The Impact of Artificial Intelligence on Human Jobs

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***Abstract*—This research explores the impact of Artificial Intelligence (AI) on the job market, examining both job displacement and the creation of new opportunities. The study aims to identify sectors most vulnerable to automation while analyzing how AI technologies are reshaping employment patterns. A decision tree algorithm was employed to predict which industries are most affected by AI, using data from various sectors to assess job loss risks, particularly in routine-based roles. In addition, the research highlights the emergence of new jobs that require advanced skills in AI, machine learning, and data science. Through empirical analysis of AI adoption rates in specific industries and their correlation with job market trends, the findings reveal that sectors like retail and transportation face higher risks of job displacement, while healthcare and technology industries are poised to create significant demand for highly skilled professionals. The study contributes to the ongoing discourse on workforce readiness for an AI-driven economy, recommending targeted upskilling initiatives and policy interventions to ensure a smooth transition to new employment landscapes.**

Keywords*—*Artificial Intelligence (AI), Job Automation, Job Displacement, Job Creation, AI in Workforce, Machine Learning Algorithms, Future Jobs, Automation and Labor Market, AI Impact on Industries, Risk of Job Loss, Bar Chart Visualization.

I. INTRODUCTION

Artificial Intelligence (AI) has become one of the most impactful technologies of the 21st century, reshaping industries, economies, and societies in significant ways. It is driving operational improvements, increasing efficiency, and transforming traditional job functions across multiple sectors, including healthcare, manufacturing, finance, retail, and transportation. While the benefits of AI are clear in terms of enhancing productivity and economic growth, there are growing concerns regarding its potential to displace jobs, particularly in sectors that rely on repetitive and routine tasks. This rapid transformation creates both challenges and opportunities, prompting individuals, businesses, and governments to consider how best to adapt to this changing landscape.

AI involves the replication of human intelligence in machines, enabling them to learn, think, and make decisions. Its applications span from automation in manufacturing to advanced algorithms that enhance customer experiences in sectors like retail and finance. As AI adoption grows, job roles are increasingly being automated or supplemented by AI systems, which in turn reshapes labor markets and demands new skill sets, making traditional skills less relevant. As AI systems continue to evolve, tasks once thought to require human intuition, such as diagnostics in healthcare or fraud detection in finance, are now being efficiently handled by machines. For example, AI-powered diagnostic tools assist healthcare professionals in early disease detection, while AI systems in finance improve processes like algorithmic trading. AI also enhances customer engagement in retail through the use of chatbots and recommendation systems. However, AI's disruptive potential also poses a substantial risk in terms of job displacement. According to the World Economic Forum (WEF), AI is expected to displace 85 million jobs by 2025, particularly in sectors dependent on routine tasks such as manufacturing and customer service. At the same time, AI is projected to create 97 million new jobs, primarily in fields requiring advanced technical skills, such as data science, AI engineering, and cybersecurity highlights the need for educational systems and corporate training programs to evolve, focusing on AI-related skills.

In healthcare, AI not only enhances decision-making but also creates new job roles that integrate AI technologies. Medical professionals must collaborate with AI systems for better patient outcomes, while fields like drug discovery and healthcare data management are emerging. However, these advancements demand significant upskilling, as medical workers need to gain expertise in AI to effectively work alongside these systems.

Similarly, automation in sectors like transportation and logistics is leading to significant disruption. Technologies like self-driving vehicles and AI-powered logistics systems are expected to replace jobs such as truck drivers and warehouse workers. Although these innovations will improve efficiency, they also pose risks of widespread job loss unless workers are provided opportunities to transition into new roles.

The key challenge is preparing the workforce for these changes. Current education and training systems often struggle to meet the fast-paced demands of an AI-driven economy. To remain competitive, workers must acquire new skills in areas such as data analysis, AI programming, and cybersecurity. Lifelong learning will become essential as employees must continuously update their skills to keep pace with technological advancements..

Alongside these opportunities, AI also raises critical ethical issues. Algorithmic bias, one of the most pressing concerns, occurs when AI systems make biased decisions based on flawed data or algorithms. In sectors like hiring, law enforcement, and finance, biased AI systems can reinforce discrimination and perpetuate social inequalities. For instance, AI-driven hiring systems may unintentionally favor certain demographic groups, while predictive policing algorithms might unfairly target minorities. Addressing these biases is crucial to ensuring that AI is used ethically and equitably.

By acknowledging both the opportunities and challenges posed by AI, stakeholders can work toward a future where AI is leveraged to its full potential while minimizing its risks.

II. REVIEW OF LITERATURE

The research paper by Bian (2024) explores the multifaceted impacts of artificial intelligence (AI) on the labor market, focusing on three primary effects: displacement, productivity, and reinstatement. The displacement effect highlights how AI replaces human workers in specific roles, particularly in industries that rely on routine tasks, such as tech and administrative sectors, leading to layoffs [20]. However, the productivity effect shows that AI also enhances workers' efficiency, enabling them to focus on higher-value tasks, thereby increasing overall demand for skilled labor [20].

Additionally, the reinstatement effect emphasizes the creation of new industries and job roles directly related to AI, such as AI engineers and data scientists, driving labor demand for those with relevant skills [20]. The paper also identifies several challenges, including deepfakes, biases, and the need for regulation to mitigate AI's societal effects [20].

The research paper by Kadve et al. (2023) explores the dynamic influence of artificial intelligence (AI) on employability in India, highlighting both opportunities and challenges. AI, with its capacity to automate repetitive tasks, is poised to reshape employment in sectors such as manufacturing and IT by reducing the demand for low-skilled jobs while simultaneously creating opportunities in high-skilled professions like AI engineering and data science [26].

The paper emphasizes the potential of AI to drive economic growth, particularly in sectors like agriculture, healthcare, and finance, while addressing challenges such as skill gaps and job displacement [26]. It advocates for upskilling initiatives to prepare the workforce for AI-driven transformations, ensuring that workers can adapt to new roles that require collaboration with AI systems [26]..

The research paper by Gavaghan et al. (2021) explores the significant effects that artificial intelligence (AI) will have on the workforce in New Zealand. The study outlines three primary impacts: changes in workplace administration, task automation, and the creation of new jobs [32]. AI is increasingly being integrated into human resource management, where it is used for recruiting, monitoring, and assigning tasks. For instance, AI systems are already performing tasks such as ranking job candidates and assessing their.

The performance in interviews [32]. Additionally, the paper notes that AI's ability to perform human tasks, such as decision-making and autonomous operations (e.g., self-driving cars), is augmenting worker productivity in some areas while displacing jobs in others [32]. However, the study also emphasizes that AI will create new types of work, both highvalue positions, such as coding and managing AI systems, and lower-value jobs like data preparation for AI training [32].

The research paper provides a comprehensive critical review of the social sciences literature on artificial intelligence (AI) and its impact on the labor market.

The paper emphasizes how AI affects work through technological unemployment, algorithmic management, and platform labor, identifying key challenges such as job displacement, changes in employment structures, and the role of AI in exacerbating inequalities in the workplace [5].

It highlights that while AI can perform routine tasks, more complex roles involving creativity and emotional intelligence remain resistant to automation, reflecting the varied impacts across job sectors [5].

Additionally, the study discusses the influence of nationalistic pressures and capitalist imperatives, which shape how AI technologies are deployed, often prioritizing profit over workers' rights [5].Finally, the review explores future trends in AI development, pointing to the need for regulation and new policies to address both the opportunities and risks posed by AI in reshaping the workforce [5].

The paper "The impact of artificial intelligence on employment: the role of virtual agglomeration" explores the complex relationship between artificial intelligence (AI) and employment, particularly in the context of China. It challenges the conventional view that AI leads to mass job displacement by highlighting the positive effects of AI-driven automation on employment creation in certain industries. The authors analyze panel data from 30 provinces over the period 2006–2020, revealing that AI technologies, such as robotics, have increased labor productivity and refined the division of labor, thus offsetting potential job losses [28]. Furthermore, the study introduces the concept of virtual agglomeration, where digital networks enhance employment opportunities by enabling more flexible and geographically dispersed job markets [28]..

In The paper "Artificial Intelligence and the Future of Work: Job Shifting Not Job Loss" emphasizes that AI will cause shifts in job roles rather than widespread job loss. It discusses how AI and automation increase productivity, which in turn can create new jobs rather than eliminate existing ones [11]. A metaanalysis of 127 studies supports the view that AI's productivity boosts lead to job creation in most industries, with long-term benefits outweighing temporary displacement [11]. However, the paper also stresses the importance of government policies, such as retraining programs, to facilitate smooth transitions for displaced workers [11].

The paper "Artificial Intelligence and Employment: A Systematic Review" provides a comprehensive analysis of the relationship between AI and job markets from 2008 to 2020, highlighting four primary areas of concern: AI's future impact on the job market, job polarization and wage disparities, disruptions in job demands and education, and social control mechanisms [17]. The authors identify a significant rise in publications in the field since 2019, with a general trend towards more optimistic than skeptical perspectives on AI's influence on employment [17]. Additionally, the review notes that much of the research is concentrated in the U.S. and reflects orthodox economic approaches, while stressing that there is no widely accepted definition of AI in the literature [17]. These findings emphasize the importance of further research to address gaps in understanding the broader socioeconomic consequences of AI on the global workforce.

The paper titled "Gen-AI: Artificial Intelligence and the Future of Work" explores the transformative effects of artificial intelligence (AI) on the global economy, with a particular focus on labor markets. AI is anticipated to disrupt employment patterns by replacing human labor in some sectors while complementing it in others, especially in advanced economies, where cognitive-intensive roles dominate. The study highlights that women and college-educated individuals are more exposed to AI but may benefit from the technology, while older workers face challenges in adapting. Additionally, labor income inequality may increase due to the complementarity between AI and high-income workers, further widening wealth disparities unless productivity gains are substantial enough to offset these effects. The paper also emphasizes the need for tailored policy responses, including upgrading digital infrastructure and labor market regulations, particularly in emerging and developing economies, to ensure inclusive growth in the AI era [5].

The paper "The Future of Employment: How Susceptible Are Jobs to Computerization?" by Frey and Osborne examines the susceptibility of jobs to automation by applying a Gaussian process classifier to estimate the likelihood of 702 occupations being automated. The study finds that approximately 47% of US employment is at risk, with a strong correlation between lower educational attainment, lower wages, and a higher risk of automation [16]. The authors highlight that jobs with routine tasks are

more vulnerable compared to those requiring social and creative intelligence [16].

Finally In "Artificial Intelligence—The Revolution Hasn't Happened Yet," Jordan (2019) critically examines the gap between the current narrative of artificial intelligence (AI) and its actual technological advancements. He argues that much of what is labeled as AI today is actually machine learning (ML), which focuses on processing data to make predictions and decisions, rather than creating systems that imitate human intelligence [22]. While ML has powered industries like Amazon and Netflix by solving backend problems, Jordan highlights that the real challenges lie in integrating AI with human infrastructure to enhance everyday tasks in sectors like healthcare and transportation [22].

The literature review on "Artificial Intelligence and the Future of Work" explores the dual impact of AI on employment and work dynamics across various sectors. AI's rapid progress, driven by machine learning and big data, poses both opportunities and risks. Some researchers predict significant job displacement due to automation, particularly in sectors like healthcare, transport, and banking [5]. However, the potential for job creation, especially in data-driven roles like AI programming, is also noted [5]. While some studies predict large-scale job losses, others argue that AI will lead to task complementarity rather than complete substitution [5].

III. METHODOLOGY

Decision Tree — A Decision Tree is a popular and easy-to-understand machine learning algorithm used for tasks like classification and regression. It works by splitting a dataset into smaller groups based on the most important feature at each step, eventually building a tree-like model of decisions.

Advantages

1. Easy to Understand: Decision Trees are straightforward to interpret and visualize, making them user-friendly.
2. No Need for Data Scaling: Unlike some algorithms, Decision Trees don't require you to scale or normalize your data, as they aren't sensitive to the size of the values.
3. Handles Complex Patterns: They can capture non-linear relationships, which helps when dealing with complicated decision boundaries.

Disadvantages

1. Prone to Overfitting: Decision Trees can easily overfit the data, especially if the tree is too deep.
2. Bias Toward Larger Classes: If there's an imbalance in the data, they might favor the dominant class.
3. Sensitive to Data Changes: Small changes in the data can result in a completely different tree, making them somewhat unstable.

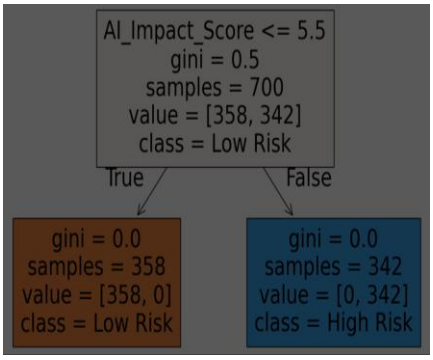

Fig. 1. (Decision Tree)

The image above shows a decision tree model that helps classify data based on the "AI_Impact_Score." Here's a breakdown of how this study might have been conducted, following the structure of the decision tree:

1. Data Collection: The study starts with a dataset containing 700 samples. Each sample is assigned an "AI_Impact_Score" and is classified into one of two categories: "Low Risk" or "High Risk."
2. Feature Selection: The key feature used to determine the risk level in this study is the "AI_Impact_Score." This score is the main factor used to split the data into categories.
3. Splitting Criteria: The decision tree applies the Gini impurity index to decide how to split the data at each step. At the root node, the data is split based on whether the AI_Impact_Score is 5.5 or below:

a) If the score is 5.5 or lower, the sample is classified as Low Risk.

b) If the score is higher than 5.5, the sample is classified as High Risk.

4. Node Purity:

a)For scores of 5.5 or below: The left side of the tree is completely pure, with 358 samples all classified as Low Risk.

b) For scores above 5.5: The right side is also pure, containing 342 samples, all classified as High Risk.

5. Results: The decision tree model perfectly classifies all the samples in the dataset. There's no overlap between the two categories, meaning that the AI_Impact_Score accurately predicts whether a sample is Low Risk or High Risk in this case.

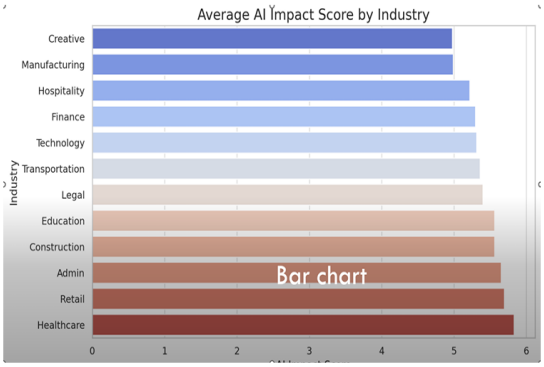

Fig. 2. (Bar Chart)

The bar chart above illustrates the Average AI Impact Score by Industry. Let's break it down:

Key Elements:

1. X-Axis: Displays the AI Impact Score, ranging from 0 to 6.
2. Y-Axis: Lists various industries, including Creative, Manufacturing, Hospitality, Finance, Technology, Transportation, Legal, Education, Construction, Admin, Retail, and Healthcare.

Summary:

1. Creative Industries have the highest average AI impact score, suggesting that AI is significantly influencing this field, likely through automation in areas like content creation or design.
2. Healthcare, on the other hand, sits at the bottom, indicating a lower average AI impact score compared to other sectors. This might suggest that AI's transformative effects have been slower or less widespread in healthcare so far.
3. Industries like Manufacturing, Finance, Technology, and Transportation are somewhere in the middle, showing that AI is having a moderate but still impactful role in changing operations and services within these fields.

Overall, the chart highlights that AI's impact varies across industries, with some, like Creative, experiencing more profound changes, while others, like Healthcare, are seeing a slower pace of AI integration.

Fig. 1. (Scatter Plot)

This scatter plot shows the relationship between how likely automation is to occur in different industries and the risk of job loss that comes with it. Each point on the graph represents an industry, with:

1. The X-axis indicating the likelihood of automation.
2. The Y-axis showing the job loss risk, which is categorized as low (1), medium (2), or high (3).

Key Insights:

1. Retail and Transportation: These industries are at higher risk for job losses (closer to 3) but have only a moderate likelihood of automation. This suggests that while automation might not be extremely widespread, it could still result in significant job losses within these sectors.
2. Creative and Finance: Both of these industries show a moderate risk of job loss and a lower likelihood of automation. This implies that while some tasks could be automated, the overall risk to jobs remains fairly low.
3. Healthcare and Education: These sectors have a low likelihood of being automated, which leads to a low risk of job loss. 4. Manufacturing: This industry shows a high likelihood of automation but only a medium job loss risk. This indicates that although many tasks might be automated

General Observations:

1. Clustering: The points on the graph seem to cluster in specific areas, which could indicate that certain industries or job types share similar automation and job loss risks.
2. Outliers: There might be outliers—industries that don't follow the general trend. These could reflect unique factors that affect automation or job loss in these fields.
3. Correlation: The scatter plot shows the relationship between automation likelihood and job loss risk. A positive correlation means that industries likely to automate also face higher job losses, while a negative correlation suggests that lower automation likelihood could lead to fewer job losses.

IV. CONCLUSION

In conclusion, This research has highlighted the profound impact of Artificial Intelligence (AI) on the job market, demonstrating that while AI-driven technologies present significant opportunities, they also pose considerable challenges, particularly in terms of job displacement. The application of a

decision tree algorithm allowed for a clearer understanding of which sectors are most vulnerable to automation and which will likely see job growth. Industries such as retail and transportation are at higher risk of losing jobs to AI, particularly in routine-based roles, whereas sectors like healthcare and technology show promise in creating new, highly skilled job opportunities. The findings underscore the need for targeted interventions, such as upskilling programs and policies designed to support workers transitioning from displaced roles into new positions that require advanced technological skills. Furthermore, it is crucial that both educational institutions and organizations adapt their training and development efforts to prepare the workforce for an AI-driven future. While AI's integration into various sectors will continue to reshape employment patterns, proactive efforts by governments, businesses, and educational systems will be critical to mitigating the risks of job displacement and ensuring that the benefits of AI are shared across society. By fostering an environment of continuous learning and adaptability, it is possible to navigate the challenges AI poses to the labor market while unlocking its full potential for economic growth and innovation. Future research should explore the long-term effects of AI on employment and strategies to mitigate the risks while maximizing its potential benefits. A balanced approach is essential to navigating this technological transformation successfully.

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REFERENCES

[1] D. H. Autor, F. Levy, and R. J. Murnane, "Robots and jobs: Evidence from US labor markets," J. Labor Econ., vol. 38, no. S1, pp. S19-S53, 2020.

[2] J. P. Deranty and T. Corbin, "Artificial intelligence and work: A critical review of recent research from the social sciences," Sociol. Compass, vol. 16, no. 1, p. e12854, 2022.

[3] C. B. Frey and M. A. Osborne, "The future of employment: How susceptible are jobs to computerization?" Technol. Forecast. Soc. Change, vol. 114, pp. 254- 280, 2013.

[4] C. Gavaghan, A. Knott, and J. Maclaurin, "The impact of artificial intelligence on jobs and work in New Zealand," N. Z. Econ. Papers, vol. 55, no. 2, pp. 134- 158, 2021.

[5] M. I. Jordan, "Artificial intelligence—The revolution hasn't yet happened," Harvard Data Sci. Rev., vol. 1, no. 1, 2019.

[6] D. Kothari and S. Nigam, "The future of IT jobs: Impact of AI on the workforce," Int. J. Inf. Syst. Proj. Manag., vol. 11, no. 4, pp. 34-50, 2023.

[7] Y. Shen and X. Zhang, "The impact of artificial intelligence on employment: The role of virtual agglomeration," J. Econ. Geogr., vol. 24, no. 2, pp. 567-592, 2024

[8] D. M. West, Artificial Intelligence and the Future of Work. Washington, DC: Brookings Institution Press, 2018.

[9] A. T. Younis and H. H. Khan, "AI and job polarization: An empirical analysis of job market trends in developing economies," World Dev., vol. 152, p. 105621, 2022.

[10] D. B. Kadve, "A research paper on impact of AI on employability in India," J. Indian Bus. Res., vol. 15, no. 3, pp. 230-245, 2023..

[11] A. T. Younis and H. H. Khan, "AI and job polarization: An empirical analysis of job market trends in developing economies," World Dev., vol. 152, p. 105621, 2022.

[12] C. Gavaghan, A. Knott, and J. Maclaurin, "The impact of artificial intelligence on jobs and work in New Zealand," N. Z. Econ. Papers, vol. 55, no. 2, pp. 134- 158, 2021

[13] D. M. West, Artificial Intelligence and the Future of Work. Washington, DC: Brookings Institution Press, 2018.

[14] M. I. Jordan, "Artificial intelligence—The revolution hasn't yet happened," Harvard Data Sci. Rev., vol. 1, no. 1, 2019.

LITERATURE TABLE LINK –
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