Thesis Project Portfolio

Enhancing Cybersecurity Through Artificial Intelligence and Machine Learning

(Technical Report)

Understanding the Role and Effectiveness of Public Service Announcements in Promoting Social Messages

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

This portfolio comprises two comprehensive papers that explore the impact of technology on society by focusing on two distinct topics. The first paper delves into the use of artificial intelligence (AI) and machine learning (ML) in the detection and prevention of cyber-attacks, while the second paper examines the role and effectiveness of Public Service Announcements (PSAs) in promoting social and public health messages. Each paper provides valuable insights into these areas and highlights the importance of continued research and innovation in these fields.

In the technical paper, I will address the growing issue of cyber-attacks and the limitations of traditional cybersecurity methods. Cybersecurity has become an increasingly pressing concern in today's digital age, as cyber threats continue to evolve and become more sophisticated. Traditional cybersecurity methods, such as firewalls and intrusion detection systems, have proven to be insufficient in the face of these evolving threats. As a result, there is a growing interest in the application of AI and ML techniques to enhance cybersecurity measures. The paper explores this interest and discusses various approaches for the implementation of AI and ML in cyber-attack detection and prevention.

I will detail how supervised and unsupervised learning algorithms can be used to train models capable of identifying patterns and anomalies associated with different types of cyber-attacks. These models can be invaluable in detecting and preventing cyber-attacks before they cause substantial damage to individuals and organizations. The paper discusses the implementation process, which includes data preprocessing, feature selection, model training and evaluation, and deployment. The results demonstrate the effectiveness of AI and ML in achieving high accuracy rates and low false positive rates in cyber-attack detection. The paper concludes with future work, including refining the models, testing on larger and more diverse datasets, and exploring new AI and ML techniques to further

improve accuracy and efficiency. The technical paper serves as a testament to the potential of AI and ML to revolutionize cybersecurity, and emphasizes the importance of continued research in this area.

The second paper, the STS project, examines the role of PSAs in modern society. PSAs are a common method for spreading important information and promoting social and public health messages, often produced by non-profit organizations, government agencies, or other institutions. I will pose research questions aimed at understanding the effectiveness, implementation, and intentions behind PSAs, with the goal of providing recommendations for improvement and better utilization.

The paper first outlines the STS methods and frameworks used to analyze PSAs, then delves into case studies of successful campaigns. These case studies provide valuable insights into the factors that contribute to a PSA's effectiveness, as well as strategies for creating impactful messages. I will also discuss general tips and tricks for producing successful PSAs, offering guidance for organizations and institutions seeking to optimize their use of this communication tool.

In addition to exploring the factors that contribute to successful PSAs, the paper addresses the challenges and limitations associated with these announcements. I identify issues such as audience engagement, message clarity, and the potential for unintended consequences. By examining these challenges, the paper provides a more nuanced understanding of the role of PSAs in society and offers suggestions for overcoming these obstacles to create more effective messaging.

Together, these papers provide valuable insights into the applications of technology in addressing real-world problems and promoting societal well-being. The technical paper showcases the potential of AI and ML to revolutionize cybersecurity, while the STS project highlights the importance of effective communication in disseminating vital information and shaping public behavior. Both papers underscore the need for continued research and innovation in these fields to improve outcomes and enhance our understanding of these critical topics.