

## A STUDY ON ARTIFICIAL INTELLIGENCE AND EMPLOYABILITY SKILLS IN INDIA

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### Abstract:

The rapidly advancing technology in India is AI, that poses opportunities and challenges on employability in the various sectors in India. Jobs of repetitive nature are likely to diminish with adoption of AI. However, there will be displacement of jobs towards adoption, development, and maintenance of AI systems. This study uses various scholarly research articles, industry reports, reputable blogs, and industry reports to examine the effect of AI on employability. This research paper first studies the opportunities and challenges on employability in various sectors in India due to AI adoption. Second, it studies the employability skills in various sectors due to AI adoption. Third, it finds out which skills will be in high demand and short supply due to AI adoption. The study found out that various foundational skills such as programming, data analysis, machine learning, mathematics and statistics, problem solving, and critical thinking will be required due to AI adoption. Various technical skills such as natural language processing, computer vision, AI ethics and bias, AI project management, and domain specific skills will be required due to adoption of AI. Major programming languages, natural language processing, data science and analytics, machine learning, and computer vision are the skills in high demand and short supply due to AI adoption in India.

**Keywords:** *Employability, Artificial Intelligence, Job Displacement, Challenges, Opportunities*

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### Introduction:

There has been as seismic shift in India's job landscape due to Artificial Intelligence (AI). Jobs which are facing automation are routine sector jobs such as data entry and call centres. However, opportunities are surging in the field of machine learning, data science, and engineering. The transformative power of AI has been recognized by the Indian Government who has launched the National AI strategy, for developing a \$1 trillion AI industry in India by the year 2035. AI will augment certain roles and will automate others. As per the India Skills Report 2024, there is an expectation that AI industry has created 2.3 million jobs. Simultaneously, on the other hand, AI industry has eliminated 1.8 million jobs. Thus, leading up to 2023, this has resulted in a net increase of 500,000 jobs. However, it is be noted that jobs have been evolved and not erased. Hence, reskilling will be the key in the new world of AI adoption. There will be sectors which will face job displacement.

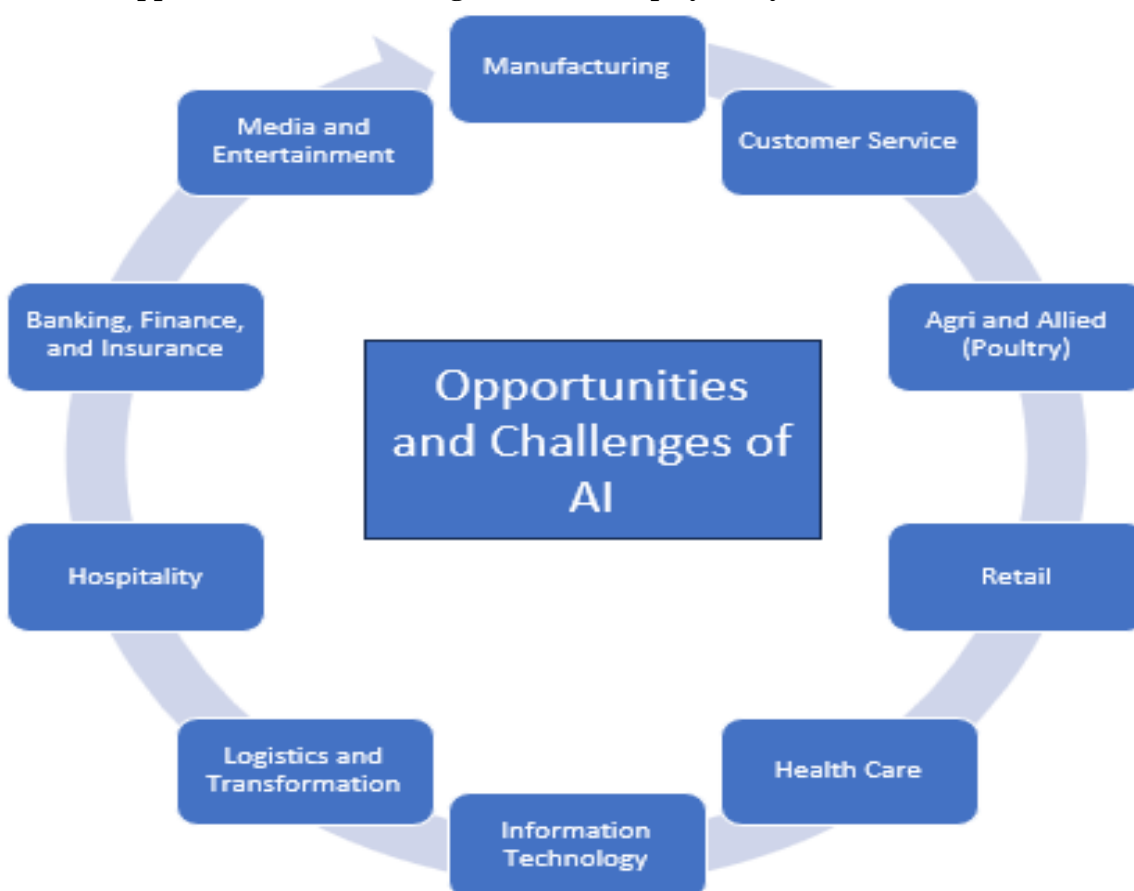
**Objectives:**

- a) To study the opportunities on employability in various sectors in India due to AI adoption.
- b) To study the challenges on employability in various sectors in India due to AI adoption.
- c) To study the employability skills that will be required due to AI adoption.
- d) To find out which skills will be high demand and short supply due to AI adoption.

**Research Methodology:** The research methodology used in this study was an extensive review of articles, published papers, and reports which were related to AI and employability skills. A total of 50 papers were scrutinized. After rigorous selection process, a total of 20 papers that align directly with the research objectives were included in this study. This research study will embrace a comprehensive approach through assimilation of diverse information sources. These sources of information include reputable survey, industry reports and research articles. A holistic understanding of AI on employability in India can be ascertained through multifaceted array of perspectives.

**Opportunities and Challenges on Employability in Various Sectors in India due to AI adoption**

**Chart 1: Opportunities and Challenges of AI on Employability**



**Table 1: Opportunities and Challenges of AI on Employability**

Sector	Opportunities	Challenges
Manufacturing	AI evolution has increased the demand for machinery and high-end equipment for technological advancement. This paradigm shift will create employment opportunities for engineering, data analysis, software development, innovation, and product marketing.	There will be displacement of labour-intensive roles as machines will take on challenging tasks. However, it must be noted that it is not a job loss story but a narrative of innovation and creation.
Customer Service	It is an engine for job creation which gives rise to role in data analytics, quality control, engineering, and software development. Chatbots ensure round the clock availability and faster response time which translate into more satisfied and happier clientele.	Customer inquiries will be substantially handled by chatbots and there will be displacement of some roles for customer service representative.
Agri and Allied (Poultry)	AI powered sensors, monitor health and behaviour of chickens like skilled diagnosticians. These AI powered sensors can identify potential health issues at a pace to take corrective actions.	The shift toward AI-driven poultry management may result in some level of job displacement among manual labourers.
Retail	Some of the emerging roles due to AI infusion will be e-commerce managers managing online stores, social media managers managing brand digitally, customer experience managers ensuring a seamless customer journey, data analysts decoding customer preferences, and logistics and supply chain managers play the role of choreographing products from shelf to the doorsteps.	The AI infusion journey is not without challenges as there may be displacement of jobs
Healthcare	AI powered diagnostics can improve early intervention rates by detecting diseases 20% faster. Initial consultation can now be handled by AI powered chatbots. Diseases are diagnosed with high accuracy as machine learning algorithms can now analyse medical scans. Some of the new jobs created in this sector will be tele-surgery in which precise, well-timed, and accurate surgeries will be carried out in comparison to completely manual operations. Robot assisted diagnostics will be carried out by integrating technology, machine learning, and artificial intelligence to perform diagnostics. Deep learning experts can develop AI solutions that will help in every stage of healthcare namely, diagnostics, care delivery, health data analytics, and population health management.	Infusion of AI in healthcare could replace administrative jobs such as those associated with patient engagement and medical record maintenance.

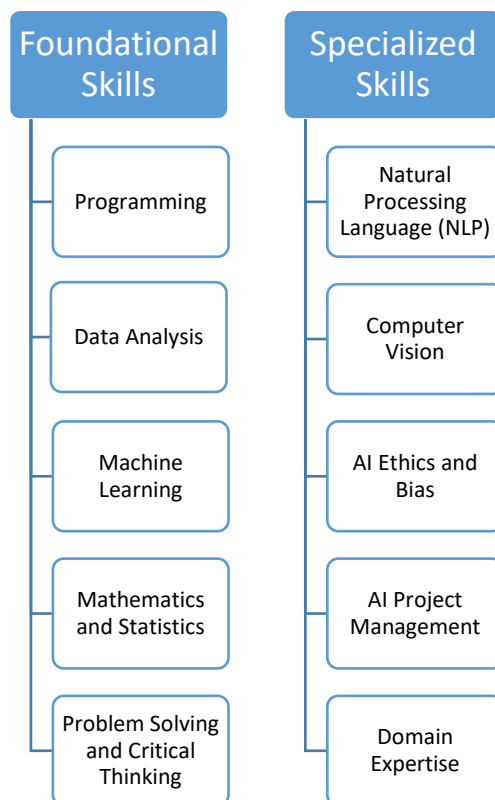
Information Technology	Some of the new jobs created will be machine learning engineers who will integrate AI and cognitive systems. Data scientists will transform data into actionable insights for making informed business decisions. Cloud architects will build the infrastructure for digital India. Cybersecurity analyst will guide the digital infrastructure. Full stack developers will bridge the back and front ends of digital experiences. Blockchain developers will develop the decentralized ledgers. UX designers will craft user-friendly interfaces.	There will be a restructuring in traditional IT roles. There will be displacement towards adoption, development, and maintenance of AI systems
Logistics and Transformation	Self-driving cars and trucks on roads are now possible due to evolution of AI in the transportation sector. This shift will boost in road safety. There will be optimization of supply chains due to AI-driven predictive analytics which will fine tune delivery schedules. New jobs will be created in the sphere of AI system development and maintenance. Some of the jobs will be in engineering, software development, and data analysis. Furthermore, there will be jobs in self-driving vehicle development and maintenance.	The opportunities of digital transformation by using AI will displace some manual labour roles.
Hospitality	AI-driven chatbots are now being used to address customer inquiries where human staff can now take care of personalized aspects of guest satisfaction. AI reach although starts from chatbots but extends to various aspects such as energy, management for sustainable operations, personalized guest recommendations, and for predictive maintenance	This transition affecting traditional roles in the hospitality sector is not a story of job displacement but a story of evolution, with new opportunities emerging in AI system development and maintenance.
Banking, Finance, and Insurance	New jobs have been created in data analysis, engineering, and software development. BFSI industry is now using AI to detect fraud and fraudulent activities. This has opened new opportunities in AI system development and maintenance.	Traditional roles in risk assessment and fraud detection in BFSI will require reconfiguration. However, it is not the case of decline, but a journey of transformation where traditional roles had to be reconfigured which needs to be addressed appropriately.
Media and Entertainment	The audience engagement has been increased due to AI-driven recommendation engines which are personalizing content for consumers. This will open opportunities in the field of AI system development and maintenance. This sector will create job opportunities in animation, graphic designing, sound engineering, web designing, gaming, VFX and IT as transformative technologies will be required in these areas.	This change in technology will bring about certain changes in the job role within the media and entertainment industry. The challenge will be to what extent AI will be adopted in the media and entertainment industry and to ensure smooth transition from traditional to emerging technology.

Source: Adapted India Skills Report 2024

**Employability Skills Required in the World of AI adoption:**

The employability skills due to AI adoption will consist of foundational and specialized skills. The foundational and specialized skills are shown as follows in Chart 2.

**Chart 2: Foundational and Specialized Skills Required in the World of AI adoption**



**1. Foundational Skills:** Some of the foundational skills required in the world of AI will be as follows:

**A. Programming:** To develop AI algorithms and applications, strong programming skills in R, Python, and Java are required. For those who want to excel in AI can enrol in coding boot camps and participate in open-source projects. To enhance programming expertise, individuals can collaborate on GitHub, and solve real-world problems. Thus, contributing to AI communities.

**B. Data Analysis:** The top 5 skills needed in data science and artificial intelligence are R programming language, Hadoop, Python, Spark, and R programming language. To gain practical experience and contribute to skill development, one can work on personal data projects, and seek internships that involve data analysis.

**C. Machine Learning:** For building AI models, one should be familiar with algorithms and machine learning concepts, namely unsupervised, supervised, and reinforcement learning. One of the top AI careers in India is that of Machine learning engineering. To reinforce theoretical knowledge, one can apply machine learning to real-world projects.

**D. Mathematics and Statistics:** For understanding AI and machine learning, strong foundation in statistics and mathematics is essential. To make the career in AI, linear algebra and statistics are among the top skills. One can use statistics tools in data projects and practice mathematical problem-solving on platforms such as Project Euler.

**E. Problem Solving and Critical Thinking:** For gaining success in the field of AI, one should have the ability in analysing complex problems, identifying patterns, and developing creative solutions. Problem solving and critical thinking are the most important skills for AI in 2024. One can participate in coding challenges on LeetCode platforms to increase problem solving abilities. To sharpen critical thinking skills, one can tackle algorithmic problems and discuss solutions with peers in the AI communities.

**2. Specialized Skills:** Some of the specialized skills are as follows:

**A. Natural Language Processing (NLP):** NLP techniques will be essential to develop AI based applications for understanding, processing, and generating human language. It is recommended to enrol in online courses, engaging in hands on project, and attending workshops for building practical NLP skills. To enhance proficiency, one can use open-source NLP libraries.

**B. Computer Vision:** For developing AI applications that can analyse and interpret images and data, skills in computer vision are essential. It is recommended to use platforms such as TensorFlow and OpenCV for developing skills related to computer vision. Furthermore, it is recommended to stay updated on latest developments in the field of object detection, image recognition, and video analysis.

**C. AI Ethics and Bias:** To develop and deploy responsible AI, it is essential to understand the ethical implications of AI and develop ways to mitigate its bias. One can stay informed about ethical guidelines by taking course in AI ethics and by participating in discussion related to bias mitigation.

**D. AI Project Management:** For successful AI implementation, an individual should possess ability to manage complex AI projects which requires gathering of information, team coordination, and risk assessment. To develop proficiency in AI project management tools, one can take certification courses or take internships.

**E. Domain Expertise:**

To gain significant advantage in the AI field, one should develop domain specific skills such as healthcare, finance, and manufacturing. It is recommended to attend industry conferences and to network with professional from the specific sector, one can enhance domain specific skills. One can apply AI theoretical knowledge to the specific domain to increase one's knowledge.

**Skills in High Demand and Skills in Short Supply:**

According to India Skills Report 2024, major programming languages, natural language processing, data science and analytics, machine learning, and computer vision are the most in-demand skills across various sectors

in India related to AI adoption. The skills which are in short supply due to accelerated development in AI are data science, programming languages, machine learning, natural processing language, and computer vision according to India Skills Report 2024. It is to be noted that the skills which are in high demand in the world of AI adoption are in short supply.

### Conclusion:

The AI revolution across various sectors in India will demise certain routine jobs but not all jobs will be replaced by AI adoption. There will be displacement of jobs towards adoption, development, and maintenance of AI systems. Various foundational skills such as programming, data analysis, machine learning, mathematics and statistics, problem solving, and critical thinking will be required due to AI adoption. Various technical skills such as natural language processing, computer vision, AI ethics and bias, AI project management and domain specific skills will be required due to adoption of AI. Major programming languages, natural language processing, data science and analytics, machine learning, and computer vision are the skills in high demand and short supply due to AI adoption.

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