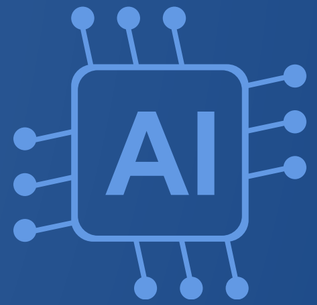
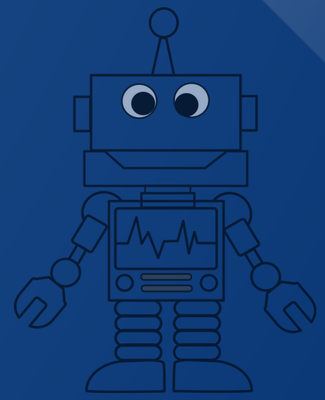


UNDERSTANDING AI

FOUNDATIONS AND APPLICATIONS

Team Brainiacs



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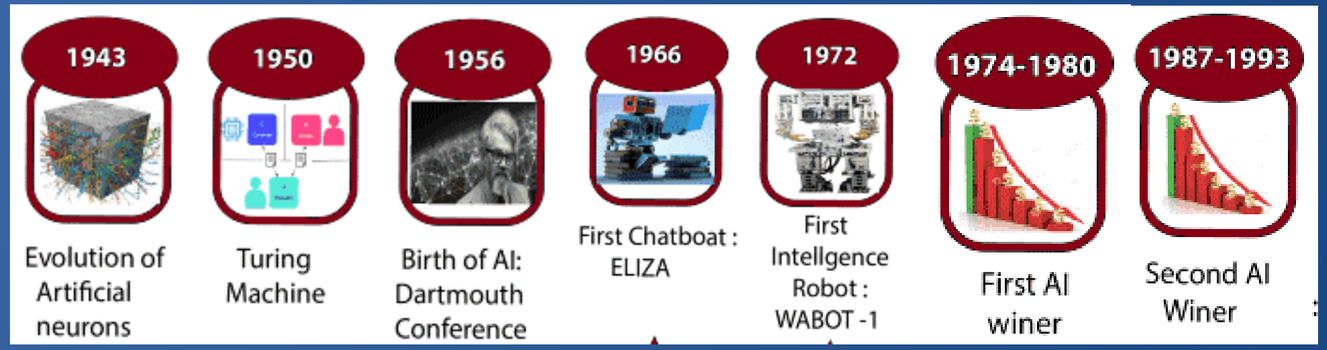
What is AI?

- the simulation of human intelligence in machines that are programmed to think and learn like humans

Types

- narrow AI
  - to perform a specific task (like recognizing faces in photos)
  - significant part of our daily lives
- general AI
  - to perform any intellectual task that a human can do
  - still remains largely theoritecal

History of AI



spans several decades and involves numerous breakthroughs and milestones.

- **Early Concepts and Foundations**
- **1940s-1950s: The Birth of AI**
- **1960s-1970s: Early AI Research**
- **1980s: The Rise of Expert Systems**
- **1990s: Resurgence and Breakthroughs**
- **2000s-Present: Modern AI**

How does AI work?

- works by using algorithms and statistical models to perform tasks that typically require human intelligence

Stages to develop AI

- Data Collection
- Data Preparation
- Choosing an Algorithm
- Training the Model
- Model Evaluation
- Model Deployment
- Feedback and Improvement

-integral steps to how AI works

Foundations of AI

- are built on several key concepts, technologies, and disciplines to make it powerful and versatile tool

1. **Mathematics and Statistics**
   - Linear Algebra
   - Probability and Statistics
   - Calculus
2. **Computer Science and Programming**
   - Algorithms and Data Structures
   - Programming Languages
   - Software Engineering

3. **Machine Learning (ML)**
   - Supervised Learning
   - Unsupervised Learning
   - Reinforcement Learning

4. **Neural Networks and Deep Learning**
   - Artificial Neural Networks (ANNs)
   - Convolutional Neural Networks (CNNs)
   - Recurrent Neural Networks (RNNs)

5. **Natural Language Processing (NLP)**
   - Text Processing
   - Language Models
   - Speech Recognition

6. **Knowledge Representation and Reasoning**

- Ontologies and Knowledge Graphs (Structures for representing knowledge and relationships)

7. **Robotics and Computer Vision**

- Perception (Techniques for interpreting sensory data)
- Motion Planning

8. **Ethics and Philosophy**

- Ethical Considerations
- Philosophical Questions

AI Models

- **Text Generation Models**
  eg. GPT (Generative Pretrained Transformer): GPT-3 and GPT-4
- **Image Generation Models**
  eg. DALL·E(OpenAI’s model), StyleGAN(NVIDIA)
- **Music and Audio Generation Models**
  eg. OpenAI Jukebox
- **Code Generation Models**
  eg. Codex: A model from OpenAI (based on GPT)
- **Generative Adversarial Networks (GANs)**
  eg. DCGAN (Deep Convolutional GAN), Deepfake Models
- **Transformer Models for Multimodal Generation**
  eg. CLIP (Contrastive Language–Image Pre-training)
- **Autoencoders and Variational Autoencoders (VAEs)**
  eg. VQ-VAE-2 (Vector Quantized VAE-2): Generates high-quality images and audios

Applications of AI

- has a wide range of applications across various industries

HEALTHCARE

- Medical Imaging
- Drug Discovery
- Personalized Medicine
- Virtual Health Assistants

FINANCE

- Fraud Detection
- Algorithmic Trading
- Risk Management
- Personal Finance

RETAIL

- Personalized Recommendation
- Inventory Management
- Customer Service
- Price Optimization

TRANSPORTATION

- Autonomous Vehicles
- Traffic Management
- Route Optimization
- Predictive Maintenance

EDUCATION

- Personalized Learning
- Grading and Assessment
- Virtual Tutors
- Content Creation

ENTERTAINMENT

- Content Recommendations
- Gaming
- Content Creation
- Social Media

MANUFACTURING

- Quality Control
- Predictive Maintenance
- Robotics
- Supply Chain Optimization

AGRICULTURE

- Precision Farming
- Crop Monitoring
- Yield Prediction
- Automation

BENEFITS

- Efficiency and Automation
  (Increased productivity and availability)
- Data Analysis and Insights
  (Enhanced Decision-Making, Predictive Analysis)
- Personalization
  (Customized Experiences)
- Improved Accuracy and Precision
  (Error Reduction)
- Innovation and Creativity
- Enhanced Customer Service
  (Instant Support)

CHALLENGES

- Job Displacement
- Bias and Fairness
- Privacy and Security
- Dependence and Reliability
- Ethical and Moral Concerns

AI with more advanced foundations in future

- Improved Algorithms: Hybrid Models, Meta-learning, Explainable AI(XAI)
- Enhanced Computing Power: Quantum Computing, Neuromorphic Computing
- Advanced Data Techniques: Self-Supervised Learning, Federated Learning
- Integration of Multimodal Data: Multimodal AI
- Ethical AI and Fairness: Bias Mitigation, Ethical Frameworks
- Improved Robotics and Autonomy: General-Purpose Robots, Human-AI Collaboration
- Enhanced Natural Language Understanding: Contextual Understanding, Cross-Language AI

THANK YOU

Team Brainiacs

DCS - 119, 118, 108

105,110,120,
124, 128,133,
134, 139,152,
153

Presented by DCS-119 Ppt prepared by DCS-118