

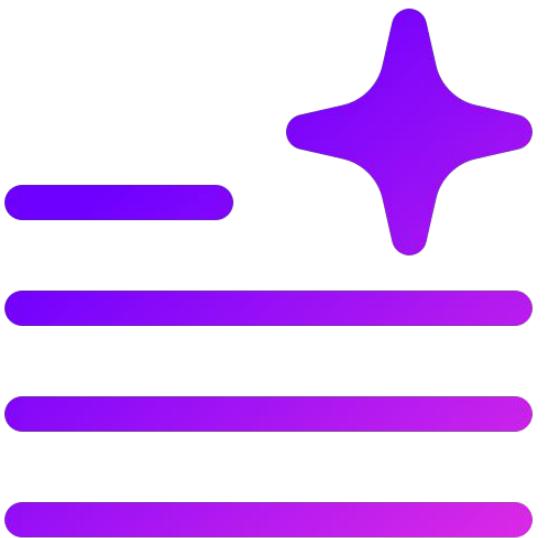


# Introduction to Artificial Intelligence

# Agenda

- What is AI?
- Human Intelligence vs AI
- Core Concepts of AI
- AI Workflow
- Types of AI
- AI Workloads
- Why is AI Important?
- AI Ethical Considerations and Challenges

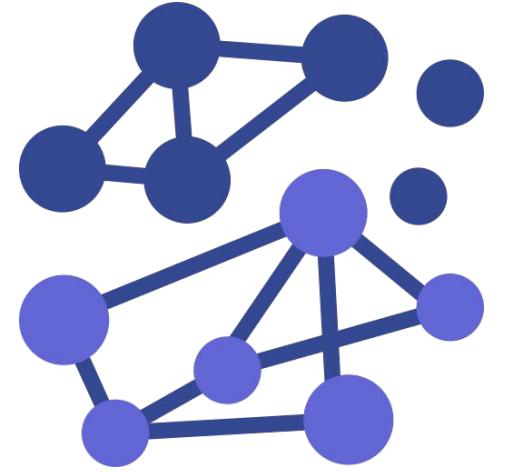




# What Is Artificial Intelligence?

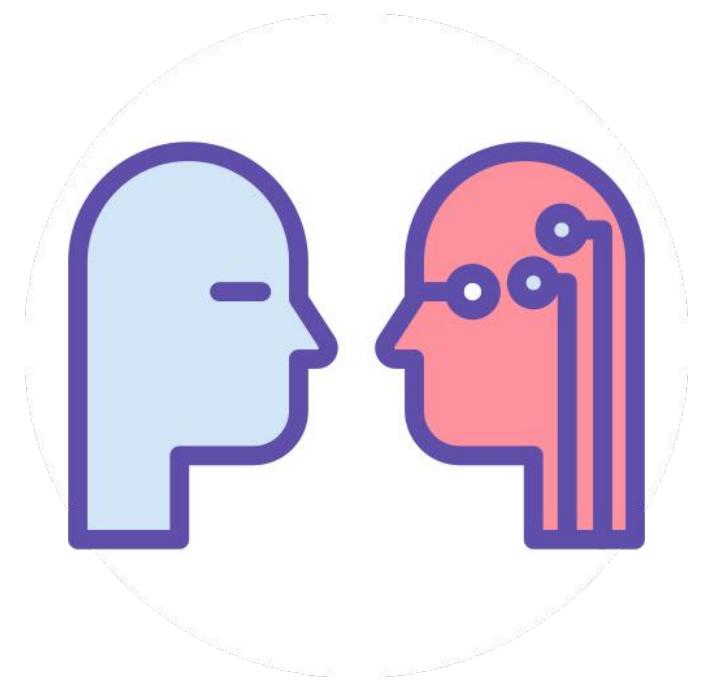
- **Definition**
  - Artificial intelligence (AI) is a branch of computer science focused on creating intelligent machines capable of mimicking human cognitive functions like **learning** and **problem-solving**.
- **Core Goal of Artificial Intelligence (AI)**
  - **Reasoning:** Analyze information and draw logical conclusions.
  - **Learning:** Acquire new knowledge and skills from data.
  - **Problem-solving:** Identify and solve problems in a goal-oriented way.
  - **Decision-making:** Evaluate options and make choices based on available information.

# Brief History of Artificial Intelligence (AI)



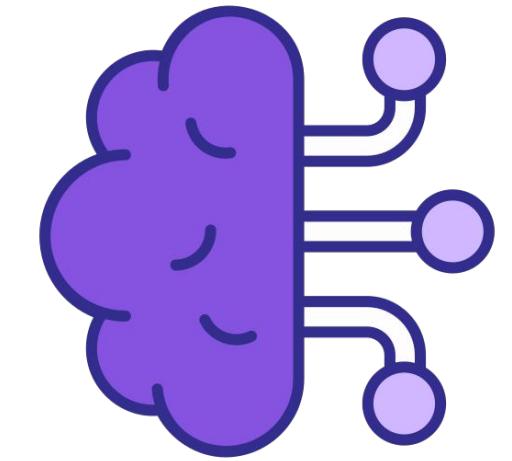
- In 1956, a group of scientists met at Dartmouth College, and that's when John McCarthy first used the term "***artificial intelligence***" to describe smart machines.
- At first, people were very excited about AI and gave a lot of money to study it. But later, in the 1970s and 1980s (***AI winters***), they were disappointed when AI didn't do as well as they hoped.
- In the 1990s and 2000s, AI grew quickly with powerful computers and the internet, enabling AI to recognize faces and understand speech.
- Between 2000 and 2020, AI made big advances with deep learning, leading to smart assistants like Siri and self-driving cars becoming part of daily life.
- After 2020, AI became even more widespread, playing key roles in healthcare, self-driving cars, and ethical debates about its impact on society.

# AI vs Human Intelligence



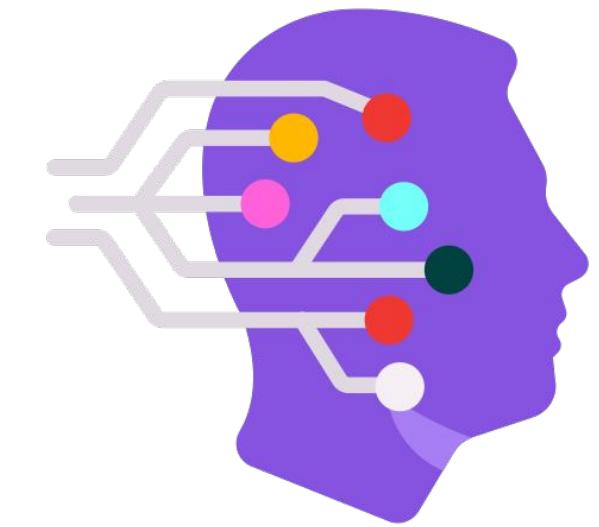
- **Learning**
  - AI learns from data and patterns, while humans learn from experiences and emotions.
- **Creativity**
  - Humans are naturally creative, able to think outside the box, while AI can generate ideas based only on existing data.
- **Speed**
  - AI can process information and perform tasks much faster than humans, but it lacks the ability to understand context deeply.
- **Decision-Making**
  - Humans use intuition and emotions in decision-making, while AI relies purely on logic and algorithms.

# Core Concepts in AI (cont.)



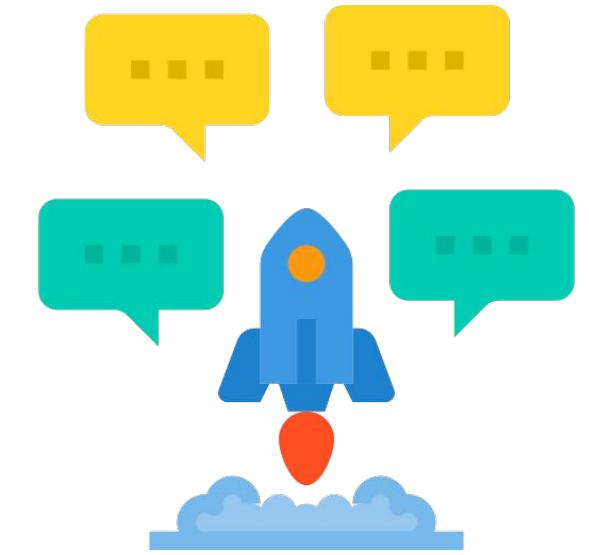
- Artificial Intelligence (AI) operates on a core set of concepts and technologies that enable machines to perform tasks that typically require human intelligence. Here are some foundational concepts:
- **Machine Learning (ML)**
  - The core of AI, where algorithms learn from data to improve and make decisions over time.
- **Neural Networks**
  - Inspired by the human brain, these networks recognize patterns and solve AI-related problems.
- **Deep Learning**
  - A type of ML using multi-layered neural networks for tasks like image and speech recognition.

# Core Concepts in AI



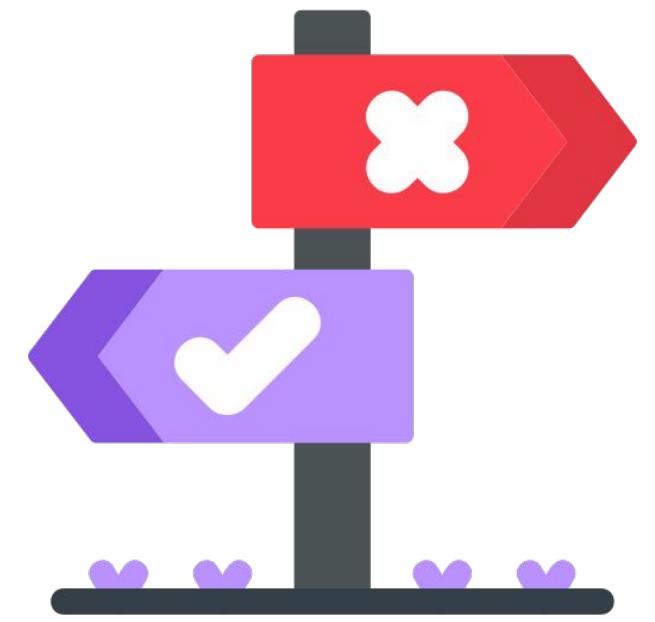
- **Natural Language Processing (NLP)**
  - Enables computers to understand and interact with humans using natural language.
- **Robotics**
  - Combines AI with physical components to create machines that perform various tasks, from manufacturing to surgeries.
- **Cognitive Computing**
  - Mimics human thought processes to solve complex problems using pattern recognition and NLP.
- **Expert Systems**
  - AI systems that replicate human expert decision-making to reach conclusions.

# Core Concepts in AI



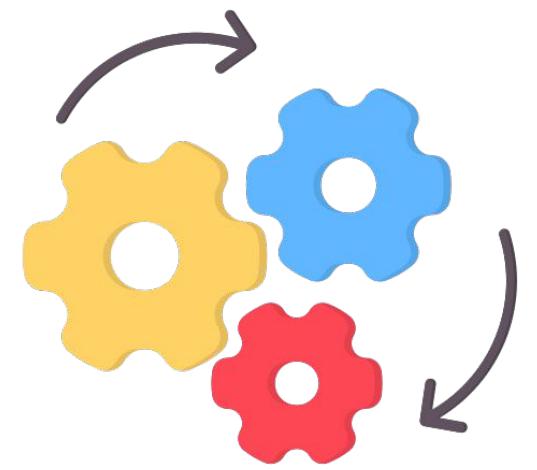
- **Generative AI (GenAI)**
  - AI systems that create new content, such as text, images, or music, based on patterns learned from existing data.
- **Reinforcement Learning**
  - A type of machine learning where algorithms learn to make decisions by receiving rewards or penalties for their actions.
- **Computer Vision**
  - Enables computers to interpret and understand visual information from the world, such as recognizing objects in images or videos.
- **Predictive Analytics**
  - Uses AI and data to forecast future trends or behaviors based on historical data.

# Core Concepts in AI



- **Autonomous Systems**
  - Machines or robots that operate independently without human intervention, such as self-driving cars or drones.
- **AI Ethics**
  - The study of how to ensure AI systems are used responsibly, addressing issues like fairness, privacy, and transparency.
- **AI Governance**
  - Refers to the frameworks and policies to guide the development, deployment, and management of AI systems, ensuring they align with ethical standards and societal values.

# How does AI works?



- Artificial intelligence (AI) enables machines to learn from data and recognize patterns in it, to perform tasks more efficiently and effectively.
- AI works in five steps:



# Work Flow of AI

## Input

Data is collected from various sources. This data is then sorted into categories.

## Processing

AI looks at data, learns patterns, and then finds similar patterns in new data.

## Outcomes

The AI can then use those patterns to predict outcomes.

## Assessments

In this way, AI keeps learning and getting better by correcting its mistakes and trying different approaches.

## Adjustments

If AI gets it wrong, it learns from the mistake and tries again with different conditions.

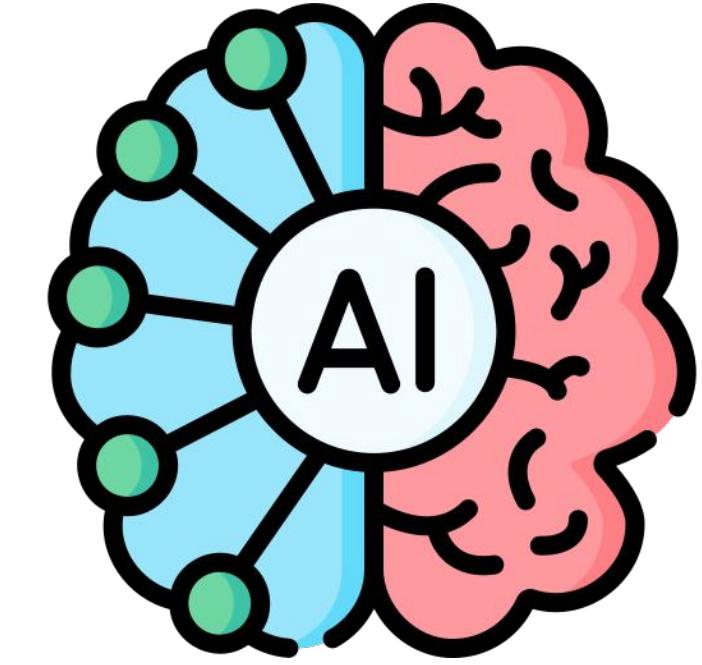


# Types of AI (cont.)



- **Narrow AI (ANI)**
  - **Definition**
    - Narrow AI, also called Artificial Narrow Intelligence (ANI), is designed to handle specific tasks. It works well in its area but can't do anything outside of that.
  - **Examples**
    - **Voice Assistants:** Devices like Amazon Alexa and Apple Siri can follow voice commands but are limited to what they're programmed to do.
    - **Image Recognition:** Software that identifies objects in images, used in things like medical imaging and social media.
    - **Autonomous Vehicles:** Self-driving cars that can navigate roads using sensors but still need human help in tricky situations.

## Types of AI (cont.)



- **General AI (AGI)**

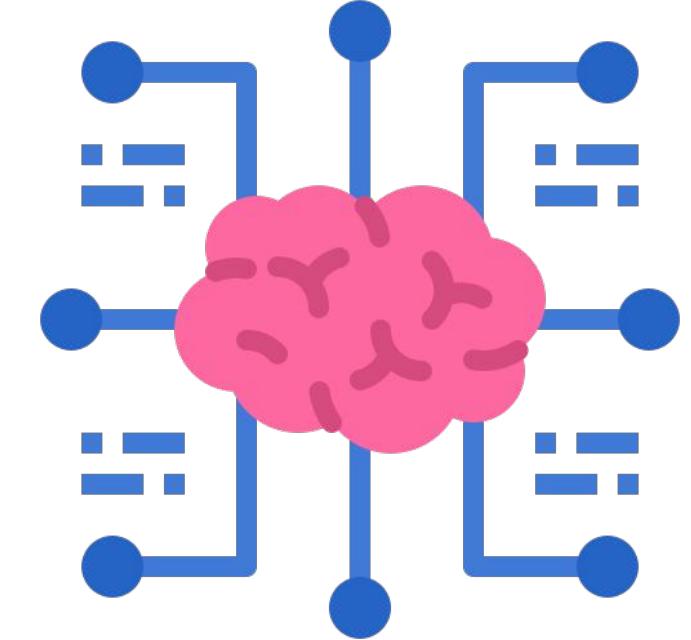
- **Definition**

- General AI, or Artificial General Intelligence (AGI), can understand, learn, and apply intelligence across a wide range of tasks, similar to human thinking. It can solve new problems without specific training.

- **Potential**

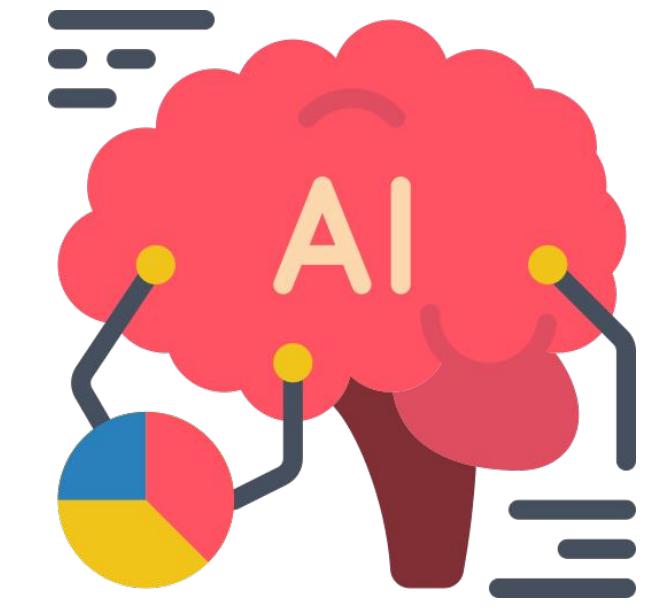
- **Versatility:** AGI can do any intellectual task that a human can.
    - **Adaptability:** It can learn new things and apply that knowledge in different situations.
    - **Collaboration:** AGI could boost fields like science, problem-solving, and personalized medicine by working alongside or even surpassing human experts.

# Types of AI



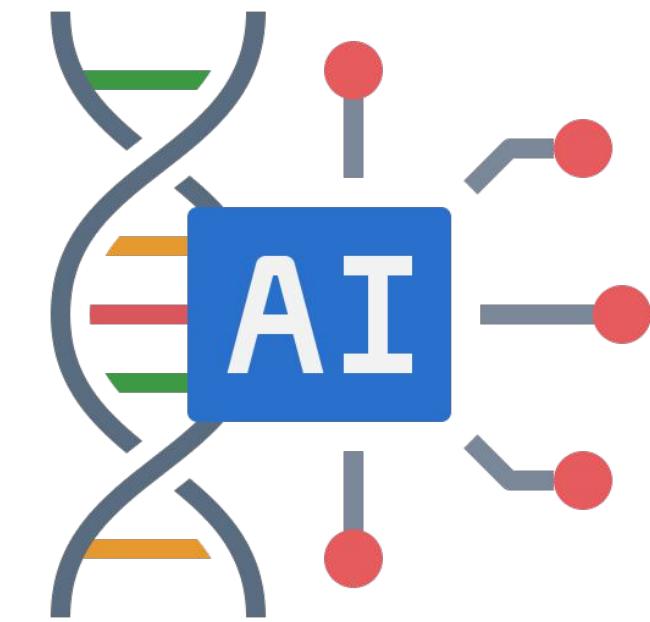
- **Superintelligent AI (ASI)**
  - **Definition**
    - Superintelligent AI, or Artificial Superintelligence (ASI), would go beyond human intelligence in all areas, including science, wisdom, and social skills. It could solve problems and create things far beyond human capability.
  - **Theoretical Implications**
    - **Exponential Growth:** ASI could lead to rapid technological advancements that change society in ways we can't imagine.
    - **Ethical Concerns:** ASI brings significant risks, such as how to control it and ensure it aligns with human values.

# Uses of AI in Different Domains (cont.)



- **Superintelligent AI (ASI)**
  - **Definition**
    - Superintelligent AI, or Artificial Superintelligence (ASI), would go beyond human intelligence in all areas, including science, wisdom, and social skills. It could solve problems and create things far beyond human capability.
  - **Theoretical Implications**
    - **Exponential Growth:** ASI could lead to rapid technological advancements that change society in ways we can't imagine.
    - **Ethical Concerns:** ASI brings significant risks, such as how to control it and ensure it aligns with human values.

# AI Workloads (cont.)



- **Healthcare**
  - **Use**
    - AI helps in diagnosing diseases by analyzing medical images like X-rays and MRIs.
  - **Example**
    - AI systems can detect skin cancer from images with high accuracy.
- **Finance**
  - **Use**
    - AI assists in credit scoring by analyzing a person's financial history to predict if they are creditworthy.
  - **Example**
    - Banks use AI to decide whether to approve loans and set interest rates.



## AI Workloads (cont.)

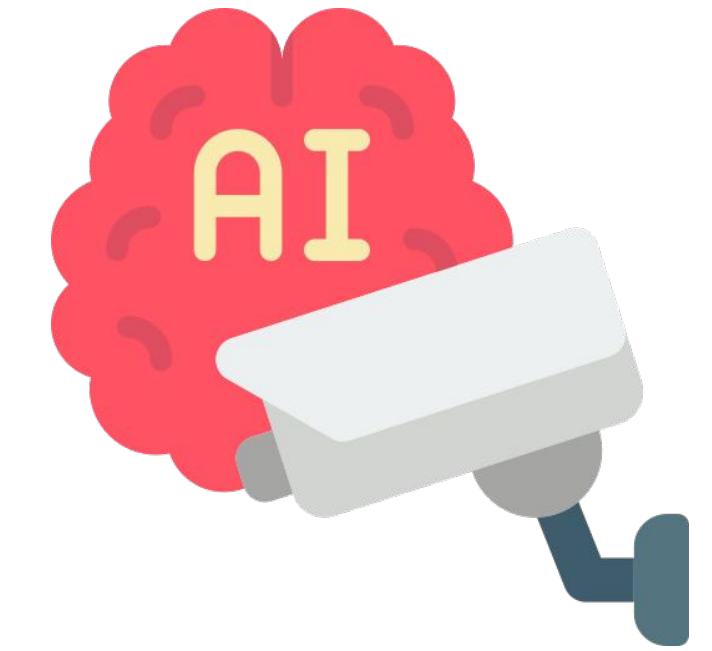
- **Retail**
  - **Use**
    - AI provides product recommendations by analyzing your past purchases and browsing behavior.
  - **Example**
    - Amazon uses AI to suggest products you might like.
- **Manufacturing**
  - **Use**
    - AI aids in quality control by inspecting products for defects.
  - **Example**
    - AI can spot tiny defects that human inspectors might miss.

## AI Workloads (cont.)



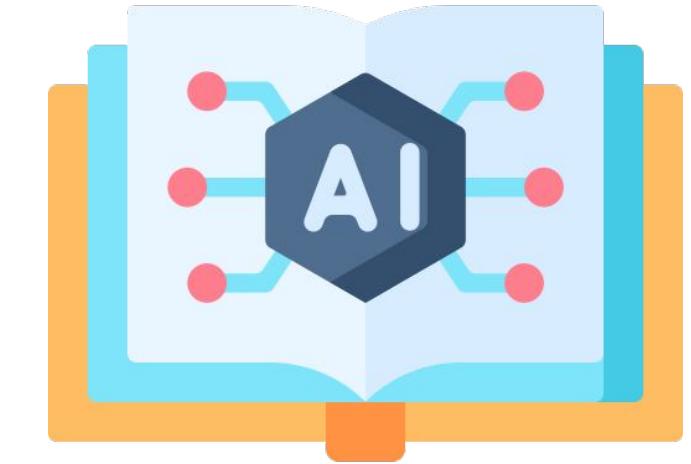
- **Transportation**
  - **Use**
    - AI is used in developing self-driving cars that can navigate without human help.
  - **Example**
    - Companies like Waymo and Tesla are working on self-driving car technology.
- **Customer Service**
  - **Use**
    - AI-powered chatbots answer customer questions and provide support.
  - **Example**
    - Banks use chatbots to help customers with their accounts and transactions.

# AI Workloads (cont.)



- **Security**
  - **Use**
    - AI is used in facial recognition to identify people from images or videos.
  - **Example**
    - This technology helps in identifying criminals or unauthorized individuals.
- **Marketing**
  - **Use**
    - AI is used for targeted advertising by showing ads to people most likely to be interested.
  - **Example**
    - Social media companies use AI to display ads based on user interests and demographics.

# AI Workloads (cont.)



- **Education**
  - **Use**
    - AI helps in personalized learning by tailoring educational content to each student's needs.
  - **Example**
    - AI-powered tutoring systems offer personalized instruction and feedback.
- **Agriculture**
  - **Use**
    - AI helps in precision farming by analyzing data from sensors/drones to optimize crop yields.
  - **Example**
    - AI can monitor soil conditions, weather patterns, and plant health to guide farmers on the best times to plant and harvest.

# AI Workloads



- **Entertainment**
  - **Use**
    - AI is used to create personalized content recommendations and enhance gaming experiences.
  - **Example**
    - Streaming services like Netflix use AI to suggest movies and shows based on viewing history.
- **Human Resources**
  - **Use**
    - AI is used in recruitment to screen resumes and match candidates to job openings.
  - **Example**
    - AI systems can analyze applications to identify the best candidates for a job based on skills and experience.

## Workloads of AI

I

II

12

10

9

8

7

6

5

4

3

2

### Healthcare

**Use:** AI helps in diagnosing diseases by analyzing medical images like X-rays and MRIs.  
**Example:** AI systems can detect skin cancer from images with

### Human Resources

**Use:** AI is used in recruitment to screen resumes and match candidates to job openings.  
**Example:** AI systems can analyze applications to identify the best candidates for a job based on skills and experience.

### Finance

**Use:** AI assists in credit scoring by analyzing a person's financial history to predict if they are creditworthy.  
**Example:** Banks use AI to decide whether to approve loans and set interest rates.

### Entertainment

**Use:** AI is used to create personalized content recommendations and enhance gaming experiences.  
**Example:** Streaming services like Netflix use AI to suggest movies and shows based on your viewing history.

### Retail

**Use:** AI provides product recommendations by analyzing your past purchases and browsing behavior.  
**Example:** Amazon uses AI to suggest products you might like.

### Agriculture

**Use:** AI helps in precision farming by analyzing data from sensors and drones to optimize crop yields.  
**Example:** AI can monitor soil conditions, weather patterns, and plant health to guide farmers on the best times to plant and harvest.

### Manufacturing

**Use:** AI aids in quality control by inspecting products for defects.  
**Example:** AI can spot tiny defects that human inspectors might miss.

### Education

**Use:** AI helps in personalized learning by tailoring educational content to each student's needs.  
**Example:** AI-powered tutoring systems offer personalized instruction and feedback.

### Transportation

**Use:** AI is used in developing self-driving cars that can navigate without human help.  
**Example:** Companies like Waymo and Tesla are working on

### Marketing

**Use:** AI is used for targeted advertising by showing ads to people most likely to be interested.  
**Example:** Social media companies use AI to display ads based on user interests and demographics.

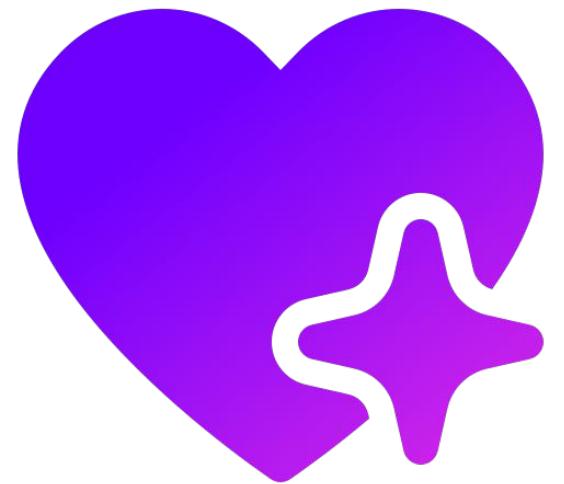
### Customer Service

**Use:** AI-powered chatbots answer customer questions and provide support.  
**Example:** Banks use chatbots to help customers with their accounts and transactions.

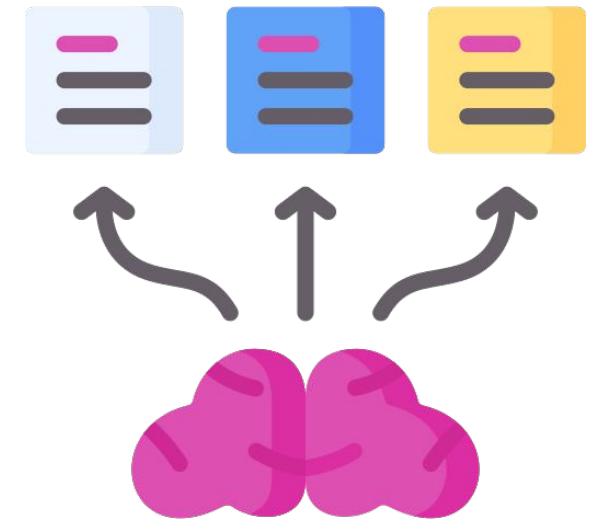
### Security

**Use:** AI is used in facial recognition to identify people from images or videos.  
**Example:** This technology helps in identifying criminals or unauthorized individuals.

# Why is AI Important? (cont.)



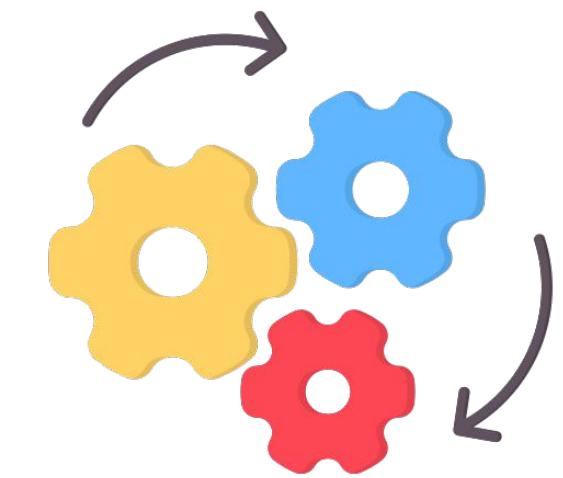
- **Increased Efficiency and Productivity**
  - **Importance**
    - AI automates repetitive tasks, saving time and resources for more important work.
  - **Example**
    - Robots in factories or chatbots in customer service let humans focus on creativity and problem-solving.
- **Enhanced Decision-Making**
  - **Importance**
    - AI analyzes large amounts of data to find patterns that humans might miss.
  - **Example**
    - In finance, AI predicts trends; in healthcare, it suggests personalized treatments.



## Why is AI Important? (cont.)

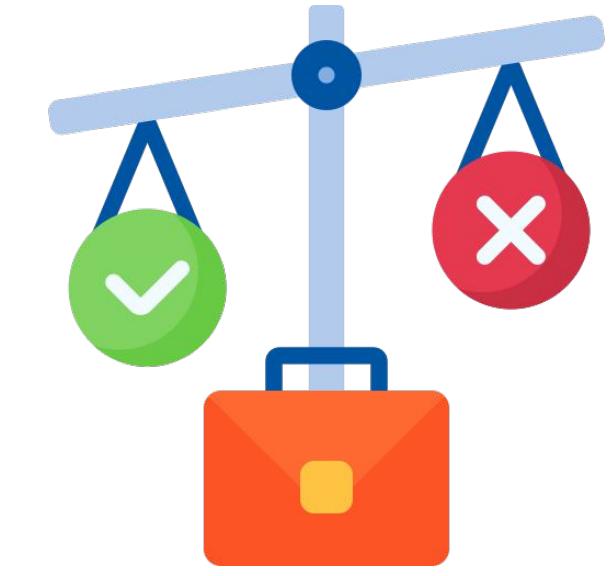
- **Innovation and Progress**
  - **Importance**
    - AI speeds up scientific discoveries and technological advances.
  - **Example**
    - AI research tools can analyze complex data and simulate experiments, leading to new breakthroughs.
- **Improved Quality of Life**
  - **Importance**
    - AI can transform various sectors, making life better.
  - **Example**
    - Self-driving cars improve safety; AI prosthetics aid mobility.

# Why is AI Important?



- **Addressing Global Challenges**
  - **Importance**
    - AI helps tackle big challenges like climate change.
  - **Example**
    - AI can optimize energy use, predict weather, and analyze environmental data to support sustainability.
- **Smart Infrastructure**
  - **Importance**
    - AI contributes to smarter, more efficient cities.
  - **Example**
    - AI manages traffic and public transport to reduce congestion and enhance city life.

# Ethical Considerations and Challenges in AI (cont.)



- **Bias and Fairness**
  - **Definition**
    - Bias in AI means unfair treatment based on prejudiced\* data or design.
  - **Challenges**
    - **Data Quality**
      - Biased data leads to biased AI outputs.
    - **Algorithm Design**
      - Algorithms can inherit designer biases.
    - **Impact**
      - Bias affects fairness in areas like justice, hiring, and lending.

# Ethical Considerations and Challenges in AI (cont.)



- **Privacy Issues**
  - **Definition**
    - AI needs lots of data, including sensitive personal information, raising privacy concerns.
  - **Challenges**
    - **Data Collection**
      - Large datasets can invade privacy.
    - **Data Storage and Access**
      - Proper management is key to protecting privacy.
    - **Surveillance**
      - AI technologies like facial recognition can lead to excessive monitoring.

# Ethical Considerations and Challenges in AI (cont.)



- **Job Displacement**
  - **Definition**
    - AI can replace human jobs, causing fears of job loss.
  - **Challenges**
    - **Economic Impact**
      - AI boosts productivity but can lead to job loss in sectors like manufacturing.
    - **Skill Gaps**
      - Workers need retraining for future jobs involving AI.
    - **Social Inequality**
      - Displacement might widen the economic gap between skilled and unskilled workers.

# Ethical Considerations and Challenges in AI (cont.)



- **Safety and Security**
  - **Definition**
    - Ensuring AI systems are safe and secure is crucial.
  - **Challenges**
    - **System Failures**
      - AI can fail unexpectedly, with serious consequences.
    - **Security Measures**
      - Strong protocols are needed to protect AI from hacking and misuse.
    - **Malicious Use**
      - AI can be misused for harmful purposes.

# **Thank You**

**jamil@cuisahiwal.edu.pk**