CAREER: Generating Credible Structured Action Models from Unstructured Social Media Data for Interpretation and Decision Making

Overview

The ever-growing presence and emergence of social media communities provide an efficient channel for individuals to connect, share and support each other particularly in the context of individuals aiming to achieve personal goals. This proposed work focuses on leveraging the publicly shared narratives to achieve two main goals: interpretation and decision-making. In particular, the specific aims of this project include: (i) developing a framework that automatically builds near-complete mental models using the engagement, syntax and semantics extracted from the posts shared by users on online discussion platforms; (ii) aligning heterogeneous data from multiple verified sources with the narratives shared by users on social media communities; (iii) using these mental models to examine the factors that drive the success of achieving personal goals in an online community setting, and there by determine evaluation metrics that make social media data good enough to build mental models for sequential decision making; (iv) building a generalizable framework that considers users' posts in any domain to build mental models of users to be deployed in addressing various societal issues.

Keywords: Online Social Media Communities, Unstructured Text, Mental Models, Markets, User Behavior, Unstructured Text, Text Analysis, Sequential Decision Making.

Intellectual Merit

The proposed work is highly timely and essential as with the times changing, society is resorting to social media communities to voice their opinions either individually or collectively. For some of the challenging public health crises such as misinformation, drug addictions, smoking and alcohol addictions, etc., social media is a great sensor to assess how individuals are going through the crises, and their coping mechanisms. Leveraging the shared narratives to identify plans that help vs plans that are not useful might help individuals stay track on course to achieve their personal goals in a methodical fashion. Conducting surveys may help but it's a very tedious process and resource consuming. Also, qualitative analysis which is a byproduct of this proposed research will shed light on various questions related to sharing practices of narratives on online communities, and the practical advice, support, feedback from other users to achieve goals. The anonymity factor provided by social media platforms can help individuals to hide their identity but can be their true self which helps us to answer various questions with a large-scale data to there by proposed policies and plans to support individuals in such situations. This work will also lay a foundation for core artificial intelligence research in terms of how to create mental models of individuals through their narratives, which can be deployed in various real-world applications.

Broader Impacts Of The Proposed Work

The technical solutions involved in this proposal are generalized approaches for building mental models through user discourse. A diverse set of domains could benefit real-world applications such as, mitigating the spread of false news, fighting endemics, limiting hate speech, etc., by using

mental models to study user behavior shifts, community dynamics of user engagement. Some of the technical solutions are especially beneficial in extending the research in classical planning where domain models are still compiled manually by experts and existing approaches may not be used to diverse domains due to lack of structured models no matter how powerful the approaches could be. The solutions proposed in this approach will narrow this gap to not only work with the free text and bypass relying on manual capabilities to construct domain models. Looking further, some of the techniques in this work will also aim at improving the online communities to facilitate healthier discussions especially in the context of sensitive personal topics. This project will pave a way to provide new training and education experiences for students enrolled in graduate and undergraduate programs here at the Lally School of Management, Rensselaer Polytechnic Institute and beyond. It will especially enrich the classes that I teach primarily for non-CS students who might benefit greatly from the exposure to these kinds of systems proposed in this project – as they venture into careers that make a difference in the world through technology. The concepts such as data mismatches, structured models, explainability through the models to create a fair and transparent software will be extremely beneficial in the teaching pedagogy. On the other hand, we hope that this project could potentially lead to collaborations with the local community especially Troy, New York (NY) in the capital region of NY. For instance, drug-involved overdose deaths increased by 37% among the NY state residents according to the NY State Department of Health (NYS DoH). Our goal for this project is to create ways for a smoother knowledge exchange between different agencies to ensure in real emergency (especially in public health crises) appropriate steps could be taken with minimal to no time delay.