

Why You Master AI and Machine Learning Skills in 2025

Abayomi Jegede, **PhD, MCPN, MACM, MACM-SIGSAP**
Department of Computer Science
Edo State University Uzairue
Edo State Nigeria

Outline

- ▶ **What is Artificial Intelligence?**
 - ▶ **Evolution of Artificial Intelligence**
 - ▶ **Popular Artificial Intelligence Technologies**
 - ▶ **5 AI Trends to Watch in 2025**
 - ▶ **Career Paths in AI and ML**
 - ▶ **5 Skills Required for AI Jobs**
 - ▶ **7 Technical AI Skills in Demand in 2025**
 - ▶ **How to Start a Career in AI**
 - ▶ **Salary Prospects for AI Professionals**
- 

What is Artificial Intelligence?

- ▶ Artificial Intelligence (also known as AI), uses computer systems that aim to mimic human intelligence.
 - ▶ AI enables digital computers or computer-controlled system or robot to perform tasks commonly associated with intelligent beings.
 - ▶ The focus is on developing systems endowed with the intellectual processes characteristic of humans.
- 

What is Artificial Intelligence? (contd.)

- ▶ Such intellectual processes include:
 - The ability to reason, discover meaning, generalize, or learn from past experience.
 - ▶ AI technology is inspired by the human brain
 - With the goal to solve complex problems, automate tasks, and improve decision-making processes.
 - ▶ Systems employ AI algorithms to:
 - Learn from data, adapt to new information, and continually improve.
- 

Why is AI Necessary?

- ▶ Conventional digital (developed since 1940s) can be programmed to carry out very complex tasks
 - ▶ Such as proving mathematical theorems or playing games (e.g. chess) with great proficiency.
- ▶ Despite continuing advances in computer processing speed and memory capacity, there are limitations in the sense that:
 - ▶ No program that can match full human flexibility over wider domains or in tasks requiring much everyday knowledge.
- ▶ Hence the need for systems that can attain the performance levels of human experts and professionals in executing certain specific tasks.

Why is AI Necessary? (contd.)

- ▶ AI in this limited sense is applied in areas such as:
 - ▶ Medical diagnosis, computer-based search engines, voice or handwriting recognition, and chatbots.
- ▶ Modern AI technologies can process and analyze large datasets much faster than traditional computer programs.
 - ▶ This enables businesses to gain **valuable insights**, make **data-driven decisions**, and **predict future trends** more accurately.

Popular AI Technologies

- ▶ **Machine Learning** – the development and use of computer systems that are able to:
 - Learn and adapt without following explicit instructions.
 - By using algorithms and statistical models to analyze and draw inferences from patterns in data.
- Provides machines the ability to automatically learn from data and past experiences:
 - To identify patterns and make predictions with minimal human intervention.
- ▶ **Deep Brain AI or AI Human** – a real-time responsive conversational AI solution
 - Can be seamlessly integrated into diverse environments.
 - Applications include:
 - Conversational consultation services on mobile applications
 - Interactive AI Human Kiosks in the offline retail industry.

Popular AI Technologies (contd.)

- ▶ **Explainable AI (XAI)** – a set of processes and methods:
 - That allows human users to comprehend and trust the results and output created by machine learning algorithms.
 - Used to describe an AI model, its expected impact and potential biases.
 - Helps characterize model accuracy, fairness, transparency and outcomes in AI-powered decision making.
- ▶ XAI is crucial for an organization in building trust and confidence when putting AI models into production.
 - AI explainability also helps an organization adopt a responsible approach to AI development.
- ▶ **Natural Language Processing (NLP)** – a branch of AI that:
 - Enables computers to process (i.e. comprehend, generate, and manipulate) human language.
 - Has the ability to interrogate the data with natural language text or voice.
- ▶ NLP enables machines to automatically perform repetitive tasks such as:
 - machine translation, summarization, ticket classification, and spell check.

Popular AI Technologies (contd.)

- ▶ **Biometrics** – measurements and calculations related to human characteristics and features.
 - Serves two distinct functions – **authentication** and **identification**.
 - Biometric authentication (or realistic authentication) is used for identification and access control.
 - Common biometric technologies include fingerprints, facial recognition, voice recognition, iris recognition, palm or finger vein and gait
- ▶ **Reinforcement Learning** – a machine learning technique that trains software to make decisions to achieve the **most optimal** results.
 - Mimics the **trial-and-error** learning process that humans use to achieve their goals.

Popular AI Technologies (contd.)

- ▶ **Data Analytics** – the science of analyzing raw data to make conclusions.
 - Converts raw data into actionable insights.
 - Includes a range of **tools**, **technologies**, and **processes** used to **find trends** and **solve problems** by using data.
 - ▶ Data analytics can **shape business processes**, **improve decision-making**, and **foster business growth**.
 - ▶ Help a business optimize its performance, perform more efficiently, maximize profit, or make more strategically-guided decisions.
- 

Popular AI Technologies (contd.)

- ▶ **Predictive Analytics** – an advanced form of data analytics used to determine future patterns or trends.
 - Uses **statistics** and **modeling** techniques to **forecast** future outcomes (Halton, 2024).
 - Examines and plots current and historical data patterns to determine the likelihood that those patterns will repeat.
- ▶ Businesses use predictive analytics to fine-tune their operations and decide whether new products are worth the investment.
- ▶ Investors use predictive analytics to decide which business opportunities to explore.
- ▶ Internet retailers use predictive analytics to fine-tune purchase recommendations to their users and increase sales.

Popular AI Technologies (contd.)

▶ Chatbots and Virtual Assistants

- ▶ Chatbots have a conversational user interface (CUI) that enables customers to interact with the chatbot via messages.
- ▶ Virtual assistants can have a chat-based interface and can also function without these interfaces, by using voice commands.
- ▶ Chatbots are designed with ML and NLP and can perform simple and repetitive tasks.
- ▶ Virtual assistants are advanced as they are designed with emotional artificial intelligence and natural language understanding (NLU).

Popular AI Technologies (contd.)

- ▶ **GPT – 3.5/GPT 4 – Generative Pre-trained Transformer.**
 - ChatGPT is a form of generative AI
 - Developed by an AI research company, Open AI.
 - An AI chatbot technology that can process natural human language and generate a response.
- ▶ ChatGPT facilitates human-like conversations to complete various tasks.
- ▶ Chat GPT allows users enter prompts and to receive humanlike images, text or videos that are created by AI.
- ▶ The generative AI tool can answer questions and assist you with composing emails, essays, marketing flyers and program code.

Popular AI Technologies (contd.)

- ▶ **Generalized Adversarial Networks** – a deep learning architecture.
 - Trains two neural networks to compete against each other to generate more authentic new data from a given training dataset.
 - For instance, you can generate new images from an existing image database or original music from a database of songs.
- ▶ Generative Adversarial Networks are good at generating random images.
 - For example, a GAN which was trained on images of cats can generate new random images of a cat having two eyes, two ears, whiskers.

Ethical and Privacy Concerns

- ▶ The introduction of AI to business applications raises urgent concerns around the **ethics**, **privacy**, and **security** of the technology.
- ▶ Governance of AI technology must consider how to develop and expand current legislation around:
 - Privacy and data protection,
 - Purpose specification, data collection and use limitations
 - Accountability and security of data storage

Ethical and Privacy Concerns (contd.)

- ▶ AI also requires human oversight to review and interpret the results it generates and monitor how it is generating them
 - So that it will not reproduce or worsen current and historical biases and patterns of discrimination (Chen, 2023).
- ▶ For example, researchers at Carnegie Mellon University revealed that **Google's online advertising algorithm reinforced gender bias** around job roles
 - By displaying high-paying positions to males more often than women (IBM Data and AI Team, 2023).

Skill Gaps and Workforce Transformation

- ▶ Although AI can bridge skill gaps
 - Offering workers access to skill sets like coding, translating, and writing, it also creates skill gaps.
- ▶ AI is a rapidly advancing and developing technology
 - Hence, training and keeping up with knowledge about AI tools can be a challenge for workers and businesses alike.
- ▶ A 2023 survey of small business owners by Microsoft revealed that:
 - Only 10% of small businesses with up to 24 employees “know how to use AI for their work-related tasks,”
 - While 67% say “they know little to nothing about AI in general.”

Advice to Business Leaders

- ▶ MIT professor John J. Horton recommends that business leaders consider the following before deciding whether to replace human labour with AI:
 - How much time the task would take otherwise?
 - How much the employee who performs the task is paid?
 - Whether AI is capable of correctly performing the task?
 - How easy it is for a human to confirm whether the AI output is accurate?

5 AI Trends to Watch in 2025

- ▶ **1. Generative AI and democratization**
- ▶ Generative AI is arguably the biggest trend in AI this year.
 - Chat and other text and image generators are accessible to the general public.
 - Widely used and adopted by business teams worldwide.
- ▶ Along with this is the democratization of AI, enabling it to be available to everyone—even those without technical knowledge.
- ▶ Hundreds of AI tools today allow us to create content faster, translate between languages, and populate search engines.
 - Changing how we communicate with each other, whether it is between friends or between the media and the general public.

AI for Workplace Productivity

- ▶ Artificial intelligence can speed up and enhance how we work—in particular, how it automates time-consuming or repetitive tasks.
- ▶ Whether data entry in a spreadsheet, writing an outline for a business plan, or controlling quality at a manufacturing plant.
- ▶ Can AI replace jobs?
 - This technology is often simply acting as a tool for automating repetition, leaving room for humans to make space for creativity, emotional intelligence, and moral judgment.

Multimodal AI

- ▶ Multimodal models in AI can grasp information from different data types, like audio, video, and images, in addition to text.
- ▶ This technology is enabling search and content creation tools to become more seamless and intuitive and integrate more easily into other applications we already use.
- ▶ For example, iPhones can now figure out who and what objects are in your photographs because they can process images, metadata text, and search data.
- ▶ Similar to how a human can look at a photo and identify what is in it, multimodals enable that same characteristic.

AI in Science and Health

- ▶ AI tools have great potential in science and health care.
- ▶ Researchers, such as those at Microsoft, are now using AI to build tools to predict weather, estimate carbon emissions, and enable sustainable farming practices.
 - This trend aims to address and mitigate the effects of climate change.
- ▶ Chatbots are being deployed in agriculture and health care, to help farmers identify a type of weed and to help medical professionals diagnose patients.
- ▶ While the accuracy of this AI is in progress, these steps can accelerate scientific discoveries and medical breakthroughs.

Regulation and Ethics

- ▶ With the proliferation of AI worldwide, the trend of mitigating any risks associated with AI is paramount.
- ▶ Government agencies and organizations like OpenAI are ensuring AI is used and deployed responsibly and ethically.
- ▶ In March 2024, the European Union debated a landmark comprehensive AI bill designed to regulate AI and address concerns for consumers. It is expected to become law this year.
- ▶ If AI is not regulated, data manipulation, misinformation, bias, and privacy risks can arise and pose greater societal risks.
 - For example, tools can be susceptible to discrimination or legal risk

Career Paths in AI and Machine Learning

- ▶ With the proliferation of AI worldwide, the trend of mitigating any risks associated with AI is paramount.
- ▶ Government agencies and organizations like OpenAI are ensuring AI is used and deployed responsibly and ethically.
- ▶ In March 2024, the European Union debated a landmark comprehensive AI bill designed to regulate AI and address concerns for consumers. It is expected to become law this year.
- ▶ If AI is not regulated, data manipulation, misinformation, bias, and privacy risks can arise and pose greater societal risks.
 - For example, tools can be susceptible to discrimination or legal risk

5 Skills Required for AI Jobs

- ▶ According to [ZipRecruiter](#), these are the top 5 skills required for AI jobs:
- ▶ Knowledge and experience in at least one of the following programming languages:
 - Python
 - C/C++
 - MATLAB
- ▶ Communication skills
- ▶ Digital marketing goals and strategies
- ▶ Collaborating effectively with others
- ▶ Analytical skills
- ▶ The [Intellipaat blog](#) also recommends these additional skills for AI professionals:
 - Solid knowledge of applied mathematics and algorithms
 - Problem-solving skills
 - Industry knowledge
 - Management and leadership skills

7 Technical AI Skills in Demand in 2025

- ▶ **Machine Learning**
Understanding algorithms, models and how to implement them using libraries like [TensorFlow](#) or [PyTorch](#).
- ▶ **Deep Learning**
Specializing in neural networks and their applications in natural language processing, image recognition and more.
- ▶ **Data Analysis and Visualization**
Proficiency in tools like [Tableau](#), [Power BI](#) and programming languages such as [R](#) and [Python](#) to interpret and present data.
- ▶ **Natural Language Processing (NLP)**
Skills in working with text data to build applications like chatbots, [sentiment analysis tools](#) and more.
- ▶ **Robotics**
Knowledge in [designing, building and programming robots](#) for various applications.
- ▶ **Computer Vision**
Expertise in [extracting information from images and video data](#) using algorithms and models.
- ▶ **Cloud Computing**
Experience with platforms like [AWS](#), [Google Cloud](#) or [Azure](#) for deploying and scaling AI solutions.

How To Start A Career in AI

- ▶ Starting a career in AI requires a combination of education, practical experience and strategic job searching.
- ▶ According to [Springboard](#), hiring managers will probably require at least a bachelor's degree in math and basic computer technology, undergraduate degrees in computer science or engineering are good starting points.
- ▶ Dan Ayoub, general manager for mixed reality education at Microsoft, explained that “curiosity, confidence, and perseverance” will benefit students looking to break into an emerging field like AI.
- ▶ He noted that familiarity with data science, machine learning and Java are good places to begin, with specialized training offered through degree programs.
- ▶ For those looking to set themselves apart, a Master's degree in artificial intelligence can provide firsthand experience and knowledge from industry experts.
 - Those interested in pursuing a Master's in AI should have a strong foundation in math, computer science and data analytics.

Salary Prospects for AI Professionals

- ▶ Salary prospects for AI professionals are very positive.
 - ▶ High average salaries and significant growth potential due to the increasing demand for AI expertise across various industries.
 - ▶ According to Glassdoor, the average AI professional in the US can expect to earn around \$170,000 annually with entry-level positions starting at \$115,000 and experienced roles reaching up to \$200,000 or more depending on specialization and company size.
- 