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ijircce@gmail.com



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A Comprehensive Study & Review of How Artificial Intelligence can Replace Human Labor

Ruchika Arora, Prince Sood

PG Student, Dept. of Computer Science and Engineering, Swami Vivekanand Institute of Engineering and Technology
Ramnagar, Banur, India

Assistant Professor, Dept. of Computer Science and Engineering, Swami Vivekanand Institute of Engineering and
Technology Ramnagar, Banur, India

ABSTRACT: Automation is nothing new; since the Industrial Revolution, machines have been gradually taking the place of human labourers. This occurred initially in mass production, then in agriculture and skilled crafts like hand weaving, and in many clerical jobs in more recent decades. There have generally still been plenty of employment available as the additional revenue brought in by these technical advancements has been reinvested in the economy, creating a new demand for human labor. However, a significant number of current human employment may be replaced by a new generation of intelligent robots, driven by the quick advancements in robotics and artificial intelligence (AI). As in the past, some new employment would be generated, but there might not be enough of them.

I. INTRODUCTION

What is AI?

The idea and creation of computer systems that can carry out tasks that have traditionally needed human intelligence is known as artificial intelligence. Among these include speech recognition, decision-making, pattern recognition, and problem-solving Artificial intelligence (AI) is a general phrase that encompasses various technologies such as machine learning, deep learning, and natural language processing (NLP). Due to this, a significant number of current human employment may be replaced by a new generation of intelligent robots, driven by the quick advancements in robotics and artificial intelligence (AI).

II. LITERATURE REVIEW

AI involved in our days!!!

Artificial intelligence powers many of the goods and services we use on a daily basis, such chatbots that provide real-time customer support and apps that recommend TV shows.

There is debate about whether these technologies—which are sometimes referred to as artificial intelligence (AI) or are merely more advanced machine learning models.

Large language models like ChatGPT, which produce text in response to queries or comments, and computer vision systems, which let robots carry out tasks like data analysis and vehicle steering, are two examples of AI in use today. While AI-related humanoid robots are still a ways off, AI is already present in many facets of daily life.

In domains related to non-routine, cognitive tasks, like information ordering, memorization, perceptual speed, and deductive reasoning, artificial intelligence has made substantial strides in recent years.

- Therefore, high-skilled, white-collar professions like business, management, science, engineering, law, and cultural studies have been the ones most affected by advancements in artificial intelligence (AI) and automation. This is in contrast to the effects of earlier automation technologies, which tended to replace low-skilled people primarily with mundane duties.
- Higher exposure to AI may be a good thing for workers, as long as they have these skills to use these technologies effectively. Now OECD research finds that, over the period of 2012-2019, greater exposure to AI was associated with higher employment in occupations where computer use is high. This shows that employees with excellent digital abilities may be better able to use AI in the workplace and adapt to it, which will allow them to profit from the advancements these technologies provide.
- By contrast, there is some indication that higher exposure to AI is associated with lower growth in average hours worked in occupations where computer uses low.

- Taken together, these results imply that the usage of AI may widen the skills gap in the labor market between workers who can effectively use AI and those who can't. Therefore, a major policy concern is ensuring that workers have the necessary skills to use the new technologies.
- White collar occupations are most exposed to AI in the past, automating technologies have primarily affected low and middle skilled workers whose tasks tended to be routine.

Because robots have replaced lower trained labor, this is one of the reasons, for example, that the manufacturing sector's employment share has drastically decreased in several OECD countries over the past few decades. But artificial intelligence is a revolutionary technology. The areas where AI has advanced the most between 2010 and 2015 are information sorting, memorization, perceptual quickness, and deductive reasoning—all skills necessary for completing non-routine, cognitive activities. In comparison, AI's psychomotor and physical abilities have not advanced as much.

As a result, the industries most exposed to AI nowadays are white collar jobs needing a high degree of formal education. Professionals in the fields of business, management, science, engineering, law, and social and cultural studies are among them. Conversely, occupations that prioritize manual labor, such as cleaning and assistance, agricultural and forestry labor, fishing labor, and food preparation assistants, have the least exposure to artificial intelligence.

III. DETAILED STUDY

Artificial intelligence with both disrupt and benefit the workplace:

As artificial intelligence transforms the workplace, the economy, and personal life, it offers both promise and hazard, according to James Timbie of the Hoover Institution, a technology expert.

According to a Stanford researcher, in the workplace of the future, a large number of mundane tasks currently completed by employees will progressively be taken on by computers, leaving people to handle more complex professions that require interpersonal skills and a broad perspective.

According to visiting scholar James Timbie, the growth of artificial intelligence would entail collaboration between humans and machines, with the finest human intelligence being bolstered by clever robots.

James Timbie, an Annenberg distinguished visiting scholar at the Hoover Institution, says that while artificial intelligence and other cutting-edge technologies offer improvements in productivity, health, and safety, they will inevitably cause significant economic disruption. He received his physics training at Stanford, worked as a senior counselor at the State Department from 1983 to 2016, where he was instrumental in advancing arms control and disarmament, and is currently researching the effects of cutting-edge technology like artificial intelligence.

What effects will the development of artificial intelligence have on specific employees in the future?

The integration of artificial intelligence with other cutting-edge technologies, such robots and 3D printing, will result in more productive manufacturing of goods and services. A vast variety of non-routine cognitive skills can be taught to machines, and more sophisticated robotics can carry out manual chores. Cost savings and higher production will benefit society as a whole, but many individual workers will suffer. According to research, about half of today's workforce is employed in sectors that could see short-term upheaval. Workers may occasionally be replaced by machines or truck drivers. Work in other sectors, like as education and medical, will change as a result of machines executing some activities more quickly and closely than skilled humans can complete other tasks.

Will automation result in the loss of well-paying "cognitive" jobs?

Perhaps more so than the well-paying manufacturing positions lost to globalization, many well-paid cognitive jobs are susceptible to disruption. Tax preparers, radiologists, paralegals, loan underwriters, insurance adjusters, financial analysts, translators, and even certain journalists and software engineers are among the many at-risk professions that are typically filled by highly educated, well-paid individuals.

IV. FUTURE ASPECT

How might human and machine collaboration lead to increased productivity and efficiency?

A medical diagnosis is one instance. A diagnosis is the process of figuring out how a patient's data fits into a pattern typical of an illness. This is a task that machines excel at. A sick patient's diagnosis, recommended course of therapy, and possibly additional testing can be generated by machines trained with the digitized records and results of millions of prior patients. More data is scanned by machines than by doctors, and they stay up to date with the latest research. In

order for the patient to adhere to the treatment plan, the doctor's main responsibility would be to explain the results to them and assist them in accepting them.

According to research, intelligent machines assisting humans will produce the best outcomes in many fields—a teacher and a machine, for example, or a doctor and a machine. In the near future, computers would still perform their best computational work, leaving other jobs to people with interpersonal skills and the ability to understand the broader picture.

V. HISTORIC TREND

How is the artificial intelligence revolution different from 20th century labour and tech destruction?

The rate of change is one significant distinction. Over several decades, there was a shift from manual labor to steam power and then from steam to electricity. It took a generation for agriculture to become mechanized, so it was enough time to teach farmers' children the new skills they would need for other jobs. Since things are changing so quickly these days, a lot of people will need to pick up new skills in order to get new positions.

Inequality is another issue. Technological advancement raises national income and wealth, and GDP rises. However, these advantages are not evenly distributed. This increasing disparity is a long-term trend that is being maintained. The GDP is up to 38%, but the median household income is roughly where it was in 1999, according to Census Bureau figures. The upper end has benefited the most from the increases. An increasing amount of wealth and income disparity is a result of the development of automation.

Think about tax preparation software. Many people gain from it since it's affordable, simple, and they may file their taxes on their own. However, a lot of people who made their living as tax preparers now fear for their employment and financial security.

VI. CONCLUSION

In what ways can society effectively safeguard its workforce and get them ready for this new era?

The challenge is to facilitate transitions 2 new occupations with new skills.

Furthermore, new jobs will be generated in tandem with the elimination of traditional jobs. In the 200 years after the Luddite uprising, which was started by English workers in the 19th century to protest the introduction of weaving machinery, technological advancements have increased productivity and created new employment and businesses over time. This could go on, or things could turn out differently this time.

Additionally, the Department of Labor reports that there are currently over 6,000,000 unfilled job openings. This indicates that employers are having difficulty finding eligible candidates for many well-paying positions, which may present chances for displaced workers who have the necessary training.

These new occupations won't always be close by, and they probably won't pay as much either—at least not right away. New talents were needed for new jobs.

A basic income guarantee is supported by some. There is, in my opinion, an abundance of work to be done. Money is not everything; one's reputation in the community and sense of self-worth are also crucial. It would be better to assist individuals in switching to new jobs rather than paying them not to work.

The current adjustment support program might be expanded to give income and assistance for training and relocation for layoffs due to automation as well as foreign competition, as it did not do much to mitigate the impact of job losses linked to globalization.

Lastly, the quick speed of change highlights the advantages of making lifelong learning a habit. Numerous courses and community colleges offer inexpensive instruction in a range of areas.

Artificial intelligence's place in the workplace of the future:

Nearly every element of society is currently undergoing a transformation due to artificial intelligence. AI is now widely used in modern life, whether it is through applications that suggest the best routes to drive, Netflix recommendations for shows to watch, or facial identification on personal smartphones.

In terms of the workplace, workforce, and work itself, artificial intelligence (AI) is driving productivity gains and is expected to have a big impact on the nature of work in the future. Whether it's using computer vision to identify outputs or products [3, 4], natural language processing to extract useful information from large amounts of reports [1], or models to forecast supply needs [2], tools are fast becoming a necessary component of creating a competitive edge in business today.

While there are still unanswered questions about how AI is used and affects workers' health and safety in the workplace, it also has the potential to put workers at danger in both conventional and unconventional ways.

Professionals and practitioners in occupational safety and health (OSH), who are usually concerned with certain physical, chemical, and biological risks in the workplace, should be mindful of the potential effects AI may have on the workplace.

AI makes it possible to benefit from advancements in sensors used in the workplace for worker safety and health [5–6]. The vast amounts of data that these sensors produce can be utilized to forecast unfavorable events at work and enhance exposure estimates. A type of AI known as computer vision is made possible by computers that can be trained to recognize patterns in pictures or videos. It has been demonstrated that computer vision is helpful in tracking employees in a specific region [9], assessing safety circumstances at a specific task site [10], and monitoring safety compliance [7–8]. Augmented reality is the term for the application of computer vision on top of physical world. Workers and OSH professionals should be informed in order to enhance training and lessen the impact of dangers.

In addition to AI's advantages, there are reservations about its application in the workplace. This is particularly true if the procedures are difficult to comprehend or explain, the data employed are inadequate, improper, or unsafe, or the systems run without human agent supervision [13–14]. It has been demonstrated that integrating this technology with dependable, predictable systems enhances adoption and performance [15]. The opposite also seems to be true, as evidenced by the two Boeing 737 Max aircraft crashes that were caused by malfunctions related to the Maneuvering Characteristics Augmentation System (MCAS), an AI system intended to activate and support the pilot in specific situations [16–17].

To give one more example, a preliminary report from the National Transportation Safety Board indicated that both of these incidents were caused by a transparent understanding of the MCAS's operation, limited assumptions about the pilot's response, and a lack of information required to identify non-normal conditions [18]. The majority of AI systems may benefit from the Safety Board's recommendations, which include improving the clarity of failure indicators to improve the timeliness and efficacy of the pilot's response, developing tools and methods to validate assumptions about pilot or operator recognition and response, and taking into account design and training to minimize the potential for safety impact.

In other words, when putting technical solutions into practice, human response and interaction must be taken into account. The worker's interaction with the tool, potential decisions that could encourage human actions (or inactivity), any positions the person must hold, the impact of schedule and hours worked, and even the possibility of working alone are all important considerations for OSH professionals and practitioners to keep in mind. These options should be assessed to see how they affect workplace exposure to chemical, physical, and biological risks, how they affect employees' mental health and general well-being, and whether they result in new or unexpected potential dangers.

In an attempt to promote human dignity, while minimising potential risk, variety of organizations developed recommendations for their responsible and ethical use of AI in society [19–21]. Search recommendations can help OSH professionals and practitioners engage with data scientist and computer programmers to develop AI systems applicable to the workforce, which are effective, explainable, accountable, secure and fair.

- **Effective:** Make sure AI is the best tool for the job at hand. Technology should not be employed carelessly; rather, it should be utilized to increase output or enhance working circumstances. Even if misusing one AI system won't always result in injury, it could eventually undermine confidence in other AI-based systems.
- **Explainable:** It is important to convey to stakeholders the reasoning behind and conclusions drawn from AI in a clear and understandable way. This is necessary to reduce risk and evaluate the impact of unforeseen, potentially dangerous outcomes.
- **Accountable:** organizations and individuals should be accountable for the outcome of AI systems develop and implement. For data scientists and computer programmers, accountability encourages an attached understanding of the system created and the potential impact on others. Furthermore, if unexpected or safety incident occurs, the appropriate group of individuals can learn and improve from the incident.
- **Secure:** AI systems ought to be protected from outside influence. Although programmers are usually aware with cyber security, it is necessary to address the potential safety risks in case the system is compromised or data is tainted. It should be known who has access to the data and the system code, and access should be granted after a suitable risk-benefit analysis. These analyses should be taken into consideration by OSH practitioners and specialists.
- **Fair:** When AI systems are trained on a particular population segment, they may be biased and generate results that differ from those of other population segments. As such, AI systems should be aware of and correctly address any discrimination and bias. Systems that protect against this assumption should be evaluated and tested in order to increase worker acceptability and guarantee safer results.

Numerous applications of AI in the workplace are anticipated to play a major role in shaping the nature of employment in the future. The anticipated advantages are enormous, but as technology develops, so too could the hazards to the

health of employees. In addition to expanding our understanding of the causes of AI-related adverse health outcomes and the practical application of worker safety and health risk management in an increasingly AI-populated world, NIOSH will keep exploring potential benefits of AI for the OSH community.

We can now clearly see how AI will revolutionize every single significant industry. Everything from more efficient manufacturing and retail to more individualized healthcare and self-driving automobiles. Many occupations will be lost as a result of this, including those of call center operators, truck drivers, and possibly even taxi drivers when self-driving cars become common. However, this also applies to blue-collar and white-collar employees.

AI's getting really good at reading radiology images, so if any of you have a son or daughter or a friend graduating from medical school with the radiology degree, I think they might have a perfectly good 5 year career in radiology. Maybe even 10 years. But I wouldn't plan for a 40 year career doing the same radiology job today. This will create challenges and will put pressure on society to figure out solutions such as a new educational system to help those whose jobs will be displaced.

VII. FUTURE WORK

Who will become the gatekeeper of jobs in age of artificial intelligence?

You will surely hear conversations about how automation will eliminate jobs. But I think there's something we don't talk about too much: who gets to be the gatekeepers of the positions that are open? Currently, job applications are being screened by an automated system that looks for specific patterns. These specific trends could be the outcome of bias from previous decision makers during the selecting process. Now, you might unintentionally have embedded bias if you are not actively seeking buyers or attempting to ensure equity. Our primary focus is on technologies that are data-centric. To use a phrase from one of my friends, "data is destiny" in certain ways. If your information is twisted,

A labour market that works for all Americans

Zoe Baird: We created the highest education system one hundred years ago, but we haven't truly created the means to participate in the digital economy yet. The country is changing now due to the digital economy, and in order for individuals to be able to adapt, we need to establish the necessary institutions.

Skillful is an effort to create a labour market that works for 70% of Americans who don't have a college diploma. Early labour market now is increasingly going into the direction of singular path for people to get into those jobs. So we are working with employers to use data on what these skills are that are needed in jobs and make that data transparent and enable job seekers to understand that. We are working with coaches to help people make sense of that data and figure out what kind of training they need. We are working with educators to understand better how what they are teaching can relate to the skills that people need for work.

Ensuring that everyone benefits from the shift to artificial intelligence.

James Fallows: a Although I haven't lived through all of American history, I have lived through a significant portion of it and have read about a significant portion of the remainder. The narrative of the American economy is one of persistent job losses and disruptions, followed by people finding new opportunities. Despite being the world's most agriculturally advanced country, very few Americans currently work as farmers as they did when my grandparents were raising their family. Thus, it's possible to connect people with several skilled employment in the skilled crafts that are opening up, many of which pay a medium to high wage, in addition to providing new training options.

Zoe Baird: it's very important to focus on job training funding and to look at the programs where we are already spending money and make sure that they can be used for a variety of training options and to let the states experiments somewhat.

But to also have data behind that helps the states understand where the growth jobs are, what d skills are, where to have these investments. So the federal government can both direct the dollars it spends and we need much more skills training funding but it can at that time make those dollars spend much more wisely by enhancing the data that's available.

Joy Buolanwini: One of my major recommendations would be looking at their data sets to see how balanced they are to be representative of the people you want to serve or the types of decisions that you are trying to make.

James Fallows: finding ways to support peoples income as they make this transition from jobs that are inevitably coming under pressure, where its mining or retail or things involving transportation, as auto driving vehicles comes up, so that they can feel both the economic security and the psychic security to be ready for the new jobs that are economy should keep producing.

Andrew Ng: I personally prefer a different approach called conditional basic income, which is based on individual research rather than unconditional basic income. The dignity of labor has value, in my opinion. Because there are so many occupations that need to be filled despite the loss of many jobs, I would prefer that society pay people to continue their education rather than paying them to do nothing.

If we can pay people not to do nothing but instead to study, I think this increases the odds that they gain the skills they need to re enter the workforce. And contribute back to the taxpayers that could contribute to this new engine of value creations for our economy.

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