential flood events in near-real time.

Furthermore, I am working with Kerk Kee, Associate Professor in the College of Media and Communication at Texas Tech University, on a multidisciplinary project to harness social media to understand information diffusion, operationalized by favorites, replies, and retweets, during natural disasters. More specifically, we are analyzing Twitter data related to Hurricane Ida, to investigate what (a) linguistic features (e.g., positive vs. negative emotion words), (b) linking features (e.g., hashtags #, mentions @, URL), (c) visual features (photos vs. videos), (d) spatio-temporal features (e.g., timing of tweets, geotags), (e) Twitter users' network positions (e.g., degree centrality, closeness centrality, betweenness centrality, and eigenvector centrality) drive faster and greater information diffusion. Our goal is to generate social media message strategies to help Twitter users accelerate their message diffusion in future disasters. Kerk Kee and I also believe that this work is fundable at the federal level, such as the National Science Foundation.

I have work-in-progress that will soon be turned into manuscripts for submissions. For example, I completed work on the use of big spatial data in additional geo-informatic applications, such as natural resource monitoring, wildfire identification, and flood risk assessment strategies. Furthermore, I worked on performance comparison of NOSQL systems in the geo-informatic application context. This work can be used as a guideline when a big data storage is needed for developing a GIS application such as for a startup company that anticipates storing a huge amount of customer/user or social media data along with their geotags.

As a full-time faculty in Computer Science, I continued to find ways to promote computer science to under-represented groups. One of the first efforts is encouraging female students to engage in computer science research. During my 6 years at KMITL, I have succeeded in mentoring 4 female undergraduate students and 2 female graduate students in my research group. For example, very early on during my time at KMITL in 2016, I took on advising a female undergraduate student (Nisarath Limadisai) on a project on performance comparisons of graph-based NoSQL systems on stand-alone environments. She successfully completed her senior capstone project in 2017. Subsequently, another female student (Jeedapa Kaiyasuan) joined my research team and co-authored a paper published in the 2018 IEEE Big Data conference proceedings. The paper utilizes Twitter data for early flood detection in Thailand. Furthermore, two recent female undergraduates (Surinthon Testhomya & Auengloung Sae-kyu) and I are finalizing a research paper (tentative title: “Utilizing RasDaMan database for geo-informatics applications: Natural resources monitoring and wildfire hotspot detection”) to be submitted to a local conference in Thailand. As a result of this recent effort, Surinthon is discussing with me about pursuing a master’s degree in computer science. Today in 2022, I am supervising two female graduate students: Now Seemoungkum and Mild Phanumart. Seemoungkum is working on “Medical AI: Detecting abnormal cells (cell profiling) for Thalassemia.” This project is an international collaboration with Dr. Mingon Kang, Assistant Professor at the University of Nevada at Las Vegas.). Phanumart is working on “Analyzing Users Segmentation in Clusters on YouTube through Comments or Interactions.”

I am currently a co-PI at KMITL on a joint European Union grant entitled “Education & Training for Automation 4.0 in Thailand” (ETAT, <http://etat-erasmus.com>, total funded: EUR 93,464.00), by the “Erasmus+” Programme (EuRopean Community Action Scheme for the Mobility of University Students), European Union. Led by Warangkhan Kimpan (PI at King Mongkut’s Institute of Technology Ladkrabang in Thailand), I am working with other co-PIs, including Wisan Tangwongcharoen, Kridsada Budsara, and Rungrat Wiangsripanawan. Given this experience, I plan to seek collaborative NSF funding with new colleagues once I am back in the US. In addition to this, I will be exploring other external funding opportunities with the NSF and other funding agencies.

=== *End of Statement* ===