Thesis Project Portfolio

PERSONALIZING FEDERATED LEARNING USING META-LEARNING

(Technical Report)

SOCIAL EQUITY ANALYSIS OF MACHINE LEARNING-BASED HIRING TOOLS

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Machine learning has immense potential for solving various problems across multiple domains due to its advanced pattern recognition capabilities that surpass human performance at low costs. However, there are certain limitations to machine learning. The first limitation is the requirement for a significant amount of data to train models, which can be challenging in distributed environments where data is spread out across multiple devices. This limitation is the focus of the capstone research, which aims to explore the potential of federated learning as a solution for collaborative model training without sharing private data.

Federated learning (FL) is a promising machine learning approach that can potentially solve the data distribution challenge by allowing multiple parties to train a model collaboratively without sharing their data directly with each other. The research investigates the differences between a popular FL algorithm, FedAvg, and its personalized variant, Per-FedAvg, in a PyTorch distributed environment. This research could lead to the development of improved federated learning algorithms that can be used in various applications, including automated hiring tools.

The STS research, on the other hand, explores the social and cultural implications of machine learning applied to hiring practices. The research employs a literature review and the Social Construction of Technology (SCOT) framework to examine the sociocultural embedding of automated hiring tools. The goal is to provide constructive suggestions to reduce bias and improve machine learning hiring practices to make them more equitable for everyone in the future.

Automated hiring tools and federated learning are two distinct domains with their unique challenges. However, both have the potential for bias to develop and cause unintended consequences. In the future, federated learning can be leveraged as a solution for automated hiring tools by training models on applicant resume information without compromising their personal information. This approach could improve the accuracy and fairness of the hiring process, while still keeping the data decentralized to protect applicants' privacy. Thus, it's clear these two can blend together to minimize social inequities and improve the hiring process in the future. Overall, the integration of machine learning and its associated subfields like federated learning into various domains like automated hiring should be done carefully, considering the sociocultural implications to prevent any unintended harm.