

# **Thesis Project Portfolio**

## **Chatbot Built with Deep Learning: Fannie Mae Internship**

(Technical Report)

## **The Early Effects of Artificial Intelligence on the Mortgage Industry**

(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

**Sooren Ghodsi**

Spring, 2024

Department of Computer Science

## **Table of Contents**

Sociotechnical Synthesis

Chatbot Built with Deep Learning: Fannie Mae Internship

The Early Effects of Artificial Intelligence on the Mortgage Industry

Prospectus

## **Sociotechnical Synthesis**

The capstone project addresses the problem of inefficiencies in database querying processes at Fannie Mae, where specific queries could only be executed by a limited number of trained associates, creating bottlenecks and slowing decision-making processes. To tackle this, a chatbot was developed using TensorFlow and integrated into Fannie Mae's systems. This AI-driven chatbot utilizes natural language processing to interpret and execute database queries, improving the efficiency of operations and accessibility for a wider range of associates.

This research examines how Artificial Intelligence (AI) and Machine Learning (ML) influence various stakeholders within the mortgage sector, focusing on both the operational and equity dimensions. These systems are examined through the lens of qualitative content analysis, leveraging findings from Fannie Mae's mortgage lender sentiment survey regarding AI and relevant academic studies. These sources describe the adoption trends, use cases, and anticipated future usage of AI/ML technologies, while also highlighting the potential biases these technologies may cause.

Considering the human and social dimensions of this technology is crucial because of the transformative impacts it can have on workplace dynamics and employment. By automating routine tasks, the technology reshapes job roles and requires a shift in skills, which can affect company morale and job security. It also poses risks related to privacy, data security, and equity that must be managed from an ethical standpoint.

The introduction of AI in mortgage processing can either perpetuate existing inequalities or serve as a tool for equity, making it important to examine these technologies through a socio-technical perspective. The Social Construction of Technology (SCOT) framework is particularly relevant here, as it provides insights into how different social groups shape technological development and, conversely, how new technologies can reshape societal structures.

Findings from the research show a significant shift towards AI/ML adoption attempting to improve efficiency and compliance. However, they also highlight concerns regarding biases in AI-driven decision-making processes that could disproportionately affect marginalized groups. This demonstrates the importance of incorporating strong ethical considerations in AI development to mitigate adverse societal impacts.

The implications of this undergraduate thesis, underscore the need to balance innovation with ethical considerations and human-centric approaches in technology deployment. The project not only demonstrates the potential of AI to improve efficiency but also highlights the importance of addressing the social implications of technological integration to create an adaptive and inclusive workplace environment.