Thesis Project Portfolio

Improving Post-Trade Risk Analysis at Jump Trading

(Technical Report)

The Effects of Techniques Used by App Developers to Retain Users

(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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Spring, 2023

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Contents of Portfolio

Executive Summary

This portfolio consists of a research paper and a technical report. The research paper is about the techniques used by apps to increase user engagement and screen time. The technical report is a case study detailing the development of a web application for a high-frequency trading firm, Jump Trading, to manage unaccounted-for trades. By exploring these topics, the report highlights the importance of ethical considerations in app design and the potential advantages of technology-driven solutions in various industries. The research paper investigates various techniques employed by app developers to increase user engagement, such as infinite scroll, streaks, and notifications. It discusses the advertising model used by many popular apps and how revenue generation is directly tied to user engagement and time spent on the app. The paper delves into the background of app monetization, focusing on the advertising model employed by many popular apps like Instagram, Facebook, TikTok, Google, Snapchat, and Twitter. It explains how revenue generation is directly tied to user engagement and time spent on the app, with more time spent leading to more advertisements being shown. The paper then explores the psychology behind user manipulation, such as growth hacking and dopamine stimulation. The psychological technique of positive intermittent reinforcement is also discussed, as it plays a significant role in keeping users constantly checking their devices. Several techniques for increasing user engagement are detailed, including infinite scroll, log-in streaks, and push notifications. The paper critically evaluates the effectiveness of these techniques and discusses potential regulations that could be enforced by the government to protect users from the potentially harmful effects of such manipulation. The paper emphasizes the importance of app developers taking responsibility for the potential harm caused by these techniques and the need for ethical considerations in app design. By bridging the gap in understanding between a company's motivations, the development

of addictive and manipulative techniques, and the negative impact on users, the research paper provides valuable insights into the consequences of increased screen time, which has been linked to depression and mental health issues, particularly in young people. The technical report presents a case study on the development of a web application for Jump Trading, a high-frequency trading firm. The application was designed to reduce the risk of unaccounted-for trades and improve the granularity of risk control. The application was successfully implemented by using React, Python, and SQL, enabling the risk team to better account for millions of individual trades. The development process for the Jump Trading application involved a step-by-step approach, focusing on frontend changes before addressing backend modifications. This strategy allowed for a better understanding of data requirements and efficient integration of new features into the platform. The results demonstrate the application's effectiveness in providing a more detailed view of individual trades and allowing the risk team to mitigate potential losses, potentially saving millions of dollars. Future work for the Jump Trading application includes improving the user interface to match the styling of other internal applications and optimizing memory usage on the client side. The success of this project highlights the potential benefits of technology in the finance sector and the importance of innovative solutions in managing risk. 2 In conclusion, the research paper and technical report explore the ethical implications of app development techniques and their impact on users, as well as the implementation of a web application to manage risk in high-frequency trading. The findings underscore the importance of considering user well-being in app design and the potential advantages of technology-driven solutions in various industries. With a better understanding of both the motivations behind app development techniques and the potential harm they can cause, stakeholders can work towards creating regulations that protect users and foster responsible innovation in the tech industry.