

Chapter 11: AI in the workforce

Aditya Nagnath Phad

Research Student, Department of Economics, Sir Parshurambhau College, Pune

Email ID: phadaditya1203@gmail.com

Introduction:

In earlier times humans were hunter-gatherers in stone age but as the time passed by, we made tools that could make our lives easier in Neolithic age we started farming by using tools like knives, blades, axes, also these were used for hunting. Then they made water lifting devices wheels were invented in bronze- age. In the era of renaissance, we made the printing press as the time passed by, we started automating our tasks, but these were limited to make human work faster and easier. But then came the industrial revolution in which spinning jenny and flying shuttle was invented due to which many artisans lost their jobs. Then came the steam engine which revolutionized the transport and manufacturing sector, but it also led to the loss of jobs for manual laborer's and the people who used to transport goods on bullock carts and horse carriages from one place to other. Many such new machines and technological innovations came into existence like computers which led to impact on every sector in the economy.

History of AI:

After the advent of computers people started researching programs which could work on their own and take decision which we today know as artificial intelligence. now we will look at the brief history of AI and its development.

The history of Artificial Intelligence (AI) dates to ancient times, but the modern concept of AI and its development began in the mid-20th century. Here's a brief overview of the history of AI:

Early Concepts (Pre-20th Century): The idea of creating artificial beings or intelligence can be traced back to ancient mythologies and folklore. The ancient Greeks had myths about automatons, and various cultures had stories about creating lifelike beings. However, these were more in the realm of fiction and fantasy than actual technological developments.

Emergence of Modern AI (1940s - 1950s): The formal study of AI as a scientific discipline began in the 1940s and 1950s. One of the earliest pioneers was Alan Turing, a British mathematician, who proposed the concept of a universal machine capable of simulating any computational task. He also introduced the "Turing Test" to determine if a machine could exhibit human-like intelligence.

Dartmouth Conference (1956): The term "Artificial Intelligence" was coined during the Dartmouth Conference in 1956. Researchers, including John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon, gathered to explore the possibilities of creating "thinking machines" and laid the foundation for AI as a distinct field of study.

AI for Everyone: Applications

Early AI Achievements (1950s - 1960s): In the late 1950s and early 1960s, significant progress was made in AI research. Programs like Logic Theorist and General Problem Solver demonstrated some level of problem-solving abilities. However, early optimism waned as researchers realized the complexity of AI tasks and the limitations of available technology.

"AI Winter" (1970s - 1980s): During the 1970s and 1980s, progress in AI research slowed down due to unrealistic expectations and the failure to deliver on ambitious promises. Funding and interest in AI dwindled, leading to what became known as the "AI Winter."

Expert Systems and Knowledge-Based AI (1980s): In the 1980s, AI research saw a resurgence with the development of expert systems. These systems were designed to emulate the decision-making capabilities of human experts in specific domains. Although they had limitations, expert systems found practical applications in fields like medicine and finance.

Machine Learning Renaissance (1990s - 2000s): The 1990s marked a significant shift towards machine learning approaches in AI. Researchers explored neural networks, genetic algorithms, and other methods to create more adaptable and intelligent systems. This period saw the rise of AI applications in areas like natural language processing and computer vision.

Deep Learning and AI Advancements (2010s - Present): The 2010s witnessed a revolution in AI, primarily driven by advancements in deep learning, a subfield of machine learning. Deep learning techniques, particularly with the use of large neural networks and massive datasets, enabled breakthroughs in image recognition, speech processing, and other AI tasks. Companies like Google, Facebook, and OpenAI played key roles in pushing the boundaries of AI capabilities.

Current State and Applications, AI: continues to evolve rapidly and has found applications in various domains, including healthcare, finance, autonomous vehicles, robotics, and virtual assistants. Ethical concerns, bias, and transparency are critical considerations as AI becomes more prevalent in society.

It's important to note that AI is a vast and multidisciplinary field, and its history is rich with contributions from researchers and scientists around the world. The development of AI is an ongoing process, and new breakthroughs and innovations continue to shape its future.

Impact of AI on employment and job roles:

Now as we have learned about how automation has taken place in human history and the development of AI; we shall look on which jobs will be impacted by AI automation in each type of jobs.

1. Black collar jobs: black collar jobs include working in harsh conditions like mining, oil rigs and construction. These people working in black collar jobs are mostly illiterate and uneducated. Talking about impact of AI in these job field are that many companies like **Caterpillar**¹ (manufacturer of earth movers) with the help **Built robotics**² have made AI powered autonomous

AI for Everyone: Applications

earth movers and vehicles which could be handled by one person while simultaneously controlling other machines from remote places. machines like automated dowsing machine, automated drilling machine, automated loading machine (excavator), and self- driving heavy trucks are also being designed which use AI to take decisions and can be given instructions like where to go where to stop and what tasks to perform they can also network with other machines to work like a team just like how human's operators do. But the difference is that they do not take brakes don't ask for pay raises and workday and night without any fatigue. These companies claim that we will not need any human operators in the future, but we will need highly skilled operators who understand those machines and can programme them. This type of AI automation is going to significantly impact **23lakh mining workers in india**³.

Now let's talk about oil drilling industry there are companies like **Nebor**⁴ which have made automated oil drilling rig which uses AI in its systems called **Pace-R8o1** which works just like any normal oil rig but without any human intervention because the rigs AI takes every decision. It also completed its first drilling mission for **Exxon mobile**⁵(oil company) in 2021.these types of automation are going to significantly impact the oil rig workers in India as well as abroad.

2. Blue collar workers: which include jobs like cab driving, delivery jobs, cooking jobs, waiter, conductors and receptionist etc. People working in blue collar jobs are comparatively more skilled and educated than black collar workers and most of them work in urban environments.

Talking about penetration of AI in these fields is also noteworthy. Many jobs in the fast-food industry may face threat of automated food vending which use AI in their systems to make pizza and burgers. There are also fully automated restaurants being made by **pazzi robotics**⁶which uses AI powered robots to make pizzas this AI- robot is designed to mimic the hand movements of very famous pizza consultant theory grafag nino that means you can eat pizza made by world famous chef whenever you want. When nino was asked about the performance of the robot he said that" the most important step of making a pizza is to make a perfect dough this AI-bot makes the same dough every time which is impossible to made by a human".

Now talking about conductors and ticket collectors they are getting automated by automated by the use automated ticket vending machines and websites where you can book your ticket in advance this has happened in western countries and slowly India is also walking in that direction.

Now if we look at the jobs of cab drivers, they will also get automated using self- driving cars companies like **tesla**⁷ and **cruise**⁸have successfully made self- driving vehicles which use AI for course correction and avoid collision. There is a big certainty in future that **1.9 million taxi drivers in india**⁹ may face unemployment in the future.

Talking about delivery jobs e-commerce giant amazon is developing AI powered drones to deliver their products these drones are integrated with AI just like self -driving cars to avoid collision with each other. Amazon says that lampposts will become charging points for the drones

AI for Everyone: Applications

and rooftops will become waiting points until their owner picks them up. These types of drone deliveries going to significantly impact the delivery job workers in India as well as abroad.

3. White collar jobs: white collar jobs include banking, accounting, auditing, banking, law and business management. These people are comparatively more educated than blue and black collar and poses good formal education with college degree.

First, we will look at the AI automation in banking industry. World bank data shows that in 2011 in India there were only 30% people who had bank accounts, but that percentage increased to 77% and has been increasing since then¹⁰. But if we look at bank PO (probationary officer) vacancies they have fallen 83% from 2016-2021 and clerical vacancies have fallen 93% from 2016-2021¹¹.

posts	2020-21	2019-20	2018-19	2017-18	2016-17
officer	1417	4336	4252	3562	8822
Clerical	1557	12075	7275	7880	19243

So, what is the reason that despite more people being included in the financial sector it is not leading to growth in employment in the banking sector. The reason behind this is the increasing AI driven automation in the banks.

Now banks are using AI to perform tasks like customer support by letting customers resolving their queries by using AI-powered chatbots. Banks are also using AI to monitor and automate transaction also for detecting fraud and theft.

Many banks in India and abroad are shifting into online modes and offering online services like a customer can open an account online transfer money online invest in fixed deposits or withdraw it or resolve doubts by talking to AI chatbots during all these activities the customer does not even need to go to bank or talk to any bank employee. These types of AI automation are going to significantly impact people working in the banking industry.

Now if we talk about other white-collar jobs like accounting and auditing can also be partially automated by the help of AI and deep learning as we are moving close to cashless economy.

In the field of law there may be no penetration of AI in the litigation field but in the field of research there are AI's like one made by the company called blue j lega¹² which can have huge impact. Before understanding this, we should know what the work of a research lawyer is they first look at a case and then research about the supporting laws and similar cases which have happened in the past. The AI made by blue j legal can automate this process because the AI is trained on billions of data points and can identify similar cases and supporting laws in seconds with the accuracy of 94% if this work was given to a team of human lawyers, it would take them days to find out information about the case.

AI for Everyone: Applications

4. Gold collar jobs: gold collar jobs include jobs like pilots, doctors, engineers, these people are highly skilled and educated with years of experience.

If we take a look at the airline industry in prior years two pilots used to fly the plane manually but now almost all airliners now have auto-pilots inside them which use algorithms just like AI can control altitude and flightpaths of the plane moreover autopilots can land the plane even in many airlines companies advise their pilots to that if there is a harsh weather it is mandatory to use autopilot to land the plane. Now the only work of the pilot is to give to new commands to aircraft autopilots and monitor them and stay in the contact with the air traffic control. Due to these advancements in autopilot, there is no need of a co-pilot only one pilot is sufficient to fly the aircraft. According to a report published by **CNBC**¹³ aircraft manufactures like Boeing and Airbus plan to make airliners that will only house one pilot in the cockpit as this will also lead savings of 15 billion dollars for the airline industry.

Now let's come to the medical industry which employs around 10.41 lakh doctors¹⁴. AI has also entered this field especially in the field of radiologists Geoffrey Hinton once told in his speech that we should stop training radiologists because in next five years deep learning and machine learning will be able to do the work of a radiologists. AI's like **chexnet**¹⁵ can do the work of a radiologists before we understand this AI, we should know what the work of a radiologists is. radiologists are the people who look at F-MRI's and X-RAY's and tell what kind of disease the patient has. AI's like chexnet can also do this with the help of deep learning and machine learning because they have trained on billions and billions of data points. There was also a competition organised between chexnet and six doctors in which chexnet won with an accuracy of 81% and doctors lost with the accuracy of 79%¹⁶.

In the surgeon space there are robotic surgeries being done , **7.5 lakh robotic surgeries have been already been performed**¹⁷ but these robots need the supervision of doctors to give instruction and monitor them In the space of normal practice where you go to a doctor for small sickness like cold and cough there are also AI's being developed which are still in their infancy but in future they may get advanced and can give prescription of medicines just like doctors do based on the patients heartbeat and medical history. Super-specialised surgeons and doctors which operate in niche spaces will not pose any threat of unemployment even in the future as they can perform specialised tasks, but normal physician and radiologists may face some kind of unemployment in the coming future as these AI's become more mainstream.

If we look at other important gold collar jobs like engineering there will be more opportunities created in the space of AI development, machine learning and data science but there may also be loss of employment in other categories of engineering. If we look at the India's engineers the situation is not good according to a report, Indian engineers still lag the relevant digital skills that companies nowadays are looking to hire for. This includes advanced tech skills such as artificial intelligence, machine learning, data science and wireless technologies among

AI for Everyone: Applications

other. Merely 2.5% of engineers in India possess skills in AI while only handful of engineers (5.5%) are qualified with basic programming. This means, overall, only 1.5% of engineers of India have the required skills for new-age jobs. This is also the reason why 80% of the engineers are unemployable¹⁸. Now there are also AI's which can perform basic coding tasks like GPT-4 and ChatGPT (gpt-3.5) these types of AI will create threat to programmers who can just perform basic level coding tasks, but it is unlikely to replace highly skilled computer scientist and software developers as they pose deep knowledge of programming and the working behind it.

5. Creative field jobs: which include jobs like graphic designing, illustration and painting. Many people have misconceptions that jobs like painting and illustration can't be done by an AI as they require human emotions but that's not the case because there are AI's like **DALLE-2** developed by **OPENAI**¹⁹(also the developer of famous ChatGPT which can generate images based on given description(prompt) to the AI in a matter of seconds. Though this AI requires human prompting it will significantly impact the entry level illustrators and graphic designers who just know basic painting skills.

(AI) technologies with human capabilities Human-AI collaboration to enhance productivity, decision-making, and augmentation refer to the integration of artificial intelligence problem-solving. This collaborative approach recognizes that both humans and AI have unique strengths and weaknesses, and by combining their abilities, we can achieve more significant outcomes.

[Here are some key aspects of human-AI collaboration and augmentation:](#)

1. Complementary Skills: Humans possess creativity, emotional intelligence, empathy, and a deep understanding of context, while AI excels at processing vast amounts of data quickly, recognizing patterns, and performing repetitive tasks with high accuracy. By combining these strengths, humans and AI can work together to achieve more comprehensive and sophisticated results.

2. Decision Support: AI can provide valuable insights and data analysis to assist humans in making informed decisions. For example, in medical settings, AI can analyse patient data and recommend potential treatments, but the final decision still lies with the healthcare professional who considers various factors like patient history and preferences.

3. Automation of Repetitive Tasks: AI can take over monotonous and time-consuming tasks, freeing up human workers to focus on more complex and creative aspects of their work. This not only increases productivity but also reduces the likelihood of human error.

4. Learning and Adaptation: AI systems can learn from human interactions and data, continuously improving their performance. Similarly, humans can learn from AI insights and adapt their strategies and approaches based on the information provided by AI.

5. Cognitive Augmentation: AI can augment human cognition by providing real-time information, enhancing memory, and offering intelligent suggestions. This can be particularly useful in fields like research, data analysis, and problem-solving.

AI for Everyone: Applications

6. Ethical Considerations: Collaborating with AI raises ethical concerns, such as ensuring fairness, transparency, and accountability in AI systems. Humans must be aware of AI limitations and biases and actively monitor AI outputs to prevent unintended consequences.

7. Training and Skill Development: To effectively collaborate with AI, humans need to acquire the necessary skills to interact with and interpret AI outputs. Educational and training programs can help individuals become proficient in using AI tools and understanding their limitations.

10. Impact on the Workforce: Human-AI collaboration may lead to job transformations rather than outright job replacement. As some tasks become automated, new roles may emerge that require a combination of human and AI expertise.

11. Trust and Acceptance: For successful collaboration, humans must trust AI systems and be willing to accept their recommendations. Transparency and explainability in AI algorithms can foster trust and improve human-AI interaction.

Overall, human-AI collaboration and augmentation hold great promise for boosting productivity, efficiency, and decision-making across various industries. To maximize the benefits and address potential challenges, it is essential to strike a balance between human judgment and AI capabilities and foster a collaborative environment where both entities can thrive.

AI (Artificial Intelligence) has been revolutionizing various aspects of **talent acquisition and workforce management**. Its applications have streamlined processes, improved decision-making, and enhanced overall efficiency. Here are some key areas where AI has made an impact:

1.Candidate Sourcing and Screening: AI can efficiently search through vast databases of resumes and online profiles to identify potential candidates who match specific job requirements. It can also analyse resumes to assess a candidate's skills, qualifications, and experience, thereby automating the initial screening process.

2.Candidate Matching: AI-powered tools can match candidates to job openings based on their skills, experience, and cultural fit. This reduces the time and effort required to find suitable candidates and increases the likelihood of making successful hires.

3.Chatbots and Virtual Assistants: AI-driven chatbots and virtual assistants can engage with candidates, answer their questions, and guide them through the application process. This provides a better candidate experience and frees up recruiters' time for more strategic tasks.

4.Interviewing and Assessment: AI can facilitate video interviews, analyse facial expressions and speech patterns to gauge candidate responses, and conduct automated assessments to evaluate a candidate's technical and soft skills.

5. Employee Onboarding: AI can streamline the onboarding process by providing personalized training plans, answering employee questions, and helping new hires get up to speed quickly.

6. Workforce Planning: AI can analyse historical data, market trends, and business objectives to predict future talent needs and help organizations develop effective workforce planning strategies.

AI for Everyone: Applications

7. Performance Management: AI can provide real-time feedback to employees, track performance metrics, and identify areas for improvement. It enables more data-driven and continuous performance management processes.

8. Employee Engagement and Retention: AI can analyse employee feedback and behaviour patterns to identify potential disengagement or attrition risks. This helps organizations proactively address employee concerns and implement retention strategies.

9. Skills Development and Training: AI can recommend personalized learning paths for employees based on their roles, skills gaps, and career goals. This ensures that training efforts are more targeted and effective.

10. Predictive Analytics: AI-driven predictive analytics can assist in identifying high-potential employees, forecasting turnover rates, and making data-informed decisions about workforce management.

It's important to note that while AI offers numerous advantages in talent acquisition and workforce management, it is not without challenges. Ethical considerations, bias mitigation, data privacy, and the need for human oversight in decision-making are critical aspects that organizations must address when implementing AI solutions in these areas.

Upskilling and reskilling for an AI driven future are essential for preparing for an AI-driven future, where artificial intelligence and automation are expected to significantly impact the job market and work dynamics. To thrive in this changing landscape, individuals need to continuously develop their skills and acquire new ones. Here are some steps to upskill and reskill for an AI-driven future:

1. Understand AI and Its Applications: Start by gaining a basic understanding of what AI is, its different forms (machine learning, deep learning, etc.), and the various domains where AI is being applied (e.g., healthcare, finance, customer service).

2. Identify Relevant Skills: Research and identify the AI-related skills that are in demand in your industry or the one you want to transition into. Some essential AI-related skills include programming (Python, R), data analysis, statistics, machine learning, and natural language processing (NLP).

3. Online Courses and Tutorials: There is a wealth of online resources available for learning AI-related skills. Platforms like **Coursera**²⁰, **Udemy**²¹, edX²² and **swayam NPTEL**²³ offer courses ranging from beginner to advanced levels, taught by experts in the field.

4. AI Specializations: Consider pursuing specialized certifications or degrees in AI and related fields. These structured programs provide comprehensive knowledge and hands-on experience.

5. Practice with Projects: The best way to solidify your AI skills is through practical projects. Work on real-world datasets and build AI models to solve problems. **GitHub**²⁴ is a great platform to showcase your projects to potential employers.

AI for Everyone: Applications

6. Stay Updated: AI is a rapidly evolving field, so it's crucial to stay updated with the latest developments. Follow AI researchers, join relevant online communities, attend conferences, and read research papers.

7. Collaborate and Network: Engage with others in the AI community, participate in forums and discussions, and attend meetups or virtual events. Networking can open opportunities and help you learn from others' experiences.

8. Soft Skills Matter: While technical skills are essential, don't neglect soft skills like critical thinking, creativity, communication, and adaptability. These attributes complement your technical expertise and make you more valuable in an AI-driven workplace.

9. Ethical AI Understanding: Familiarize yourself with the ethical implications of AI. As AI systems influence decision-making, it's crucial to understand bias, privacy, and transparency concerns.

10. Continuous Learning: Commit to lifelong learning. The AI field will continue to evolve, and you must embrace ongoing education and adaptability.

11. Explore Adjacent Fields: Consider exploring fields that complement AI, such as data science, robotics, or human-computer interaction. A multidisciplinary approach can enhance your value in the job market.

12. On-the-Job Training and Internships: Seek opportunities for on-the-job training or internships with organizations that are actively implementing AI solutions. Hands-on experience in real-world projects is invaluable.

Remember, the key to upskilling and reskilling is dedication, perseverance, and a willingness to embrace new challenges. By staying proactive and continually learning, you can position yourself for success in an AI-driven future.

References:

1. caterpillar: - <https://www.caterpillar.com/>
2. built robotics: - <https://www.builtrobotics.com/>
3. 23lakh mining jobs: -<https://economictimes.indiatimes.com/industry/indl-goods/svs/metals-mining/mining-sector-witnessing-job-losses-has-potential-to-create-5-cr-jobs-fimi-to-pm/articleshow/71034044.cms?from=mdr>
4. nebor: -<https://www.nabors.com/>
5. exxon mobile: - <https://corporate.exxonmobil.com/>
6. pazzi: - <https://pazzirobotics.com/>
7. tesla: - <https://www.tesla.com/>
8. cruise: - <https://getcruise.com/>
9. 1.9milliontaxidrivers: -<https://mobilityforesights.com/product/on-demand-taxi-market-in-india/#:~:text=The%20Indian%20taxi%20market%20size,terms%20of%20registered%20taxi%20fleet.>

AI for Everyone: Applications

10. <https://www.livemint.com/Industry/CJk2Yalf8NYRdgp8HcvFFJ/19-crore-Indian-adults-dont-have-bank-account-World-Bank.html>
11. vacancies of po: - <https://youtu.be/u2VCRTjQ9ss>
12. blu j legal: - <https://www.bluej.com/>
13. CNBC report: - <https://www.cnbc.com/2019/05/20/boeings-new-797-could-be-built-to-fly-with-just-one-pilot-on-board.html>
14. 10.41 lakh doctors: - <https://timesofindia.indiatimes.com/blogs/voices/we-dont-even-know-how-many-doctors-currently-practice-in-india/>
15. chexnet: - <https://github.com/jrzech/reproduce-chexnet>
16. chexnet: - <https://laurenoakdenrayner.com/2018/01/24/chexnet-an-in-depth-review/>
17. 12,800 robotic surgeries: - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6961426/>
18. business insider: - <https://www.businessinsider.in/engineers-in-india-lack-the-right-job-skills-including-artificial-intelligence-and-machine-learning-report/articleshow/68516807.cms>
19. openai: - <https://openai.com/>
20. coursera: -<https://www.coursera.org/>
21. udemy: -<https://www.udemy.com/>
22. edx: - <https://www.edx.org/school/edx>
23. swayam nptl: - https://swayam.gov.in/nc_details/NPTEL
24. github: - <https://github.com/>