Undergraduate Thesis Prospectus

How Machine Learning May Change Ecommerce

(technical research project in Computer Science)

Sustaining Confidence in Autonomous Vehicles: How Automakers and Tech Companies Invoke Technology to Protect Their Credibility.

(sociotechnical research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Prospectus

General Research Problem

What are the sociotechnical implications of ML?

Recent developments in machine learning (ML) offer new possibilities in automation that may transform numerous economic sectors, including ecommerce and transportation. Besides ML's actual technical capabilities, perceptions of ML and of other state-of-the-art technologies, such as 5G and lidar, have been applied to sustain confidence in unproved developmental systems, such as connected and autonomous vehicles.

How Machine Learning May Change Ecommerce

How ML may transform e-retail?

The technical research problem explains how Machine Learning may transform e-retail. Machine Learning helped ecommerence companies improve their services through chatbots to assist customers, natural language processing which analyzes data to help consumers find recommended products, and more data privacy on ecommerence stores (Odrynska, 2021). Professor Bloomfield, a staff member in the Department of Computer Science at University of Virginia, is the advisor. This project is a capstone and solo project.

Sustaining Confidence in Autonomous Vehicles: How Automakers and Tech Companies Invoke Technology to Protect Their Credibility.

Since 2018, as optimism about the near-term possibilities of so-called "autonomous vehicles" (AVs) has waned, how have tech companies used promises about ML, 5G, and other state-of-the-art technology to revive the optimism?

Tech companies and automakers invoke machine learning (ML), 5G, lidar, and other state-of-the-art technology in an effort to sustain optimism about connected and automated vehicles. According to some companies, ML may finally make autonomous vehicles practical (Zhydik, 2021). The participants include seven tech companies: Honda, Tesla, Waymo, Aurora, Autonomous Vehicle Industry Association (AVIA), Partners for Automated Vehicle Education (PAVE), and the Coalition for Safe Autonomous Vehicles and Electrification (SAVE Coalition). Honda plans to equip its vehicles with five millimeter-wave radar arrays to for automatic braking and steering control (Usher, 2022). Tesla aims to develop autonomous vehicles (AVs) with no manual controls (Nedelea, 2022). Waymo's AVs use cameras, radar, and sensors for navigation (Wayland, 2022). Aurora (n.d.) uses cameras and sensors to improve AVs' perception. It works with Toyota, Uber, Volvo, and Pascar to reach more customers (LeBeau, 2021).

The Autonomous Vehicle Industry Association (AVIA) promotes autonomous vehicles in the U.S., claiming that vehicle automation will make roads safer and improve mobility access among the elderly and disadvantaged (AVIA, n.d.). It uses sensors and computers in its level 4 and 5 AVs. AVIA claims its technology will make AVs practical. It argues that AVs offer safety, better mobility for the elderly and the disadvantaged, reduced traffic congestion and lower greenhouse gas emissions (AVIA FAQs, n.d.). AVIA works with international policymakers and industry to promote regulatory standards that accommodate Level 4 vehicles and an open and competitive market for AVs. Partners for Automated Vehicle Education (PAVE) is a diverse coalition of industries and nonprofits that support the development of practical AVs. It publicizes

information about AVs in an effort to build public support for and confidence in them (PAVE, 2022). According to PAVE, “Sixty percent of Americans would trust automated vehicles more if they better understood how the technology works.” As means of publicity, PAVE uses a website, social media channels, “hands-on” driverless technology demonstrations, conferences, public forums, a virtual panel series, podcasts, and public sector workshops. Through the Coalition for Safe Autonomous Vehicles and Electrification (SAVE Coalition), Nuro and Zoox also promote AVs. According to the SAVE Coalition, its member companies program their AVs for safe driving, promising that automation will prevent human failures such as distracted or impaired driving and speeding (SAVE Coalition, n.d.). The SAVE Coalition plans to seek approval from the National Highway Traffic Safety Administration (NHTSA) for AV operation on public roads (NHTSA, n.d).

Raisigel (2021) contends that vehicle automation induces risk compensation, or risk taking attributable to overconfidence in safety systems. According to Mack (2003), drivers of automated vehicles may also be more susceptible to inattention blindness. For instance, when an autonomous Uber struck and killed a pedestrian in 2018, the vehicle’s safety driver was watching a video on her phone (Conger, 2020).

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