Thesis Project Portfolio

Enabling Machine Learning Prediction of Consumer Stalling in Checkout Process

(Technical Report)

Social Group Influence in the California Consumer Privacy Act

(STS Research Paper)

An Undergraduate Thesis

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Rishika Nayak

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Department of Computer Science

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Sociotechnical Synthesis

Introduction

My technical report and STS research project both center around the theme of consumer data privacy, albeit from different angles. In my technical report, I focus on my experience as a Software Engineer Intern at an eCommerce company where I worked on developing a backend microservice to predict customer behavior during the checkout process. This project showcased the practical application of machine learning using consumer data and highlights the importance of this data in online commerce. Consumer data allows eCommerce businesses, such as the one I interned for, to predict consumer buying behavior, facilitate the shopping process for customers, and increase the company's revenue. Due to the capabilities of consumer data in enhancing online business, companies with data collection practices have reason to hold stake in consumer privacy regulations. My STS research examines consumer data privacy legislation with respect to how such stakeholders influence it. I investigate the rulemaking process of the California Consumer Privacy Act (CCPA) in 2018, focusing on the tension between stakeholders advocating for individual privacy rights and those prioritizing corporate interests. Together, these projects offer insights into the multifaceted nature of consumer data privacy and how it is interacted with by different social groups.

Technical Report

In the Summer 2022, I interned as a Software Engineer Intern for an eCommerce company. An issue persisted for this company in which customers would occasionally stall at certain points in the checkout process. The team I worked on proposed a solution to develop a machine learning model to predict how likely a customer is to stall at a phase of the checkout process. My role in this project was to develop the microservice, or backend architecture, that links the frontend to the

customer stalling ML model. To complete this project, I used tools standard to my team— the framework Flask and the language. In the development of this project, I implemented the following mechanisms: processing of the front-end request, API calls to retrieve relevant data, feature engineering of retrieved data into model input form, an API call to the ML model, and processing prediction output data for delivery to the front-end. Essentially, my work transformed the prediction data into a readable format for the front-end and returned the prediction to the front-end for use. Upon completion of my project and internship, my team integrated the microservice I developed into the checkout process nudging system.

STS Research Project

My STS research investigates the influence that various social groups have on the formation of data privacy legislation. Specifically, I explore the rulemaking process of the California Consumer Privacy Act (CCPA) in 2018 to reveal the context behind the first data privacy legislation in the United States. I use the Social Construction of Technology framework to demonstrate that there was a battle between stakeholders invested in individual privacy rights and corporate interests during the CCPA's rulemaking process. In my analysis, I discuss how this tension shaped key provisions of the CCPA, such as the definition of "personal information," private right of action, and the right to opt-out. While corporate-side entities aimed to balance privacy regulations with revenue generation, consumer advocacy groups pushed for robust privacy protections. Considering this conflict, I argue that the CCPA was shaped through a battle of interests between corporate-side stakeholders who view consumer data as a commodity and consumer-side stakeholders who view it as an extension of identity. The purpose of my research is to offer insights into the interests of stakeholders invested in data privacy to aid policymakers in designing provisions that balance their needs in future legislation.

Conclusion

  Working on both my Technical Report and STS Research Project simultaneously provided me with a unique and comprehensive perspective on the intricacies of consumer data privacy. Through my technical project, I gained practical experience in developing a system that uses consumer data for predictive analytics. My report on my project shed light on the value of consumer data in business practices. Moreover, reflection upon my internship project allowed me to understand firsthand the challenges and considerations involved in handling consumer data responsibly. My STS research delved into the needs of social groups invested in data privacy legislation, particularly through the lens of the CCPA. By examining the interplay between various stakeholders, including corporate-side and consumer-side entities, I gained insight into the social group interests that shape data privacy laws. Completing these projects together enabled me to use the Social Construction of Technology framework to connect how social influences impact how consumer data privacy is used practically. Additionally, by engaging with stakeholders on different levels— from technical implementation to legislation research—I developed a holistic understanding of the challenges and opportunities in safeguarding consumer data privacy. Overall, working on both projects together allowed me to collect diverse insights and develop a more nuanced understanding of technological artifacts such as consumer data privacy.