Thesis Project Portfolio

Novel Web Application for Image Authentication and Deep Fake Prevention (Technical Report)

Developing a Framework to Formulate a Balanced Approach to the Development of Data Analytic Technologies in Sports (STS Research Paper)

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Executive Summary

In the last 10 years technology has undergone exponential growth and at the forefront of this growth is artificial intelligence (AI) and it needs to be kept in check. My technical report features a web application that can detect if images have been altered from their original copy. This is important as ai generated pictures are becoming more prevalent and harder to detect and this web application offers a way for these images to be detected. My STS research paper explores the growing data analytics and AI that are being integrated into sports culture and how they are changing the way sports are being played and managed. This is important because the growing data analytics is threatening to diminish the impact of traditional sports wisdom and the human element that accompanies it, it is important to balance the two to ensure that the passion of sports stays alive. These topics are not entirely connected however they both focus on the rapid growth of AI and how it needs to be checked. Both of these papers tackle potential problems that AI can cause if it grows too rapidly.

This technical report presents a significant contribution to digital media verification through the development of a web application modeled after a certificate authority, which verifies the authenticity and origin of images and videos. This application effectively addresses the challenge of deepfakes, AI-generated forgeries that now flood the internet. By leveraging Python libraries such as Flask for web development, cryptography for RSA encryption, and SQLite3 for database management, the project implements an environment that checks for tampering or AI-generated alterations in content that is uploaded to the web application. The application also offers a safe location to store original images as the application is RSA encrypted.

The results of the study showcase the effectiveness of the web application in authenticating digital media by demonstrating perfect accuracy in detecting tampered images. In addition, the application's user-friendly interface has been well-received, indicating a minimal learning curve to using this tool. Looking forward, the future steps include enhancing the application’s accessibility and ultimately integrating it into mobile devices to allow real-time uploads and instant verification, which would greatly expand its usability in everyday interactions. The project's continuing development aims to refine the application’s infrastructure, ensuring it can seamlessly handle increased traffic as the application scales. This progression is crucial for the integrity of digital content in an era where deepfakes and AI-generated images are becoming more prevalent and realistic.

This STS paper explores the question of how the rise of data analytics is reshaping the cultural and competitive landscapes of sports. It investigates the balance between maintaining the human essence of sports and embracing technological advancements that enhance performance and fan engagement. It employs a mixed-methods approach, the study integrates quantitative analyses to measure the direct impacts of analytics on sports performance and fan behavior, alongside qualitative interviews that capture the personal experiences and perspectives of various stakeholders within the sports ecosystem. This comprehensive methodology, framed withinTechnological Determinism and the Social Construction of Technology (SCOT), and Actor Network Theory allows for an in depth exploration of the relationship between data-driven decision-making and traditional sports values.

The findings from this research reveal that data analytics has a massive impact on the sports industry, driving changes in performance strategies, and fan engagement. Quantitative evidence showed improvements in team performance and injury prevention, resulting from the

adoption of new technologies. However, qualitative data from interviews with athletes, coaches, and fans highlight the other side. While some athletes, fans and coaches embrace these changes for the competitive edge they offer, others regret the loss of spontaneity and the 'human' element in sports. The paper concludes that while data analytics offers many benefits in terms of performance and the business operations, its integration into sports must be carefully managed to preserve the values of passion and unpredictability that define the spirit of sports. Balancing the technological advancements with these values is crucial, ensuring that sports remain a dynamic part of human culture.