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Paper Assignment #1

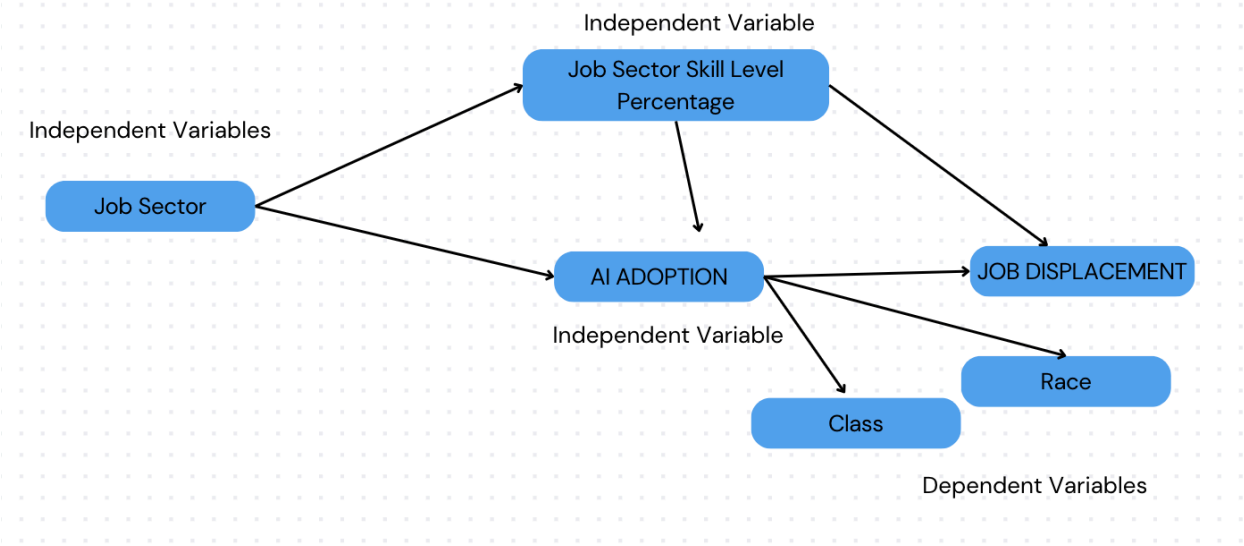
Fall Stat Measuring & Modeling Data

Examining how the rise of automation and AI technology disproportionately impacted job security and employment rates among marginalized groups - Research Proposal

The integration of artificial intelligence (AI) and automation into various industries is transforming the global workforce. While these technological advancements promise increased efficiency and productivity, they have also sparked concerns about job displacement, particularly for low-skilled workers in marginalized communities. The relationship between AI and job security remains a critical area of study, with scholars debating whether AI will increase income inequality or potentially reduce polarization between low- and high-skilled workers. This study will examine how AI adoption affects job security in marginalized communities, exploring both the possibility of increased disparity and the potential for convergence between skill levels.

Theory. In the past, technological advancements have followed the principle of capital-skill complementarity; this is the relationship that as technology advances, it replaces low skilled work, and high skilled workers become in more demand because these workers can use advanced technologies more effectively, widening the wage gap between them and low-skilled workers. Historically, automation has displaced low-skilled workers who could not transition into new roles or industries, leading to long-term unemployment and causing more income inequality (Ernst, Merola, & Samaan, 2019). Low skilled workers are the most vulnerable to AI-driven automation, as they normally hold jobs in sectors like manufacturing, retail, and services, which are highly susceptible to automation(Petropoulos). These workers, often performing routine, manual tasks, face the greatest risk of displacement. New job opportunities still arise, but they will mostly benefit high-skilled workers. However as AI's use extends from routine physical tasks to mental tasks, it potentially offers benefits to low-skilled workers in ways previous technologies did not (Ernst et al., 2019). Unlike earlier waves of automation in the past, AI has the potential to increase productivity in low-skilled sectors, such as agriculture or construction,

without requiring workers to develop advanced technical skills (Petropoulos, 2018). As a result, some scholars argue that AI may reduce polarization by improving the productivity of low-skilled workers, creating opportunities for job growth and wage increases (Ernst et al., 2019). This study will explore both the displacement hypothesis, which suggests that AI adoption will widen the gap between low- and high-skilled workers, and the convergence hypothesis, which says that AI may reduce inequality by enhancing low-skilled jobs.



This diagram shows that both the job sector and the percentage of low-skilled jobs in a given sector, combined with the level of AI adoption, have an impact on job displacement. Additionally, it shows how race and class are affected by these changes, checking if certain marginalized communities are disproportionately impacted by the introduction of AI and automation technologies.

Measurement. The hypothesized relationships in this study will be examined using five key variables, collected from publicly available databases such as the U.S. Bureau of Labor Statistics, McKinsey's AI Adoption Index, and U.S. Census Bureau. These data sources provide detailed information across various sectors and demographic groups, to fully cover all the key

variables in this study. The Variables and Unit of Analysis: AI Adoption (X1) – an interval-level variable measured as the percentage of tasks automated in various industries. This variable will represent the degree to which each job sector has integrated AI and automation technologies. Job Sector Skill Level Percentage (X2) – an interval-level variable measuring the percentage of low-skilled jobs within each sector. This variable helps in assessing which sectors are more vulnerable to displacement through automation.

Race (X3) – a nominal-level variable representing different racial groups (e.g., White, Black, Hispanic, Asian). For simplicity in analysis, this variable may be coded as a dichotomous factor (White vs. non-White) to capture potential disparities in job displacement effects due to AI adoption. Class (X4) – an interval-level variable coded across distinct income groups (e.g., lower class, middle class, upper class). This variable will be useful in evaluating how AI adoption affects job displacement across socio-economic classes. Job Displacement (Y) – the dependent variable, an ordinal-level measure of the extent of job loss or job transition due to AI adoption. This variable will reflect the scale of job insecurity or employment transformation within various sectors.

Statistical Analysis. To visualize the impact of AI adoption and job displacement across racial and class groups, I'll use grouped bar charts. This will allow us to compare the percentages of job displacement within various racial categories and different classes (lower class, middle class, upper class). Each bar will represent a racial or class group, and the height of the bars will show the proportion of job displacement in that group. This will help highlight any disparities or disproportionate effects of AI adoption on marginalized communities. The bar charts will also help see if certain racial groups or socio-economic classes are more vulnerable to job displacement due to AI adoption in certain job sectors (manufacturing, healthcare, education).

This will help identify which demographic groups are more vulnerable to automation and job insecurity.

Conclusion. The rise of AI and automation brings both challenges and opportunities for the workforce, particularly for marginalized communities. Historically, low-skilled workers have faced job displacement due to capital-skill complementarity, increasing income inequality. This study will investigate whether AI adoption will increase this gap or, by enhancing productivity in low-skilled sectors, reduce polarization. By looking at the impact of AI on job security, with a focus on race and class, this will shed light on whether marginalized groups are disproportionately affected by job displacement. The results will provide insights for policymakers on how to address the unequal effects of AI and create a more fair and equal future for all workers.

References

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