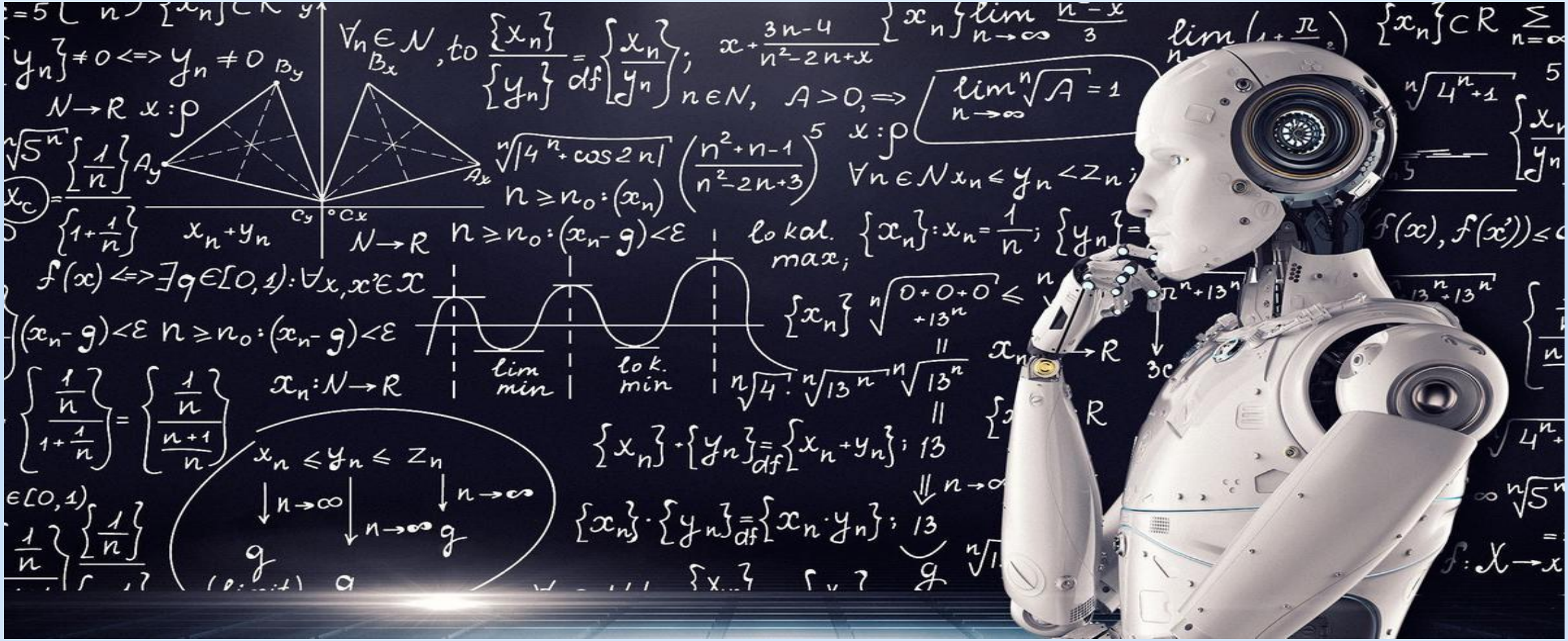
Artificial Intelligence for Every One



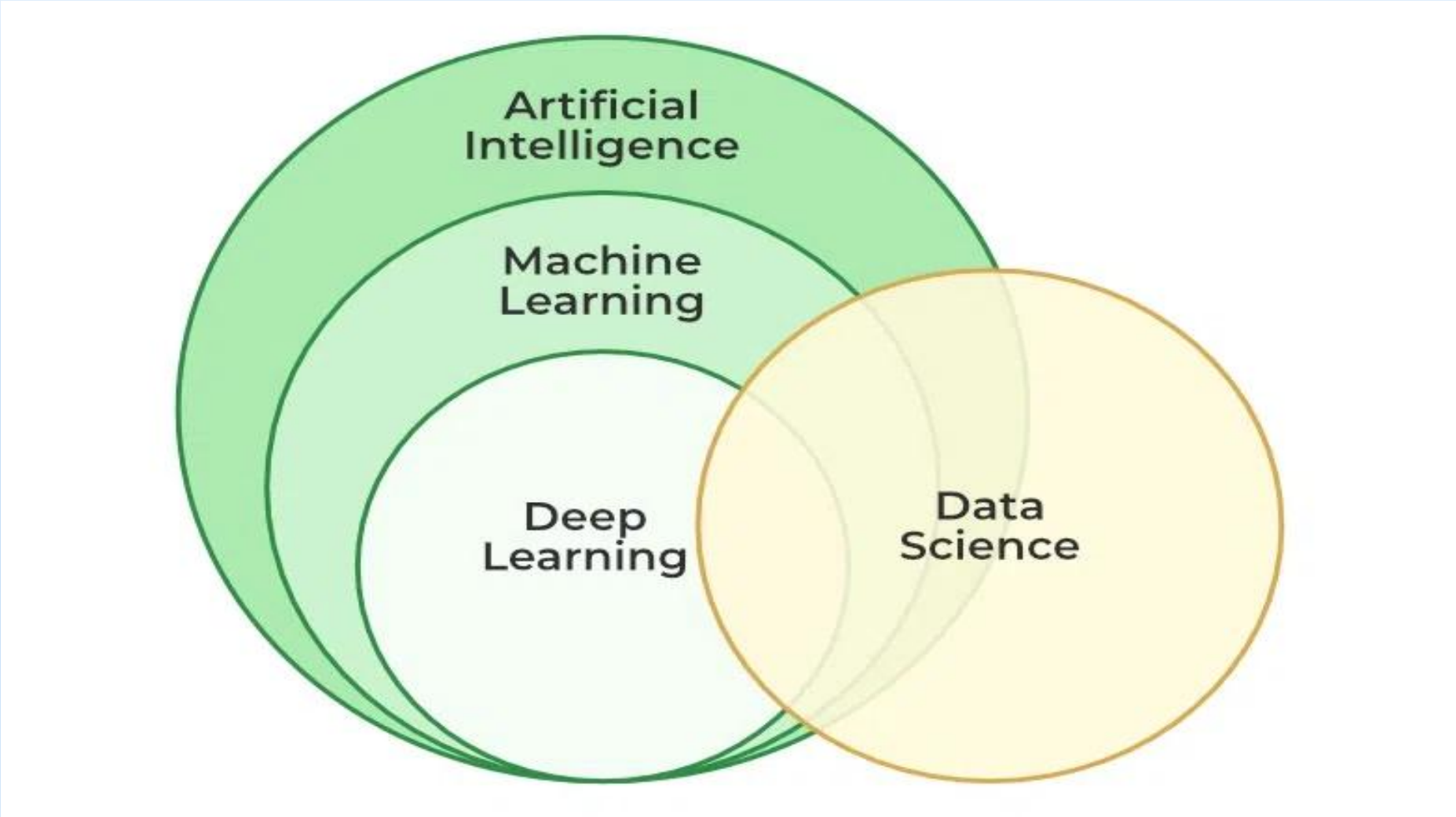
What is Artificial Intelligence?

Artificial Intelligence is the branch in Computer Science that tries to replicate human intelligence into machines so as to build intelligence machines.

The critical aspect of human intelligence is the ability to think, which comes from multiple elements like the

- **Ability to understand**
- **Learn**
- **Do reasoning**
- **Communicate and**
- **Act.**

The Relation between Artificial Intelligence, Machine Learning, Deep Learning and Data Science



The important facets of AI

1. Machine Learning: Just like we learn from examples, AI algorithms process a vast amount of data and improve their performance gradually over time.

2. Pattern Recognition: It helps machines to find meaning in data. For example, AI can spot patterns in medical images such as X-Rays and MRIs helping doctors in detecting diseases accurately.

3. Natural Language Processing (NLP): It allows computers to understand and generate human languages. Chatbots, virtual assistants like Siri or Alexa, and language translation rely on NLP.

4. Computer Vision: This enables machines to view and interpret the visual world. The application includes helping robots to navigate environment, facial recognition in smart phones, assisting medical diagnoses by interpreting medical images etc.

History of AI

1950: Alan Turing proposes Learning Machines

1955: John McCarthy coins the term Artificial Intelligence in Dartmouth Conference.

1957: Frank Rosenblatt came with the idea of first shallow neural network.

1959: Arthur Samuel creates the term machine learning.

1963: Defence Advanced Research Projects Agency (DARPA) funds AI at MIT

1964: Joseph Weizenbaum at MIT develops first chatbot ELIZA to hold conversation with humans.

History of AI (Continued..)

1971: Alexey Grigoryevich Ivakhnenko creates 8-layer deep neural network.

AI Winter

1997: Deep Blue (Developed by IBM) defeats World Chess Champion Gary Kasparov

1999: Graphics processing units (GPU) computers enabling faster data processing

2018: Yoshua Bengio, Geoffrey Hinton and Yann LeCun wins Turing award 2018 for their contribution in deep learning.

2022: OpenAI launches the chatbot chatGPT.

Weak AI Versus Strong AI

Weak AI (Narrow AI): Also known as Narrow AI, is the type of AI we encounter most commonly today. Weak AI is designed to perform specific tasks exceptionally well. It excels within a limited domain and doesn't possess general intelligence.

Weak AI cannot think for itself or adapt to entirely new situations outside its programmed parameters.

Some examples of weak AI are as follows:

- Cars like Tesla with self-drive technology
- Voice assistants like Alexa, Google, Siri and more
- Google Maps
- Chatbots like ChatGPT, Brad, etc.
- Recommendation systems like Amazon, Spotify, Netflix, etc.
- Spam Filters on Email

Strong AI (Artificial General Intelligence or AGI): This is the realm of science fiction for now. Strong AI is a hypothetical concept aiming to achieve human-level intelligence. It would be capable of generalized learning and problem-solving across various fields. It would be able to understand and reason like a human, adapting to new situations and creatively solving problems.

Imagine a machine that can learn medicine, write poetry, and hold a conversation – that's the potential of strong AI.

Some examples of Strong AI are as follows:

- Cyber Security
- Robots with high intellect
- Integration of strong AI in IoT (Internet of Things)
- Language translation machines
- Image recognition systems

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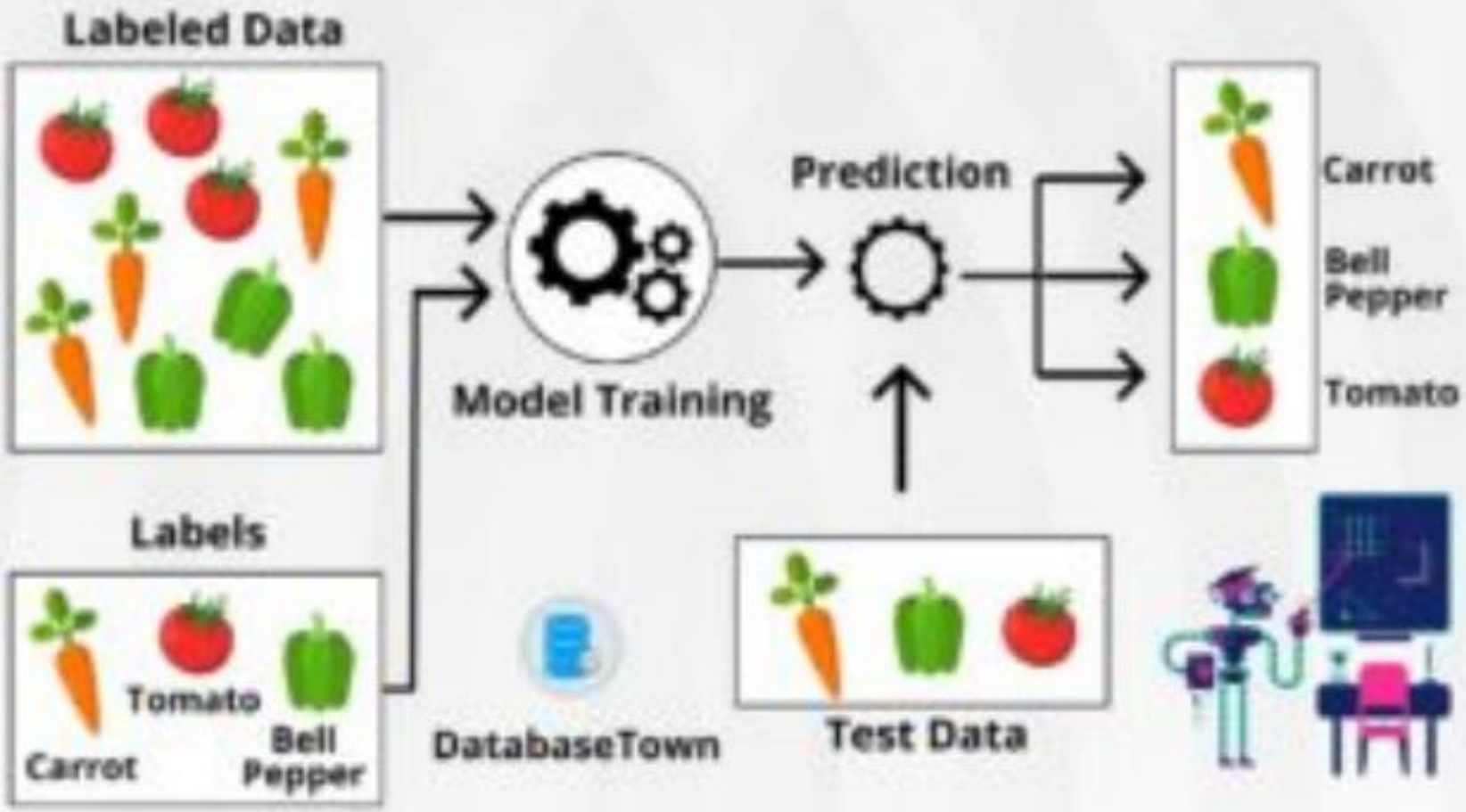
Types Of Machine Learning

Machine Learning

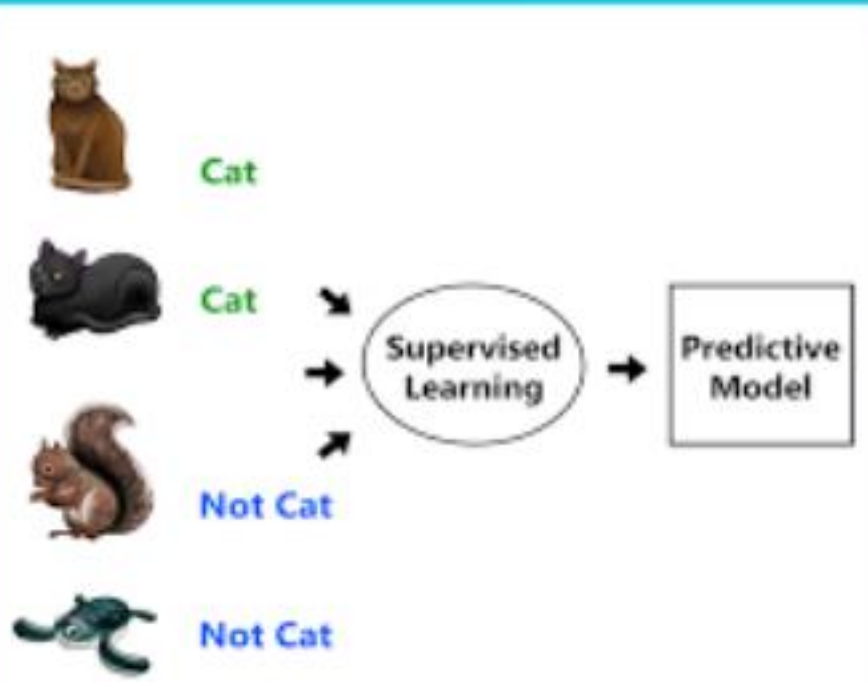
- **Supervised**
  - Task Driven (Predict Next Value)
  - 
- **Unsupervised**
  - Data Driven (Identify Clusters)
  - 
- **Reinforcement**
  - Learn From Mistakes
  - 

SUPERVISED LEARNING

Supervised machine learning is a branch of artificial intelligence that focuses on training models to make predictions or decisions based on labeled training data.

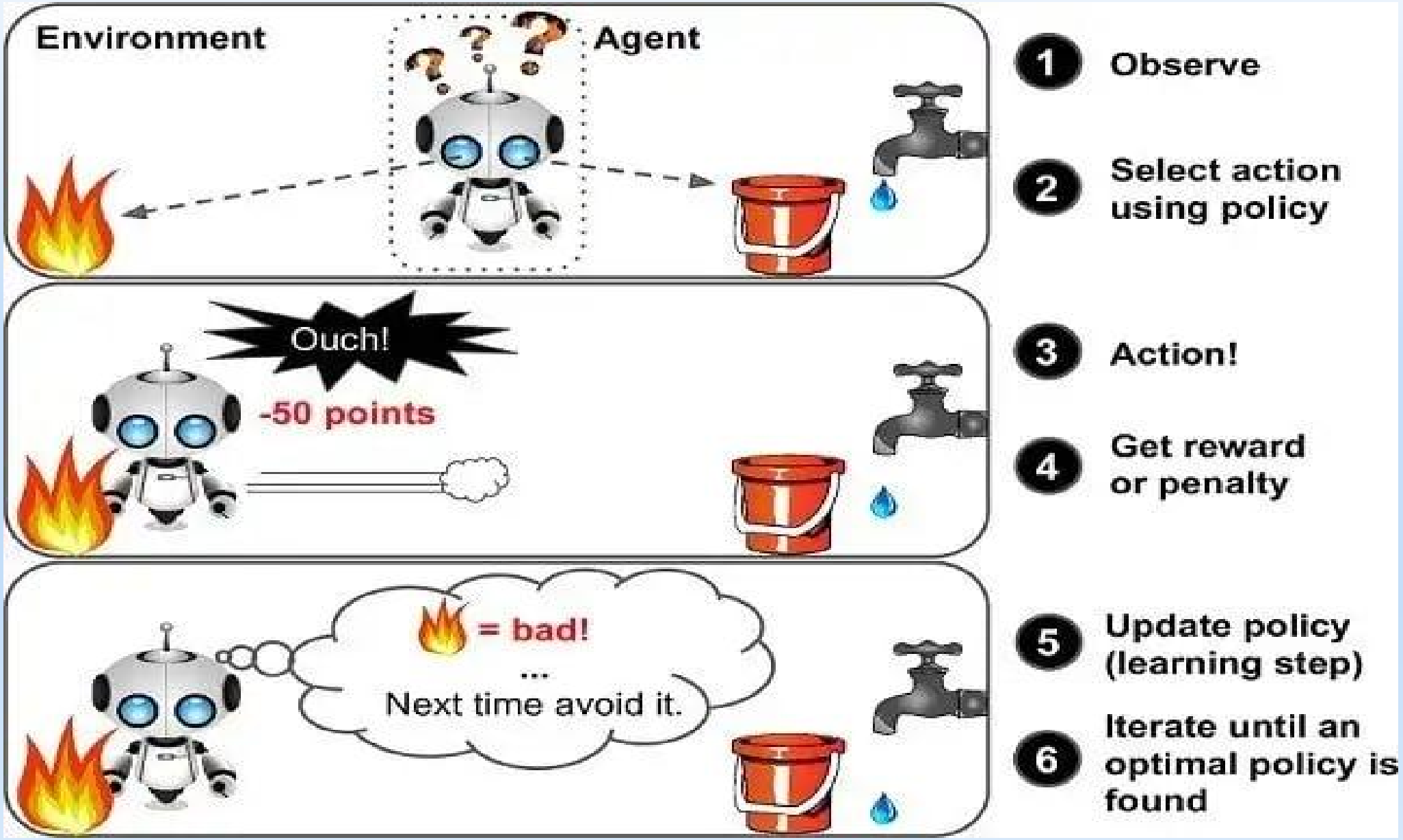


Supervised Learning (Classification Algorithm)



Unsupervised Learning (Clustering Algorithm)

Reinforced Learning



1.Before Conditioning

Food

Unconditioned Stimulus

Response

Salivation

Unconditioned Response

2.Before Conditioning

Bell

Neutral stimulus

Response

No Salivation

No Conditioned Response

3.During Conditioning

Bell

\+

Food

Response

Salivation

Unconditioned Response

4.After Conditioning

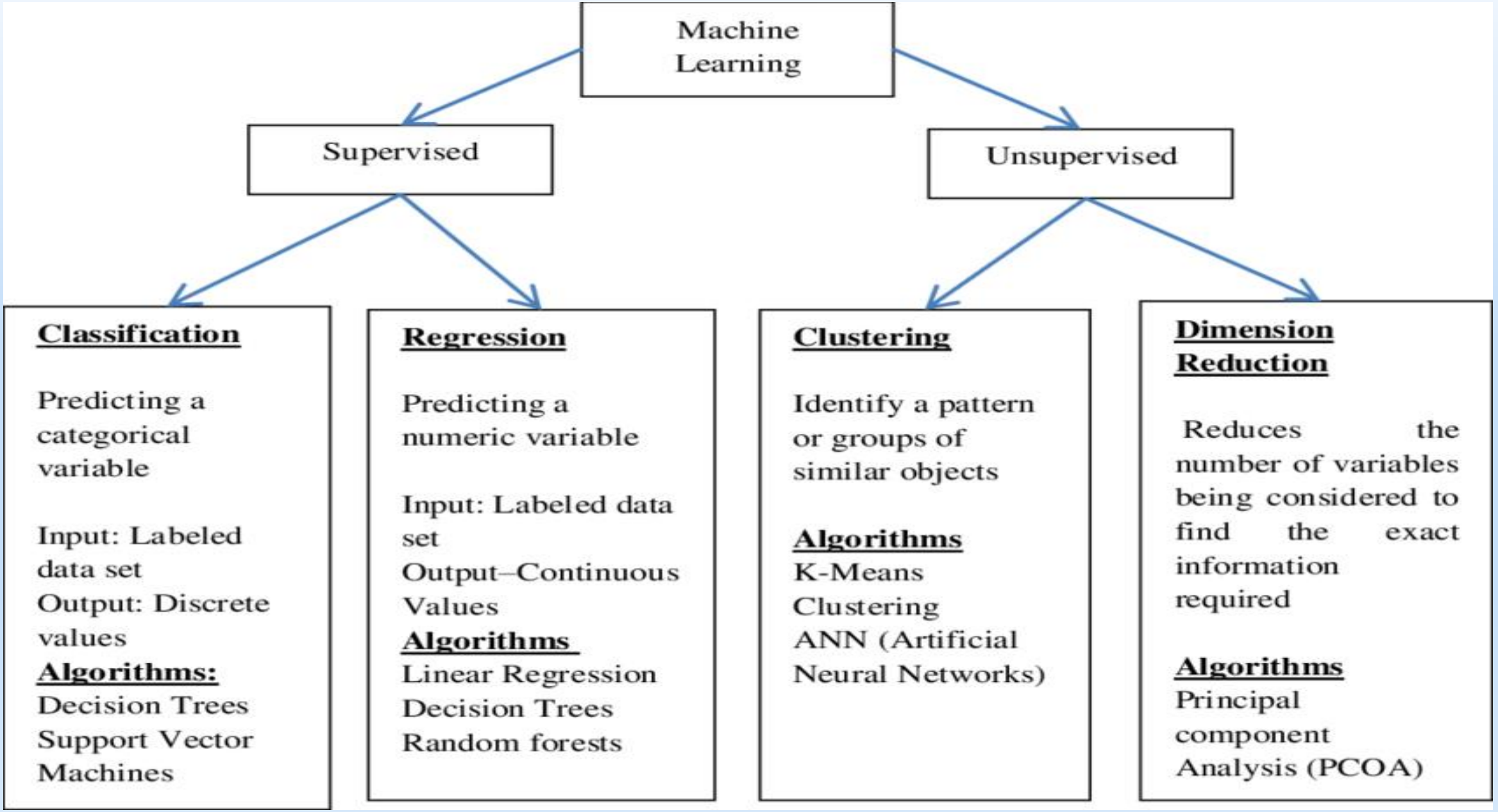
Bell

Conditioned Stimulus

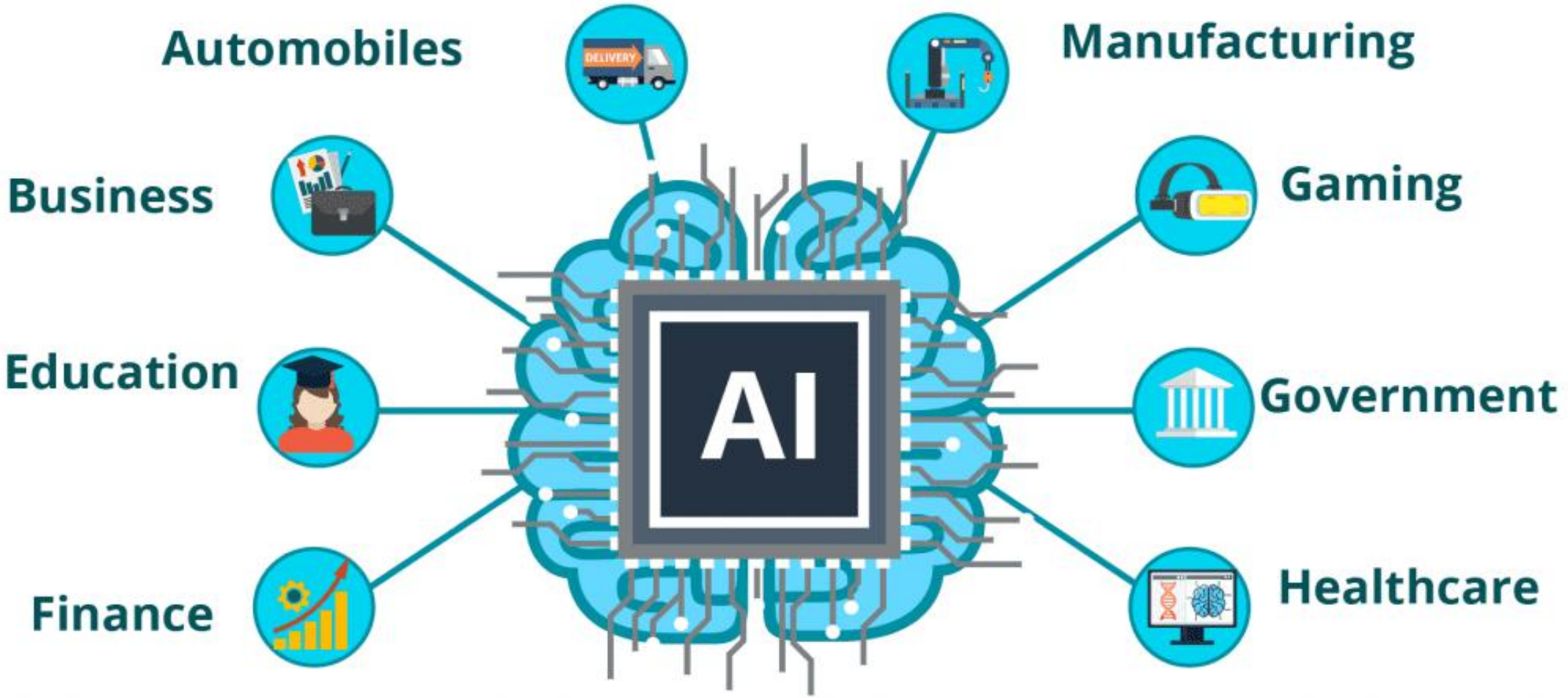
Response

Salivation

Conditioned Response


Machine Learning
Supervised
Unsupervised
Classification
Predicting a categorical variable
Input: Labeled data set
Output: Discrete values
Algorithms:
Decision Trees
Support Vector Machines
Regression
Predicting a numeric variable
Input: Labeled data set
Output–Continuous Values
Algorithms
Linear Regression
Decision Trees
Random forests
Clustering
Identify a pattern or groups of similar objects
Algorithms
K-Means Clustering
ANN (Artificial Neural Networks)
Dimension Reduction
Reduces the number of variables being considered to find the exact information required
Algorithms
Principal component Analysis (PCOA)

Applications of Artificial Intelligence



1.Banking and Finance

- **Fraud Detection:** helps banks identify unusual or suspicious transactions quickly.
- **Customer Service:** AI powered chatbots and virtual assistants can answer customer queries 24x7 making banking services more accessible.
- **Credit Scoring:** AI analyses customer's financial history and behaviour and helps bank to approve loan and credit card applications.
- **Risk Management:** AI helps banks access and manage risks by analyzing large amount of data to make more informed decision about investments and lending.
- **Automation:** Routine tasks such as data entry and paper work can be automated.
- **Security:** AI helps banks to enhance cyber security.
- **Predictive Analysis:** AI can predict market trends and customer behaviour and helps to make better decisions.

2.Insurance

- **Claims Processing:** AI helps insurance companies quickly process claims by analysing documents and photos to assess damage or injuries.
- **Risk Assessment:** AI analyses data to determine the level of risk associated with insuring a person or property.
- **Customer Service:** AI powered chatbots and virtual assistants can answer customer queries regarding policy information and claims, providing 24x7 support.
- **Fraud Detection:** AI identifies suspicious behaviour or false claims, helping insurance companies to prevent and investigate fraud.
- **Predictive Analysis:** AI predicts future trends and risks, helping insurance companies make informed decisions about coverage and pricing.
- **Personalized policies:** AI allows insurers to offer customized insurance plans based on individual's need and circumstances.

3.Health Care

- **Diagnosis and Imaging:** AI helps doctors by analyzing medical images like X-Rays, CT Scans and MRIs, making it easier to spot problems early.
- **Treatment Recommendation:** AI suggests treatment options based on a patient's medical history and current conditions.
- **Drug Discovery:** AI speeds up finding new medicines and treatments.
- **Electronic Health Records (EHRs):** AI manages patient records digitally, making it easy for healthcare providers to access and share information.
- **Monitoring:** AI monitors patients' vital signs and health data so as to alert healthcare professionals for prompt intervention, if required.
- **Administrative tasks:** AI assists in scheduling appointments, manage billing and handling paper works.
- **Healthcare Chatbots:** AI powered chatbots can answer patient's questions and provide information and guidance.

4.Retail and E-Commerce

- **Product Recommendation:** AI algorithms analyse a customer's purchase history and browsing behaviour to suggest relevant products and enhance shopping experience.
- **Inventory Management:** AI helps retailers optimize their inventory by predicting demand patterns, identifying slow moving items and reordering products when stock goes low.
- **Customer Service:** AI powered Chatbots and virtual assistants attend and provide information to customers 24x7.
- **Price Optimization:** AI algorithms analyse various factors such as competitor pricing, demand fluctuations and historical sales data to adjust product price in real time. This dynamic pricing strategy maximizes profits and competitiveness.
- **Visual Search:** AI enables customers to search for products using images or photos instead of text queries.

4.Retail and E-Commerce (Cont..)

- **Fraud Detection:** AI algorithms continuously monitor transactions and customer behaviour to identify unusual and suspicious activities such as fraudulent payment activities or account hijacking.
- **Supply Chain Optimization:** AI optimizes supply chain operations by predicting demand, improving logistics and reducing lead time. This results in cost saving and faster order fulfillment.
- **Customer insights:** AI analyses vast amount of customer data to gain insight into preferences, buying patterns and trends. Retailer can use this insights to tailor marketing campaigns, product assortments and store layouts to meet customer needs.
- **Chatbots for sales:** AI powered chatbots can assist with sales by guiding customers through product selection, providing product recommendation and processing order through chat interface.

5. Manufacturing

- **Quality Control:** AI checks products as they are made and looks for defects like cracks or errors. This ensures high standard and reduces waste.
- **Predictive Maintenance:** AI predicts when machines might break down and need repairs.This reduces unexpected shutdowns and keep production running.
- **Production Optimization:** AI helps factories plan and manage production schedules. It can adjust production rates based on demands, reducing inventory.
- **Supply Chain Management:** AI tracks the movement of materials in real time, ensuring they arrive at right place in right time.
- **Robots and Automation:** AI controls robots that assemble, weld or move factory materials. They work tirelessly, speeding up the process.
- **Safety:** AI monitors the safety of factory environments.
- **Inventory Management:** AI manages how much raw materials are needed and when to order it, reducing excess inventory.

6.Entertainment

- **Content Recommendation:** AI suggests movies, shows, music and games you might like, based on your previous views.
- **Content Creation:** AI can generate music, art and even write stories. It is used to create special effects and animations in movies.
- **Streaming Quality:** AI ensures that streaming services like Netflix and YouTube run smoothly without buffering.
- **Voice and Face Recognition:** AI powers virtual assistants like Siri and Alexa, that recognizes your voice and recognizes your face for security.
- **Editing and Post-Production:** AI helps in editing videos and adding special effects.
- **Extended Virtual Reality (VR):** AI improves realism and immersion in VR experience, making games and simulations more exciting.

7.Agriculture

- **Crop Monitoring:** AI uses drones and sensors to check on crops. It looks for signs of pests, diseases, or need for water and nutrients.
- **Precision Farming:** AI helps farmers to decide precisely when and where to plant seeds and apply fertilizers, thus making farming more efficient.
- **Weather Prediction:** AI analyses weather data to provide accurate forecasts.
- **Harvesting Robots:** AI powered robots can pick fruits and vegetables faster, without damaging them.
- **Soil Analysis:** AI checks the soil quality and predicts right type and amount of fertilizers.
- **Crop Sorting and Grading**: AI sorts and grades harvested crops based on size, quality and ripeness.
- **Supply Chain Management**: AI tracks the movement of crops and animals from farm to market, to ensure that fresh and safe food reaches customers.

8. Education

- **Personalized Learning:** AI customizes lessons for each student. I figures out what you are best in and when you need help.
- **Grading and Feedback:** AI can grade assignments and tests quickly.
- **Curriculum Planning:** Helps teachers choose best materials and methods for teaching.
- **Language Translation:** AI can translate languages making students to access contents.
- **Virtual Classrooms:** AI powers virtual classrooms where students and terachers interact online.
- **Study Guides:** AI can create study guides and tests based on your requirements.

Challenges in AI

AI holds immense promises, but also has diverse challenges that needs careful consideration

1. Data Privacy
2. Bias and Fairness
3. Lacks Transparency
4. Ethical Concerns
5. Job Displacement
6. Security Risks
7. Lack of skilled work force
8. Interoperability or integrating AI systems with existing technologies.