

The background of the image is a scenic view of a mountain peak, likely El Capitan in Yosemite National Park, during the 'golden hour' of sunset or sunrise. The sky is a mix of soft orange, yellow, and pale blue. The mountain face is rugged and dark, with some sparse vegetation visible on the lower slopes. A large, dark semi-transparent rectangle is centered over the image, containing the quote in white text. Below the quote, there is a smaller red rectangle with the author's name in white. At the bottom center, there is a small logo and the text 'quotefancy'.

In God we trust; all
others bring data.

W. Edwards Deming



ARTIFICIAL INTELLIGENCE LAB





MAIN CONCEPTS

- **Introduction to Artificial Intelligence**
- **Programming for AI**
- **Machine Learning Basics**
- **Neural Networks and Deep Learning**
- **Natural Language Processing (NLP)**



INTRODUCTION TO AI

- Overview of AI and its applications
- History and evolution of AI
- Ethical considerations in AI



Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think, learn, and make decisions. These systems can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation. AI encompasses a wide range of technologies, including machine learning, neural networks, natural language processing, robotics, and more.



KEY COMPONENTS OF AI

- 1. Machine Learning (ML):** A subset of AI that involves training algorithms to learn from and make predictions or decisions based on data. Common techniques include supervised learning, unsupervised learning, and reinforcement learning.
- 2. Neural Networks:** Computational models inspired by the human brain, used for tasks like image and speech recognition. Deep learning, a subset of neural networks, involves multiple layers of neurons to model complex patterns.
- 3. Natural Language Processing (NLP):** Enables machines to understand, interpret, and generate human language. Applications include chatbots, language translation, and sentiment analysis.
- 4. Computer Vision:** Enables machines to interpret and make decisions based on visual data from the world. Applications include facial recognition, object detection, and autonomous vehicles.
- 5. Robotics:** Combines AI with mechanical engineering to create robots that can perform tasks autonomously or semi-autonomously.



Applications of AI

1. Healthcare

1. **Diagnosis and Treatment:** AI algorithms can analyze medical images, predict disease outbreaks, and recommend personalized treatment plans.
2. **Drug Discovery:** AI accelerates the process of drug discovery by predicting how different compounds will interact with targets in the body.

2. Finance

1. **Algorithmic Trading:** AI systems can analyze market data and execute trades at high speeds.
2. **Fraud Detection:** Machine learning models can identify unusual patterns indicative of fraudulent activity.

3. Retail

1. **Personalized Recommendations:** AI analyzes customer behavior to recommend products.
2. **Inventory Management:** Predictive analytics helps in managing stock levels efficiently.

4. Transportation

1. **Autonomous Vehicles:** AI powers self-driving cars by processing data from sensors and making real-time driving decisions.
2. **Traffic Management:** AI optimizes traffic flow and reduces congestion through real-time data analysis.



1. Customer Service

1. **Chatbots:** AI-driven chatbots provide instant customer support and handle routine inquiries.
2. **Sentiment Analysis:** AI analyzes customer feedback to gauge satisfaction and improve services.

2. Manufacturing

1. **Predictive Maintenance:** AI predicts equipment failures before they occur, reducing downtime.
2. **Quality Control:** Computer vision systems inspect products for defects.

3. Education

1. **Personalized Learning:** AI tailors educational content to individual student needs.
2. **Administrative Automation:** AI automates administrative tasks like grading and scheduling.

4. Entertainment

1. **Content Recommendation:** AI suggests movies, music, and other content based on user preferences.
2. **Game Development:** AI creates realistic non-player characters (NPCs) and adaptive game environments.

5. Security

1. **Surveillance:** AI-powered cameras can detect suspicious activities in real-time.
2. **Cybersecurity:** AI identifies and mitigates potential security threats.

6. Agriculture

1. **Precision Farming:** AI analyzes data from sensors and drones to optimize crop yields.
2. **Pest Control:** AI predicts pest outbreaks and recommends control measures.

TIME LINE

History of Artificial Intelligence

1950

The time when it all started.

1955

John McCarthy coined term 'Artificial intelligence'.

1974

Computers became faster & affordable

1980

The year of Artificial Intelligence.

2000

Landmark of AI establishment achieved.



A.I. TIMELINE

1950

TURING TEST

Computer scientist Alan Turing proposes a test for machine intelligence. If a machine can trick humans into thinking it is human, then it has intelligence

1955

A.I. BORN

Term 'artificial intelligence' is coined by computer scientist, John McCarthy to describe "the science and engineering of making intelligent machines"

1961

UNIMATE

First industrial robot, Unimate, goes to work at GM replacing humans on the assembly line

1964

ELIZA

Pioneering chatbot developed by Joseph Weizenbaum at MIT holds conversations with humans

1966

SHAKY

The 'first electronic person' from Stanford, Shakey is a general-purpose mobile robot that reasons about its own actions

A.I. WINTER

Many false starts and dead-ends leave A.I. out in the cold

1997

DEEP BLUE

Deep Blue, a chess-playing computer from IBM defeats world chess champion Garry Kasparov

1998

KISMET

Cynthia Breazeal at MIT introduces Kismet, an emotionally intelligent robot insofar as it detects and responds to people's feelings



1999

AIBO

Sony launches first consumer robot pet dog AiBO (AI robot) with skills and personality that develop over time



2002

ROOMBA

First mass produced autonomous robotic vacuum cleaner from iRobot learns to navigate and clean homes



2011

SIRI

Apple integrates Siri, an intelligent virtual assistant with a voice interface, into the iPhone 4S



2011

WATSON

IBM's question answering computer Watson wins first place on popular \$1M prize television quiz show Jeopardy



2014

EUGENE

Eugene Goostman, a chatbot passes the Turing Test with a third of judges believing Eugene is human



2014

ALEXA

Amazon launches Alexa, an intelligent virtual assistant with a voice interface that completes shopping tasks



2016

TAY

Microsoft's chatbot Tay goes rogue on social media making inflammatory and offensive racist comments



2017

ALPHAGO

Google's A.I. AlphaGo beats world champion Ke Jie in the complex board game of Go, notable for its vast number (2^{170}) of possible positions



ETHICAL CONSIDERATIONS IN AI

ETHICAL

Regulation

Privacy

Mitigation of Bias

Transparency

Relevance



LEGAL

Governance

Confidentiality

Liability

Accuracy

Decision Making



PROGRAMMING FOR AI

- Python programming basics
- Libraries and frameworks (e.g., NumPy, Pandas, Matplotlib)
- Introduction to AI-specific libraries (e.g., TensorFlow, PyTorch, Scikit-learn)



MACHINE LEARNING BASICS

- Supervised learning (Linear Regression, Logistic Regression, Decision Trees)
- Unsupervised learning (e.g., K-Means Clustering, Hierarchical Clustering)
- Evaluation metrics (e.g., Accuracy, Precision, Recall, F1 Score)



NEURAL NETWORKS AND DEEP LEARNING

- Introduction to neural networks
- Training and backpropagation
- Convolutional Neural Networks (CNNs) for image processing
- Recurrent Neural Networks (RNNs) for sequence data



NATURAL LANGUAGE PROCESSING (NLP)

- Text preprocessing (e.g., tokenization, stemming, lemmatization)
- Sentiment analysis
- Language models (e.g., Word2Vec, BERT)