Thesis Portfolio

Predicting User Behaviour at Twitter

(Technical Report)

Examine China's Standards in the Development of Telemedicine

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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SOCIO-TECHNICAL SYNTHESIS

The contents of this thesis portfolio submission include both a technical report and an STS research paper.

The technical report was based on my capstone research project, completed in December 2019. This report would focus on user behavior prediction on Twitter. User behavior prediction from social media posts could potentially enable more robust active cognition models, and help construct more accurate simulations of the spread of online information to further the understanding of adversarial manipulation of such information. This technical report presents a network-based framework to predict a given Twitter user's reactions to a given set of information. natural language processing was used to tokenize each tweet from our collected data and constructed a semantic network from a given Twitter user's timeline. Then, text tokens were used as nodes, and integrated spreading activation to assign weights to nodes. After that, the unweighted centrality and weighted centrality with TF-IDF for tweets the user may see were calculated, and such values were used with other Twitter-specific features to train the classifier. The classifier implements a Convolutional Neural Network model that takes a list of tweets and assign probabilities of different types of user behaviors. In the evaluation, the implementation of the semantic network has generally increased prediction accuracy from baseline models. Several potential applications of our framework were also provided.

The STS thesis would focus on the development of telemedicine in China. Telemedicine is a subsection of smart health which involves the practice of caring for patients remotely when the provider and patient are not physically present with each other. Healthcare contributes to any average person's good health and well-being, a fundamental human right. To explore potential implementations of telemedicine in the United States, international developments about telemedicine were examined during the study, especially Chinese telemedicine startups companies that are applying Artificial Intelligence to advance the development of telemedicine. In the thesis, case studies were conducted on telemedicine-based companies in China with both SCOT and VSD methods to analyze the creation of ethical and technical standards with telemedicine-based applications. Surveys from students enrolled in Zhejiang University to gain the first-hand experience the telemedicine-based applications during the COVID-19 pandemic, with a brief social media analysis followed to explore the general public's opinion towards this development.

The technical report and STS thesis are unrelated.