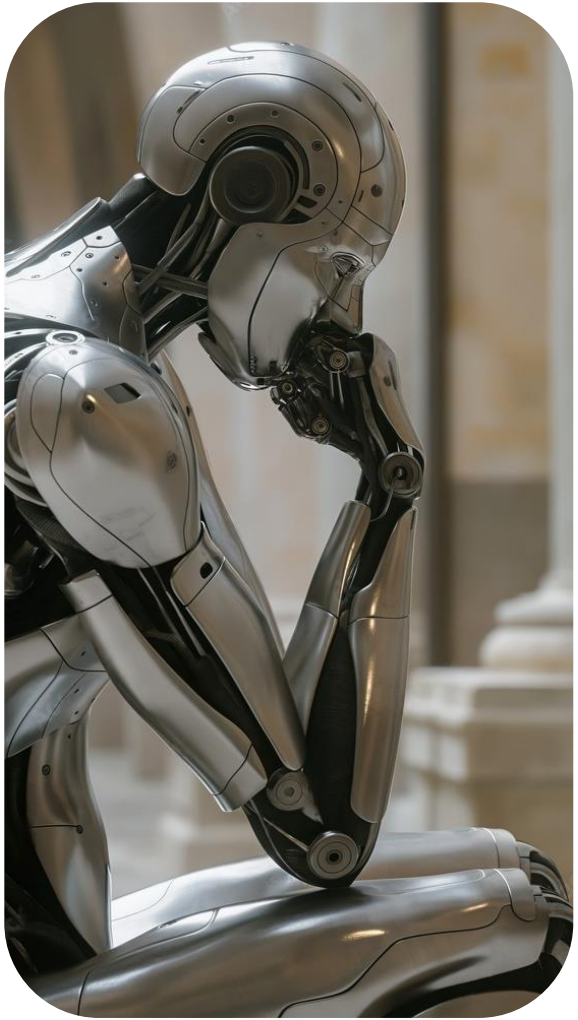
A Comprehensive Workshop

Karthick AG, G-Tec Trichy - LumiLearn

What is AI?

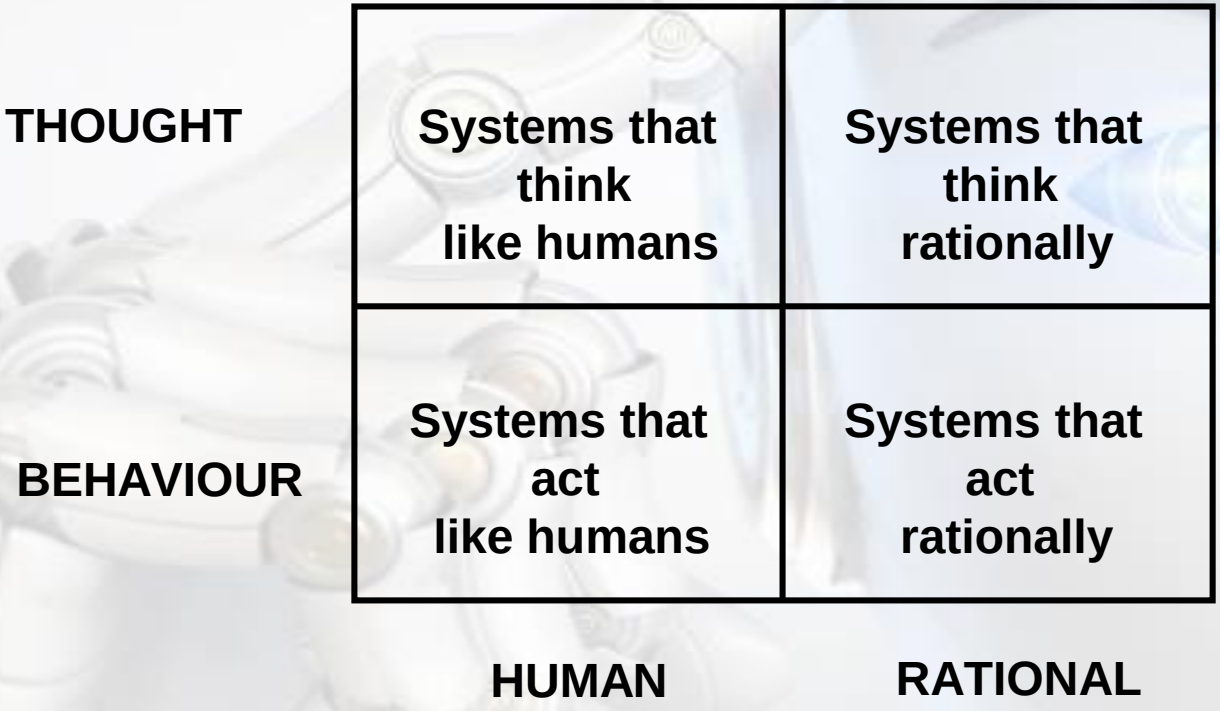


What is AI?

Definition:
Artificial Intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems.

Key Processes:
Learning, reasoning, selfcorrection.
Brief history: From Turing's test to modernday AI.

What is Artificial Intelligence ?



What is Artificial Intelligence ?

Systems that think like humans

Goal: To understand and replicate the internal mechanisms of human thought.

Real-World Application: IBM Watson, when it uses natural language processing to mimic human understanding of language.

Systems that act like humans

Goal: To create machines that behave indistinguishably from humans in specific tasks.

Real-World Application: Virtual assistants like Siri or Alexa, which interact with users in a human-like manner.

Systems that think rationally

Goal: To develop AI that can make decisions and solve problems optimally using formal logic.

Real-World Application: AI algorithms used in financial trading systems to make optimal trading decisions based on logical analysis of market data.

Systems that act rationally

Goal: To develop AI that can perform tasks efficiently and effectively, making the best possible decisions based on the data it has.

Real-World Application: Autonomous drones used for delivery services that calculate the most efficient route to deliver packages.

Artificial Intelligence

Artificial

- Produced by human art or effort, rather than originating naturally.

Intelligence

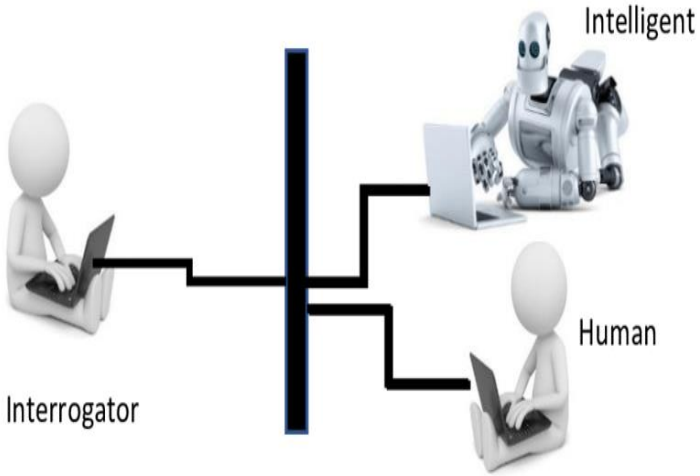
- is the ability to acquire knowledge and use it“

So AI was defined as:

- AI is the study of ideas that enable computers to be intelligent.

- AI is the part of computer science concerned with design of computer systems that exhibit human intelligence
(From the Concise Oxford Dictionary)

What is Intelligence?
The Turing Test



A machine can be described as a thinking machine if it passes the Turing Test.

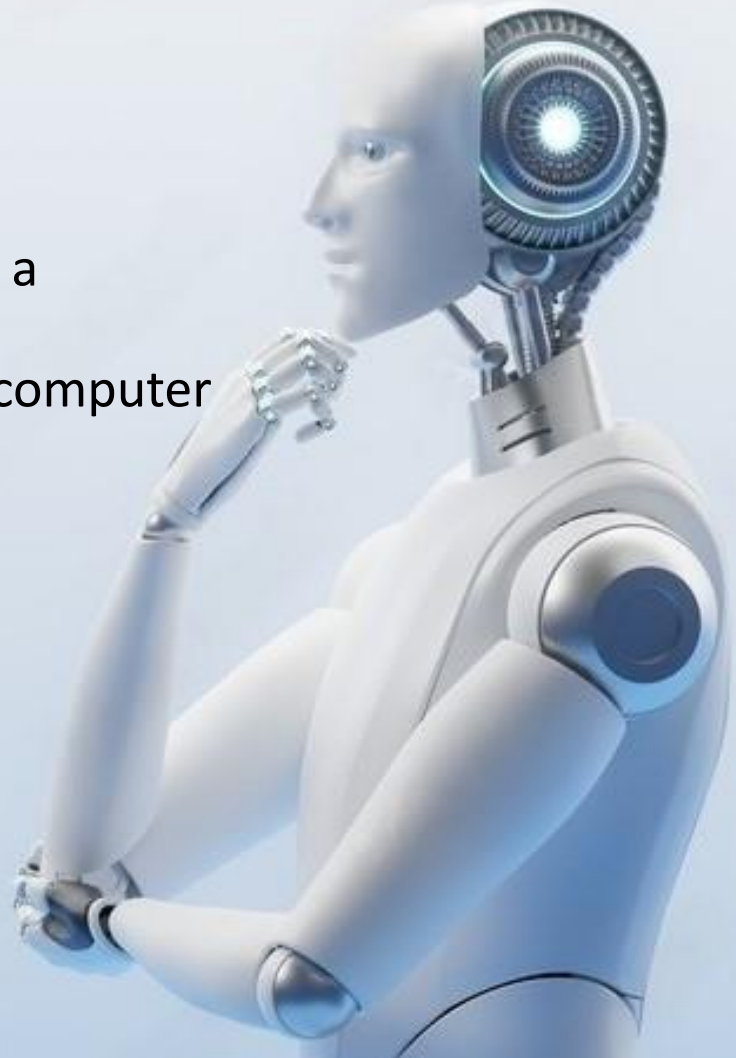
i.e. If a human agent is engaged in two isolated dialogues (connected by teletype say); one with a computer, and the other with another human and the human agent cannot reliably identify which dialogue is with the computer.

Intelligence

- *Turing Test*: A human communicates with a computer via a teletype.
  - If the human can't tell he is talking to a computer or another human, it passes.

  - ✓ Natural language processing
  - ✓ knowledge representation
  - ✓ automated reasoning
  - ✓ machine learning

- Add vision and robotics to get the total Turing test.



The Scientific Roots of Artificial Intelligence

- AI has roots in a number of scientific disciplines
  - computer science and engineering (hardware and software)
  - philosophy (rules of reasoning)
  - mathematics (logic, algorithms, optimization)
  - cognitive science and psychology (modeling high level human/animal thinking)
  - neural science (model low level human/animal brain activity)
  - linguistics

KEY RESEARCH AREAS IN AI

Problem solving, planning, and search

-- generic problem solving architecture based on ideas from cognitive science (game playing, robotics).

Knowledge Representation

– to store and manipulate information (logical and probabilistic representations)

Automated reasoning / Inference

– to use the stored information to answer questions and draw new conclusions

Machine Learning

– intelligence from data; to adapt to new circumstances and to detect and extrapolate patterns

Natural Language Processing

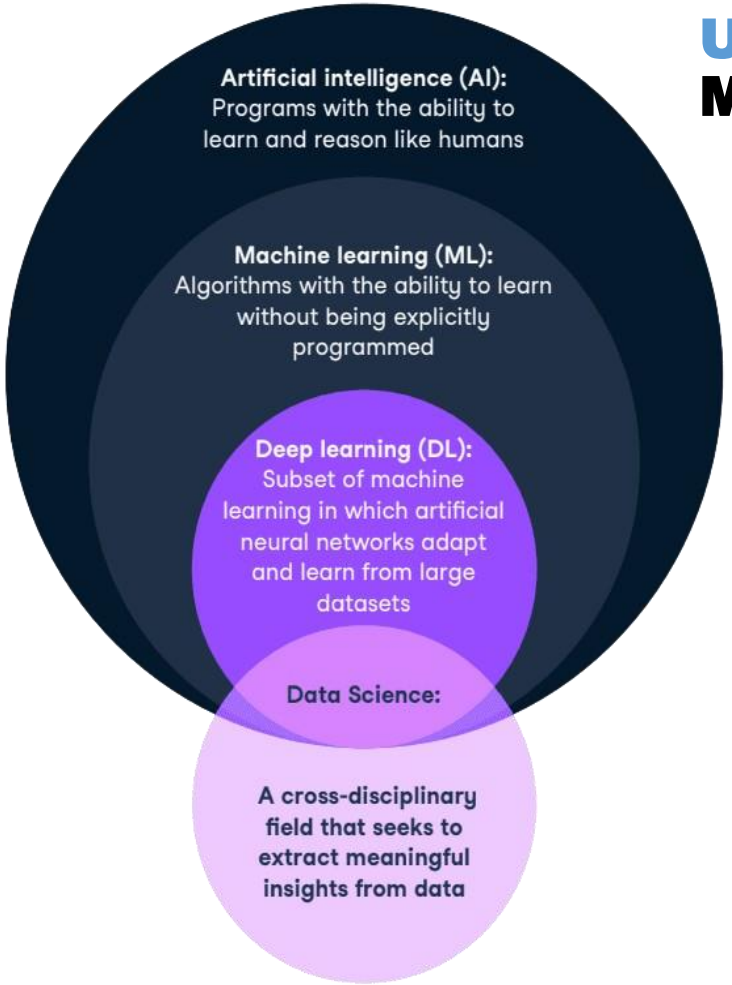
– to communicate with the machine

Computer Vision

-- processing visual information

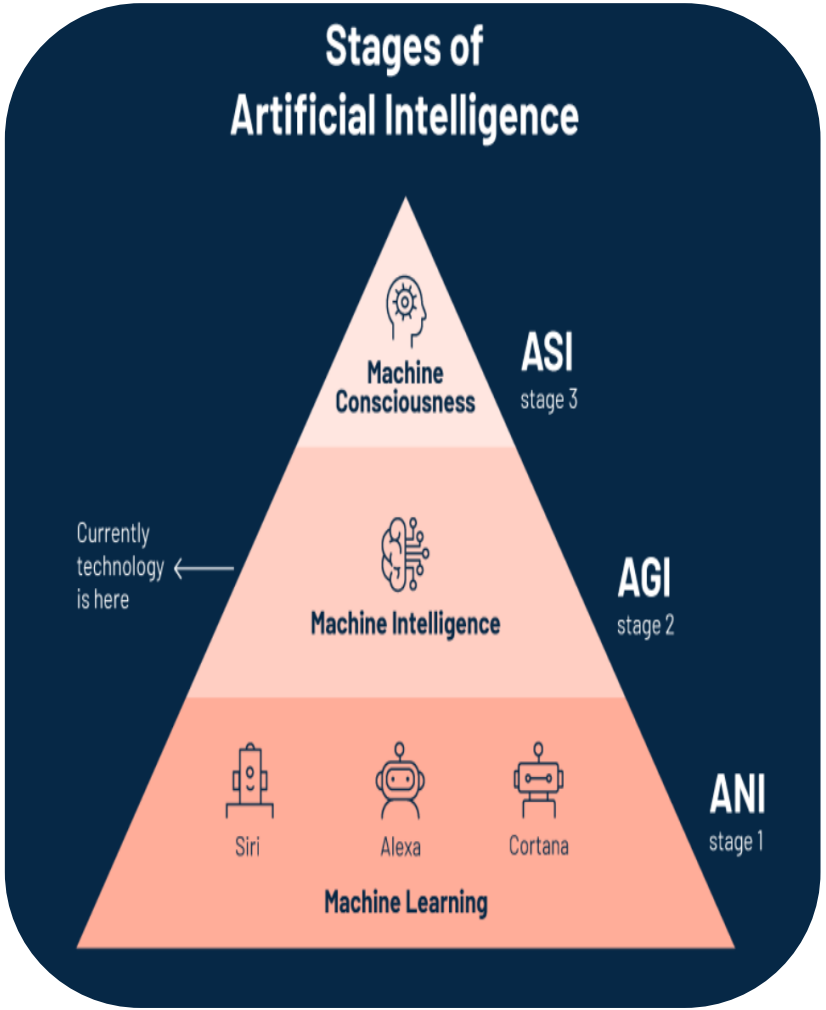
Robotics

-- Autonomy, manipulation, full integration of AI capabilities



Understanding the Hierarchy of AI, ML, and DL within Data Science

- **Machine Learning (ML):** Algorithms that allow computers to learn from data.
- **Deep Learning (DL):** Subset of ML using neural networks with many layers.
- **Neural Networks:** Computing systems inspired by the human brain's network of neurons.
- **Natural Language Processing (NLP):** AI's ability to understand and generate human language.
  Subfield of AI and DS
- **Data Science (DS):** Interdisciplinary field that uses scientific methods, algorithms, processes, and systems to extract knowledge and insights from structured and unstructured data.



Types of AI

Based on Capabilities

Narrow AI

Specialized for a specific task
(e.g., facial recognition, voice assistants)

General AI

Hypothetical AI with the ability to understand and learn any intellectual task that a human can

Super AI

A theoretical AI that surpasses human intelligence across all fields, including creativity, general wisdom, and social skills

Types of AI Based on Functionality

REACTIVE

Spam Filters

Chatbots

Recommendation engines from Spotify or Netflix

LIMITED MEMORY

Generative AI tools (e.g. ChatGPT)

Self-driving cars

Virtual assistants

4 Types of AI

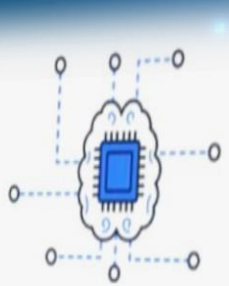
THEORY OF MIND

Understands the needs of other intelligent entities

SELF-AWARE

Evolved to have human-like intelligence and self awareness

Types of AI Based on Application Domains

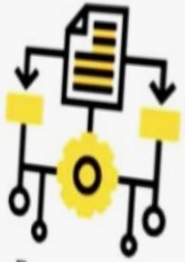


Machine Learning

Deep Learning

Robotics

Expert Systems



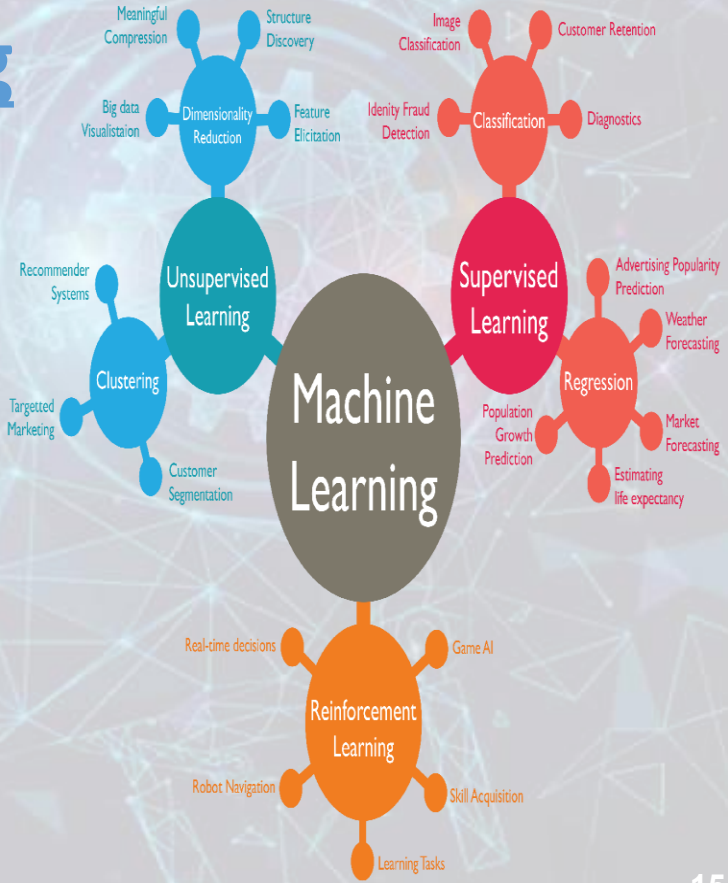
Fuzzy Logic

Domains
of
Artificial Intelligence

Basics of Machine Learning

Machine learning is a type of artificial intelligence that teaches computers to learn from examples and make decisions. It's like teaching a computer to recognize patterns and make predictions. We use it in many areas, like recommending movies or predicting the weather. Machine learning algorithms learn from data, improve over time, and can make decisions without being explicitly programmed. It's like teaching a computer to think for itself! Some popular algorithms include decision trees, neural networks, and support vector machines.

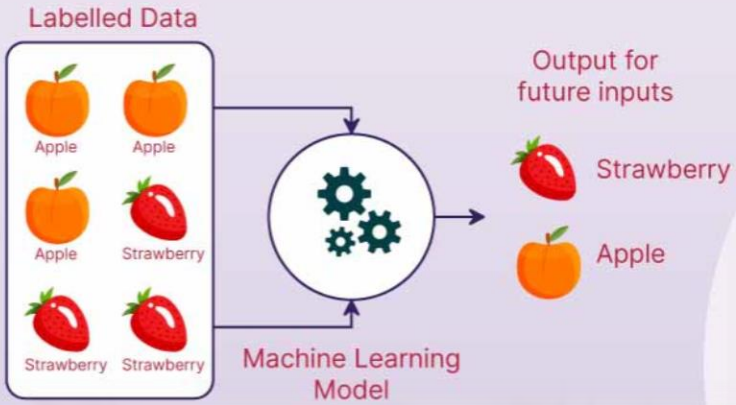
- **Definition**: Subset of artificial intelligence where computers learn patterns from data to make predictions or decisions.
- **Components**: Data preparation, model training, evaluation, and deployment.
- **Tools**: Python, R, TensorFlow, scikit-learn, and Matplotlib for visualization.
- **Applications**: Recommendation systems, image recognition, predictive maintenance, and fraud detection.



Types of Machine Learning

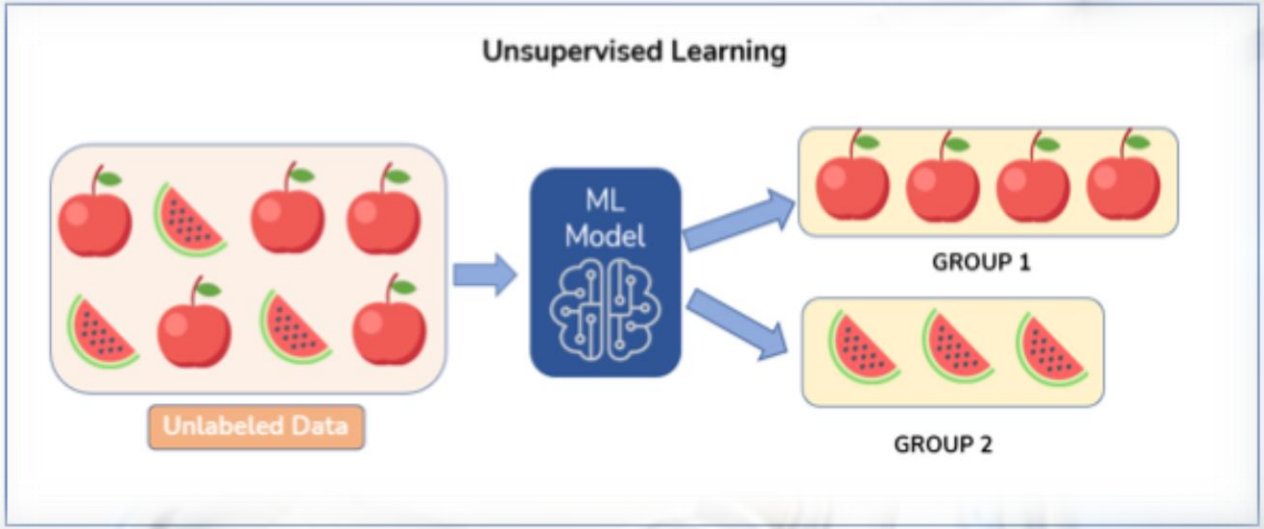
- **Supervised Learning:**
  Linear Regression, Classification.
- **Unsupervised Learning:**
  Clustering, Dimensionality Reduction.
- **Reinforcement Learning:**
  Learning based on reward and punishment.

Supervised
Machine Learning



Learning from labeled data.

Example: predicting fruits.



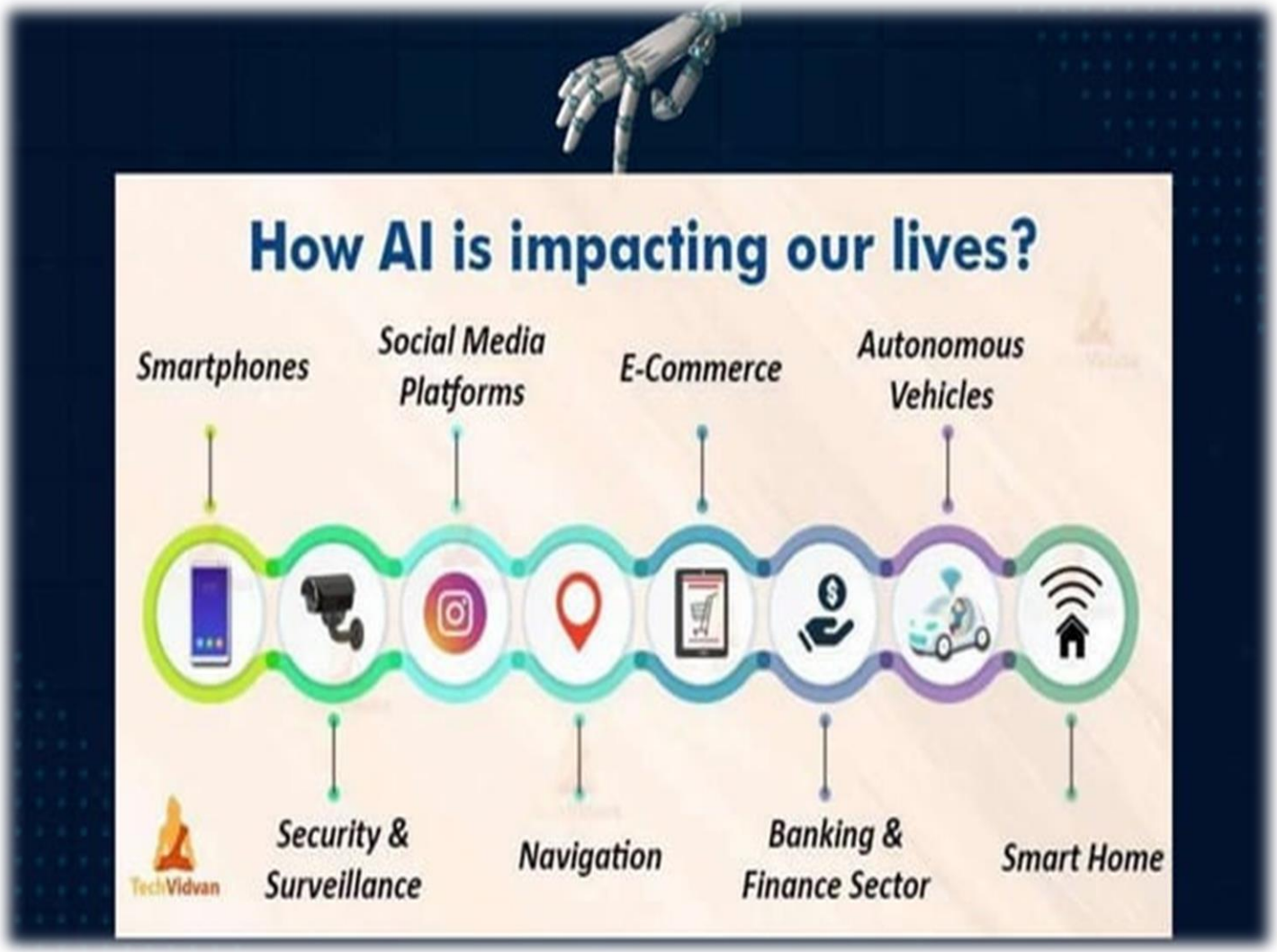
Finding patterns in unlabeled data.
Example: Clustering Fruits based on Appearance.

Reinforcement Learning

Learning through trial and error, receiving rewards or penalties.

Example: Training a dog to follow/abserve the Action and act.

Real-World Applications of AI


How AI is impacting our lives?
Smartphones
Social Media Platforms
E-Commerce
Autonomous Vehicles
Security & Surveillance
Navigation
Banking & Finance Sector
Smart Home
TechVidvan

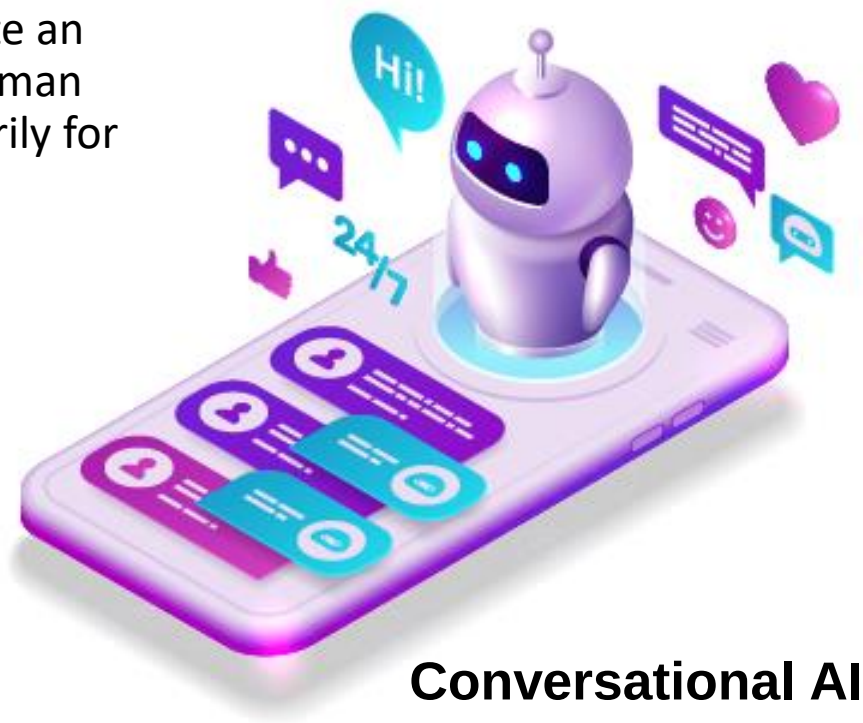
What is a chatterbot?

It is a computer program designed to simulate an intelligent conversation with one or more human users via auditory or textual methods, primarily for engaging in small talk.

AI

Chatbots

A chatter robot, chatterbot, Chatbot, or chat bot



Conversational AI

Uses

- such as online help,
- personalized service,
- information acquisition.

USEFUL AI TOOLS

https://www.copy.ai/

https://quillbot.com/

Enhance your writing

Paraphrase

Rewrite any text with 2 free (Standard, Fluency) and 5 Premium (Formal, Simple, Creative, Expand, Shorten) modes.

Check Grammar

Fix grammar, spelling, and punctuation errors.

Get Explanations

Learn from your mistakes and improve your English.

Detect Tones Premium

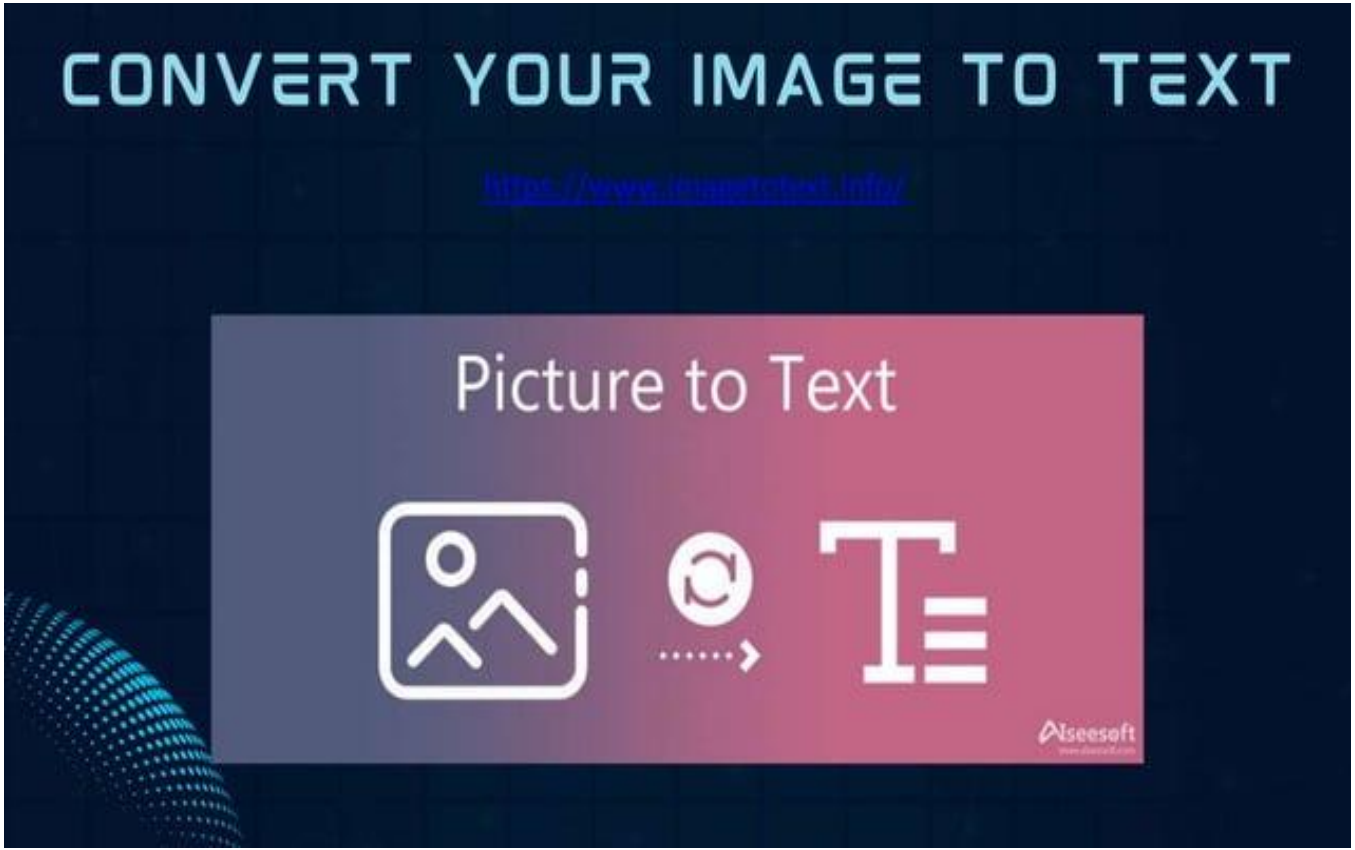
Focus on your tone to improve readability.

https://pictory.ai/

https://chat.openai.com/

https://consensus.app/

https://www.imagetotext.info/



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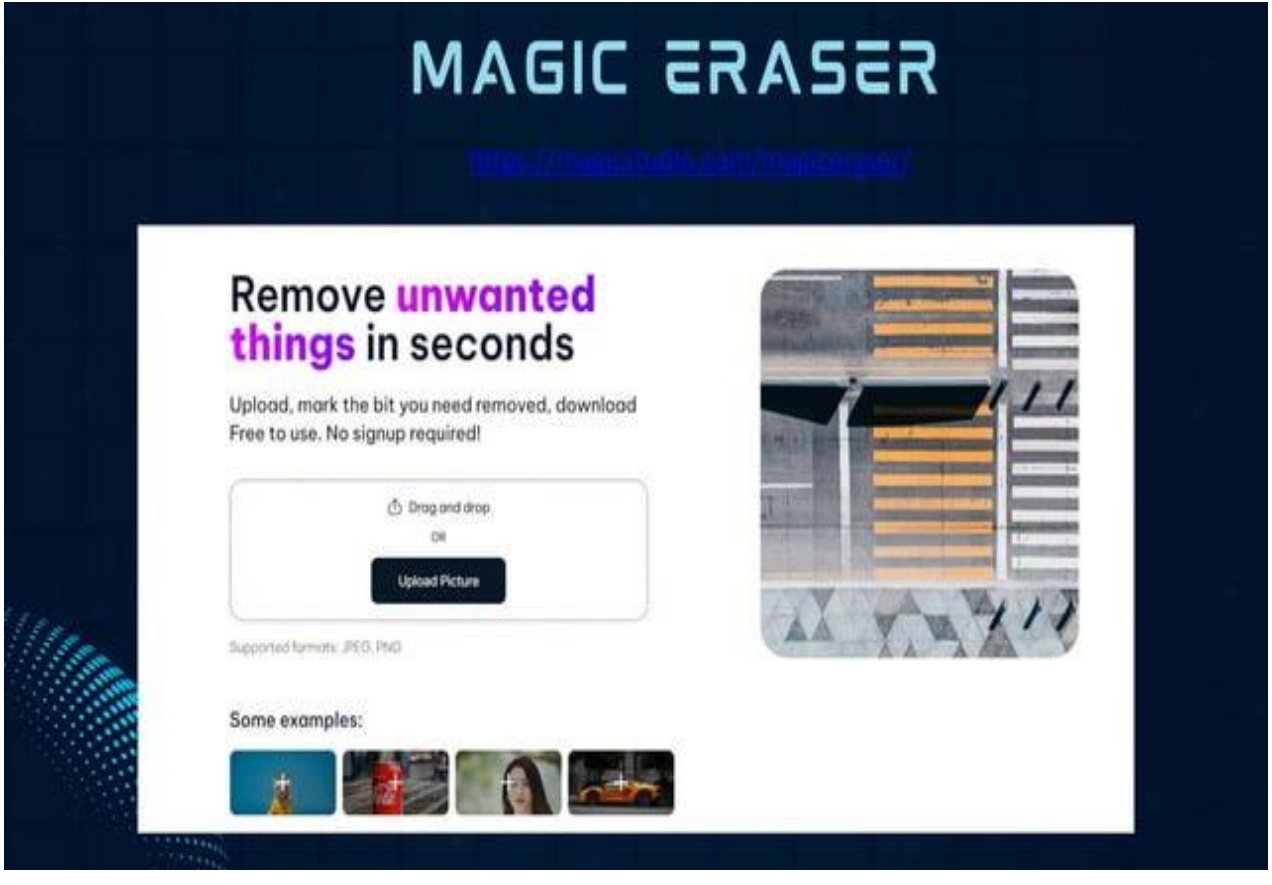
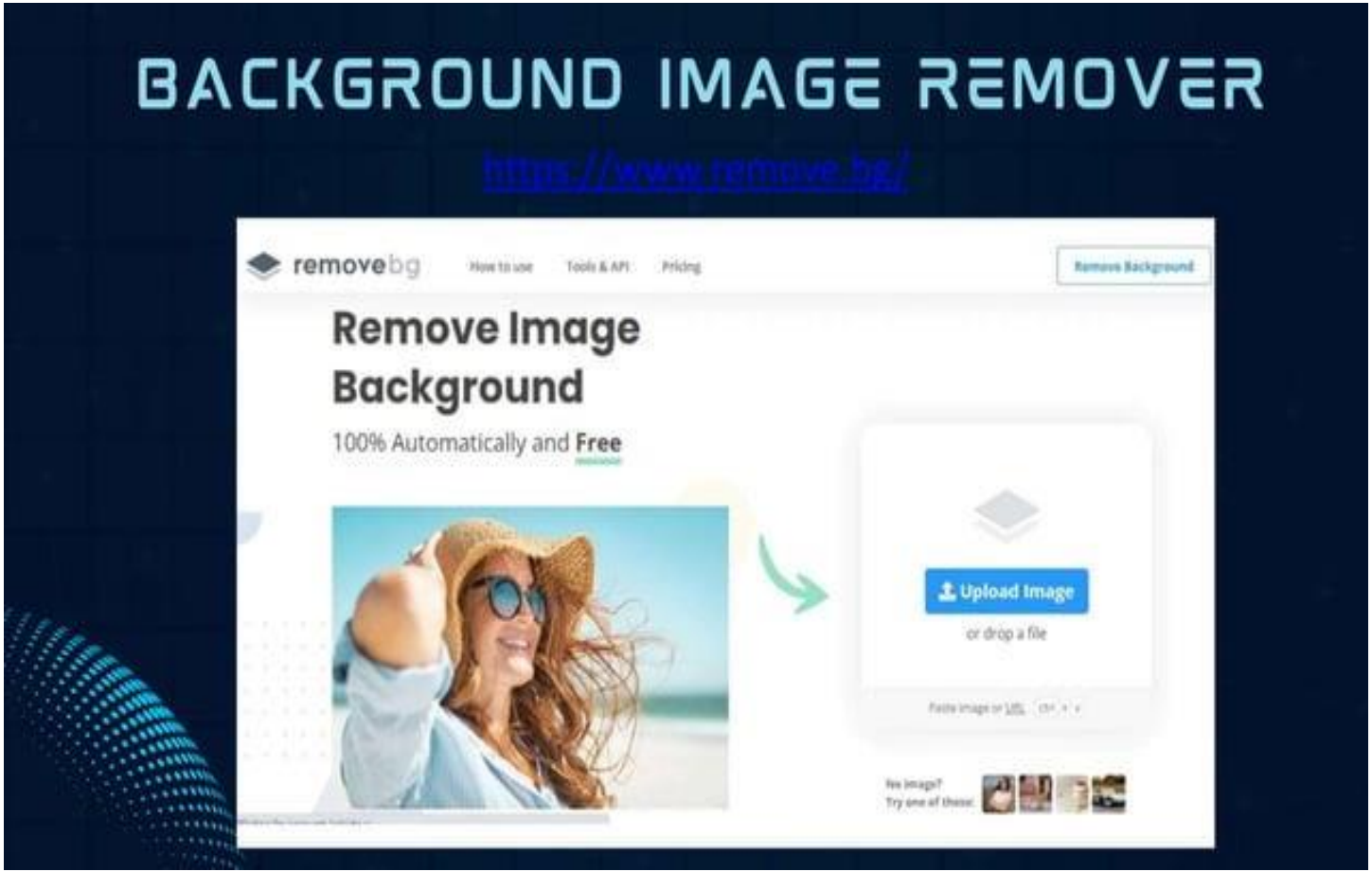
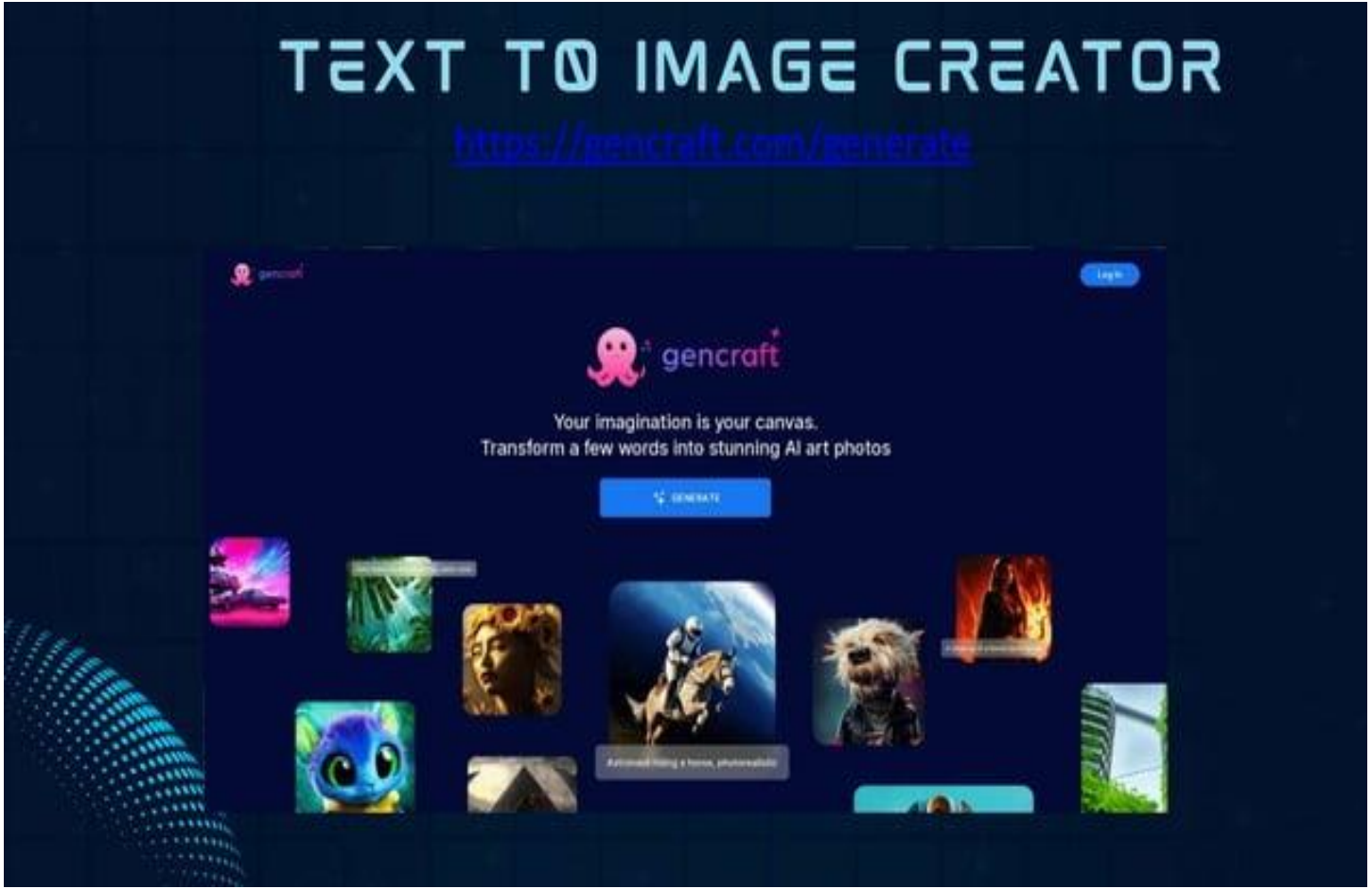


https://picwish.com/

https://www.remove.bg/



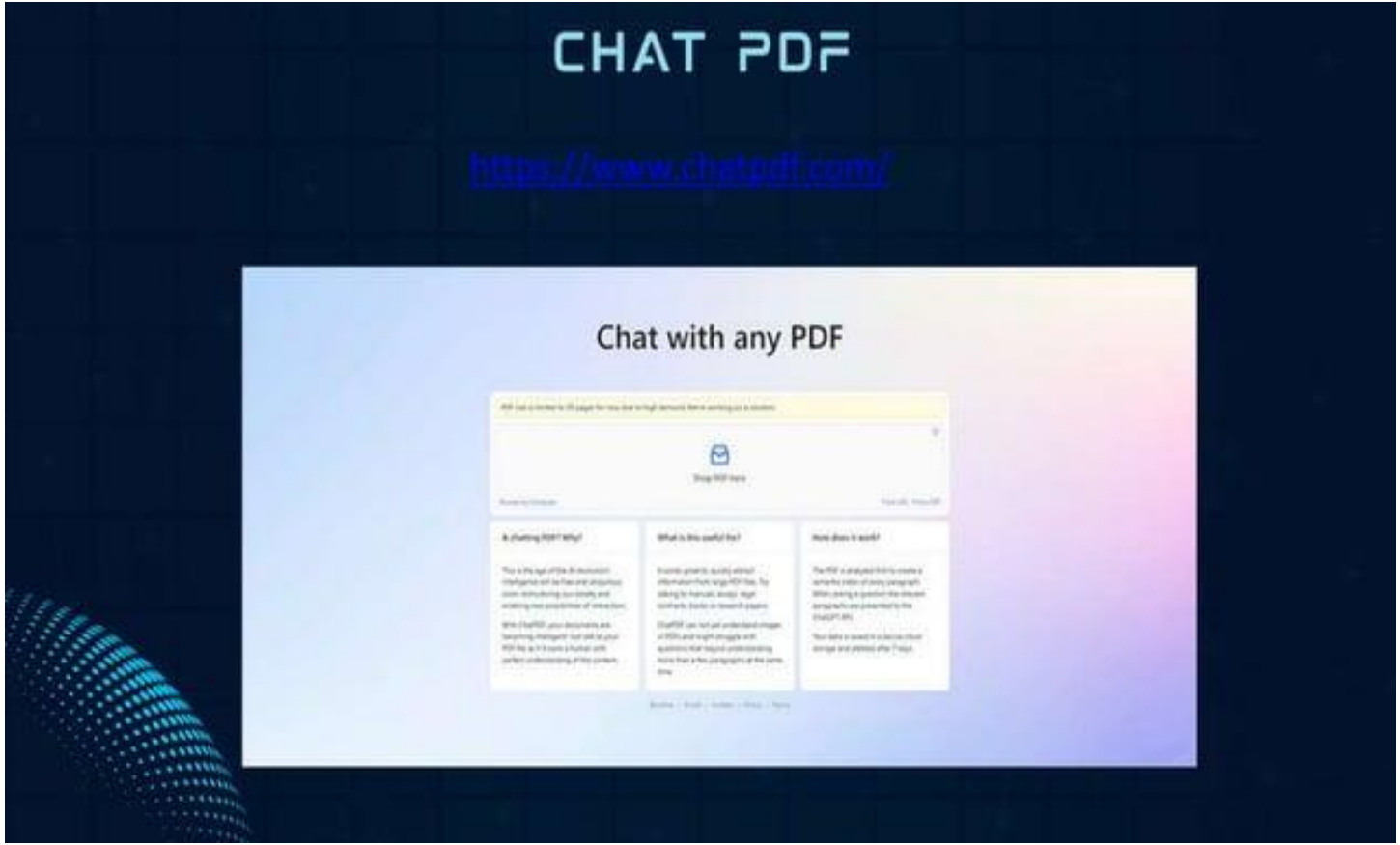
https://gencraft.com/



https://www.decktopus.com/

https://www.ilovepdf.com/

https://www.chatpdf.com/

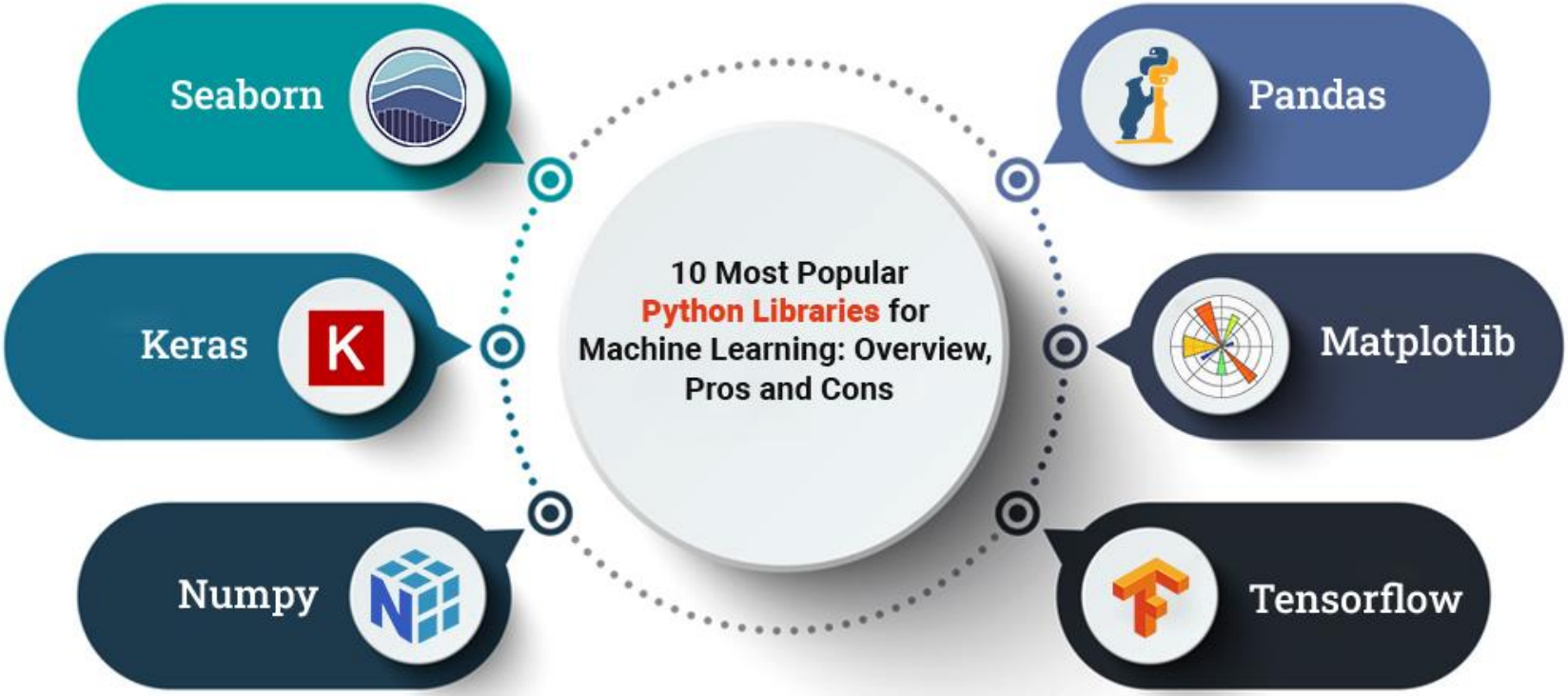


https://podcastle.ai/

The AI Workflow

- **Data Collection**:
  Gathering relevant data.
- **Data Preprocessing**:
  Cleaning and preparing data for analysis.
- **Model Training**:
  Teaching the model using training data.
- **Model Evaluation**:
  Assessing the model's performance.
- **Deployment**:
  Implementing the model in a realworld environment.

Python Libraries for AI and DS



Thank you for your time and attention ☺

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