

Hillingdon u3a Computer Club

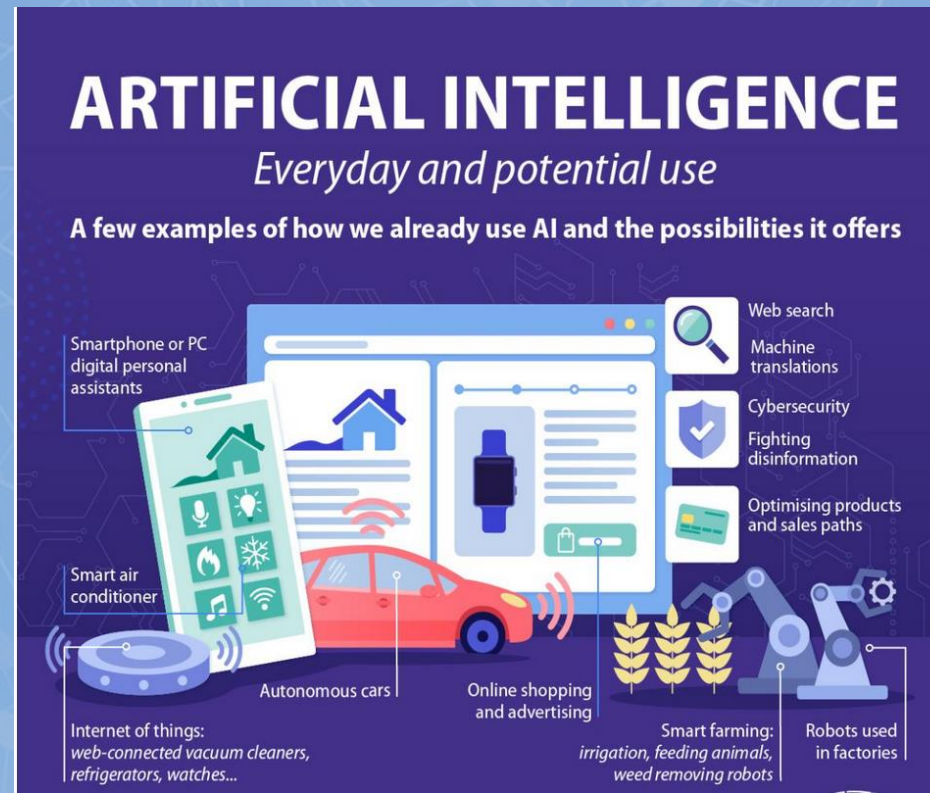


An Introduction to Artificial Intelligence

November 2023

A Definition

Artificial intelligence - or AI for short - is technology that enables a computer to think or act in a more 'human' way. It does this by taking in information from its surroundings, and deciding its response based on what it learns or senses.



A Definition - 2

AI is becoming a bigger part of our lives, as the technology behind it becomes more and more advanced. Machines are improving their ability to 'learn' from mistakes and change how they approach a task the next time they try it.

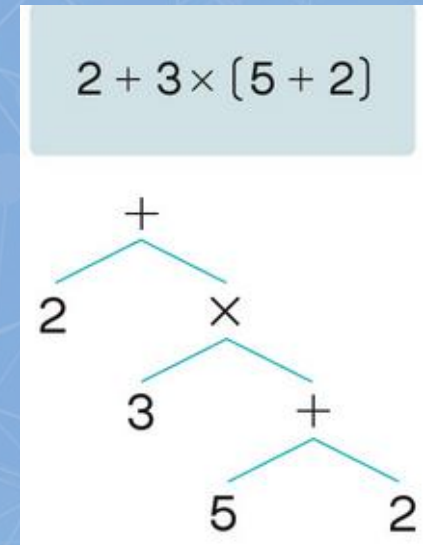
You might not realise some of the devices and daily activities which rely on AI technology - phones, video games, autonomous cars and online shopping, for example.

A Brief History

- 1956 – Birth of AI. John McCarthy, Computer & Cognitive Scientist, was the first to use the term Artificial Intelligence. He wrote “Every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it”.
- 1950-1960’s Early AI research focused on symbolic problem-solving and rule-based systems.

$$\frac{\partial^2 \psi}{\partial x^2} - \frac{1}{v^2} \frac{\partial^2 \psi}{\partial t^2}$$

Allen Newell and Herbert A. Simon developed the first AI program, which could prove mathematical theorems.



A Brief History

- 1960-1970 Start of Expert Systems where knowledge from human experts are used to solve specific problems.

Example is MYCIN, an expert system for medical diagnosis to identify bacteria causing infection such as meningitis and recommend an antibiotic. It used an inference engine and a knowledge base of ~600 rules. The physician would answer a long series of yes/no or textual questions and get a possible culprit bacteria ranked on probability with reason for diagnosis and recommend a course of drug treatment.

- 1980's interest in AI declined due to over promises and under delivery. Also with limited computational power and poor algorithms it became an "AI Winter"

A Brief History

- 1990's Machine learning gained prominence with applications like speech recognition, computer vision (acquiring, processing & analysing digital images) and data mining (discovering and extracting patterns in large data sets).
- Late 1990's Reinforcement Learning became of interest for training agents to make decisions. The IBM Deep Blue defeated world chess champion Garry Kasparov in 1997 using this.
- 2000's Big Data caused an increased interest in AI along with better computational power. Neural networks (i.e. deep learning) got used for tasks like image and speech recognition.
Example: Deep learning in image recognition, they might learn to identify a cat by analysing example images that have been manually labelled as "cat" or "no cat" and using the results to identify cats in other images. They do this without any prior knowledge of cats

A Brief History

- 2010's Breakthroughs in natural language processing led to the development of virtual assistants like Siri, Alexa, and Google Assistant. Advancements in computer vision enabled applications in facial recognition and autonomous vehicles

Present day AI is an integral part of various industries, including healthcare (diagnosis and drug discovery), finance (algorithmic trading), and education (personalized learning).

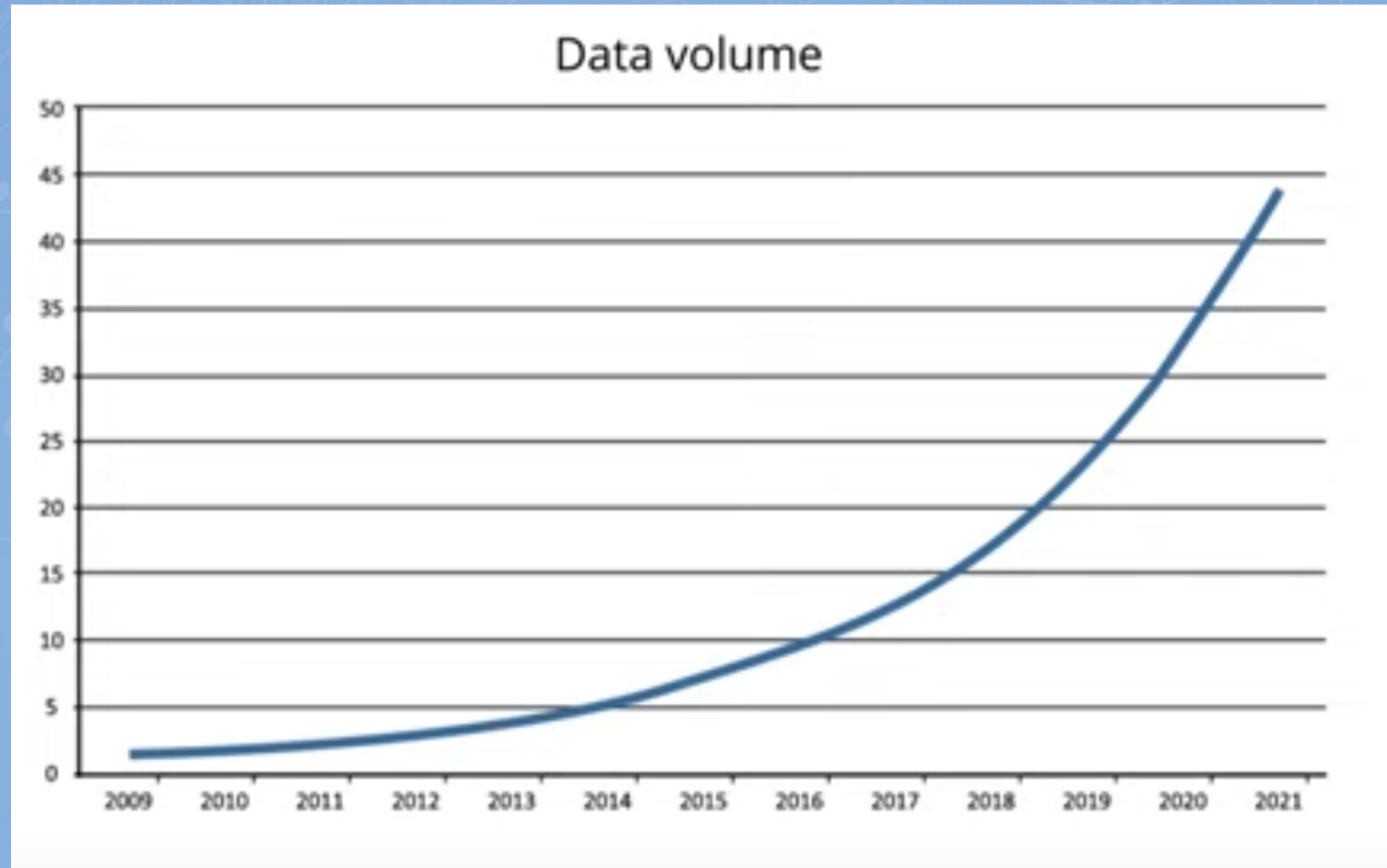
It's all about the Data

Data volume refers to how much data has grown over the past few years and how it could grow in the future. This has given rise to a new economy causing a battle of companies to own data and derive benefit from it.

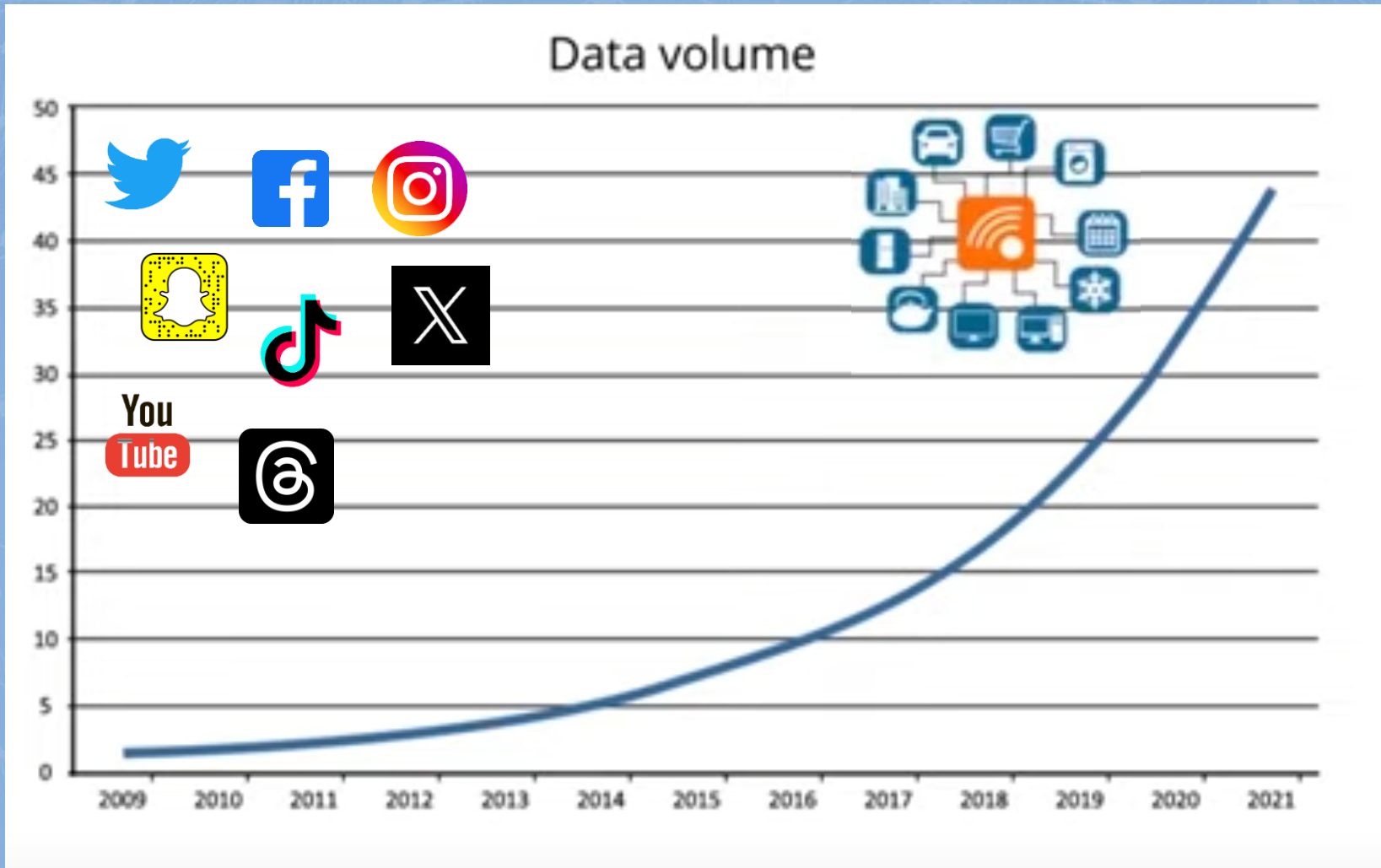
This in turn has given rise to “Big Data” and the need to analyse this data “Data Science”. This is where AI comes in to help make sense of all the information.

It's All About The Data

Increase of 44 times in 11 years



It's All About The Data



It's All About The Data

These “AI chatbots” do a fantastic job of synthesizing information that is entertaining and is often accurate in the details of your query.

But under the hood, they're actually large-language models, or LLMs, trained on billions or even *trillions* of points of data (text) that they learn from in order to anticipate which words to put together based on your query.

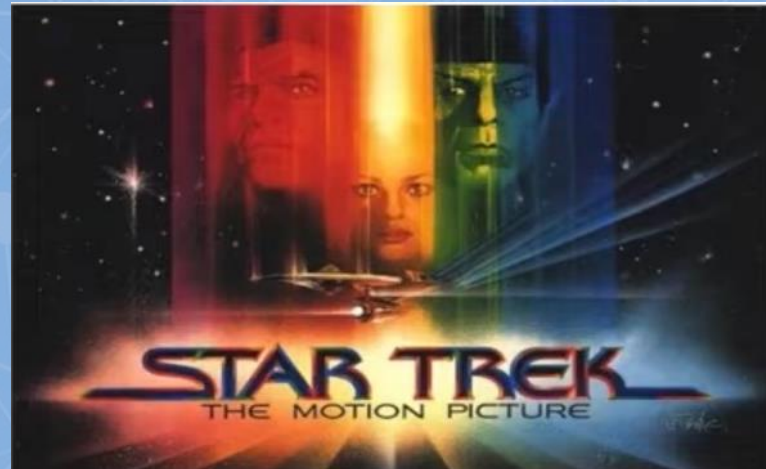
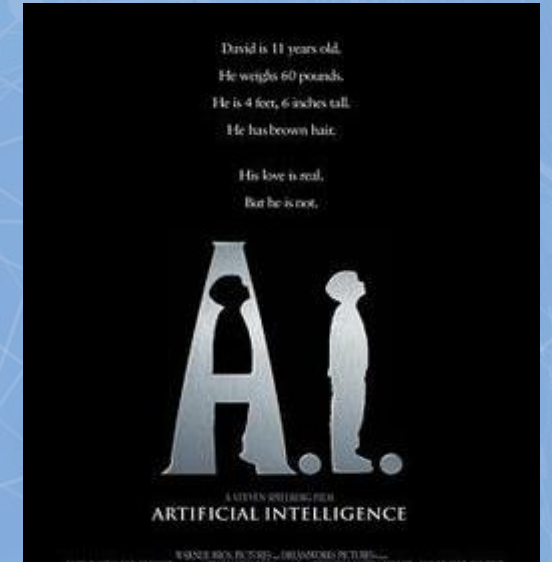
However, AI chatbots aren't intelligent at all. They draw on patterns of word association to generate results that seem to fit your query, then state them definitively with no idea of whether they are true.

The Chatbots all come with a warning that they can make mistakes. So you need to check import information



Films

Si-Fi Movies using AI as a Theme





Applications

Real World - Autonomous Cars



These cars use radar, cameras and lidar (light detection and ranging sensors) to create and maintain a continuous map of their surroundings.

Video cameras are used to read traffic lights and road signs, to track other vehicles and keep a lookout for pedestrians and other vulnerable road users.

And of course, a powerful on-Board computer.

Real World – Language Translation



A device that can help this tourist who can't speak German, to convert the words she sees to English.

Real World – Blind Assistance

A device that can help this blind man see the world around him.





The Issues

11 Ethical AI Issues

Issue 1: Job Displacement

Issue 2: Privacy

Issue 3: Bias

Issue 4: Security

Issue 5: Explainability

Issue 6: Accountability

Issue 7: Deepfakes

Issue 8: Misinformation

Issue 9: Exploitation of Intellectual Property

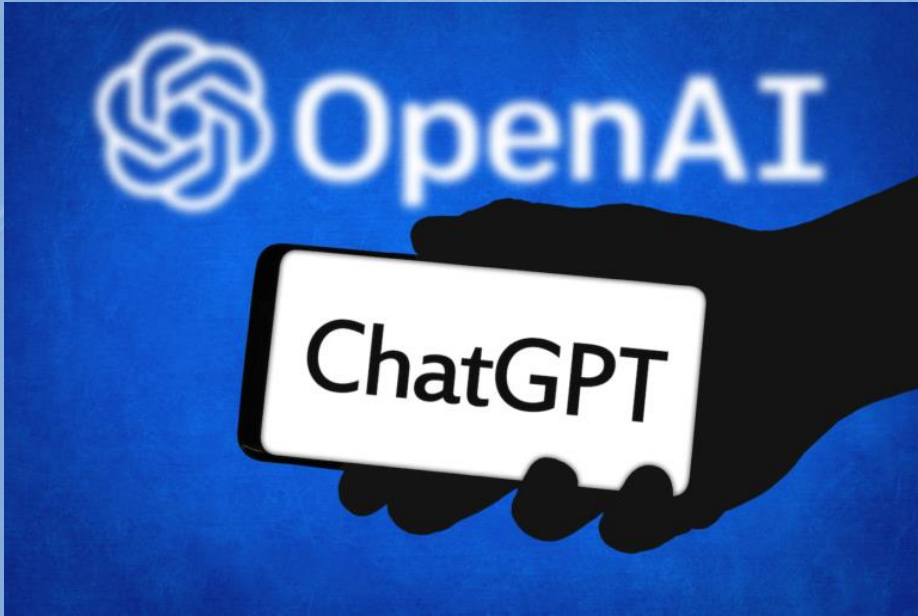
Issue 10: Loss of Social Connection

Issue 11: Balancing Ethics With Competition

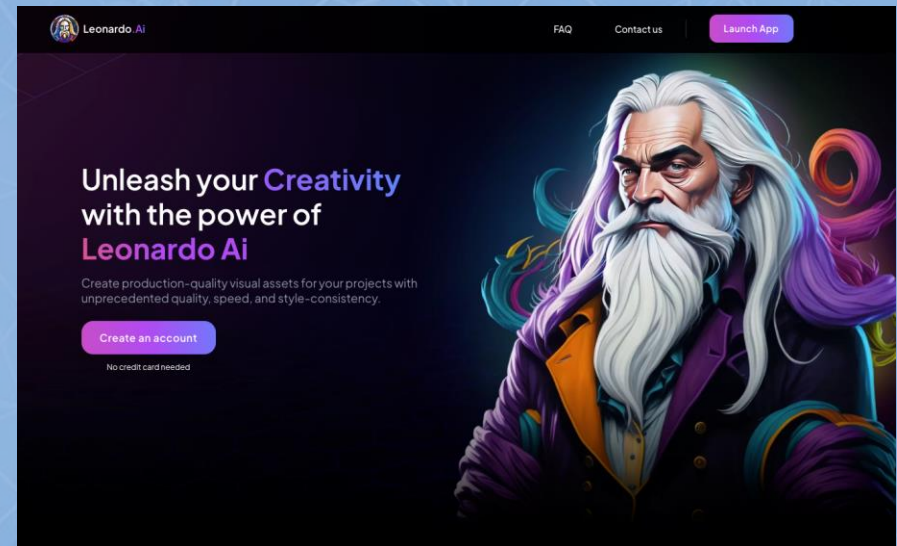
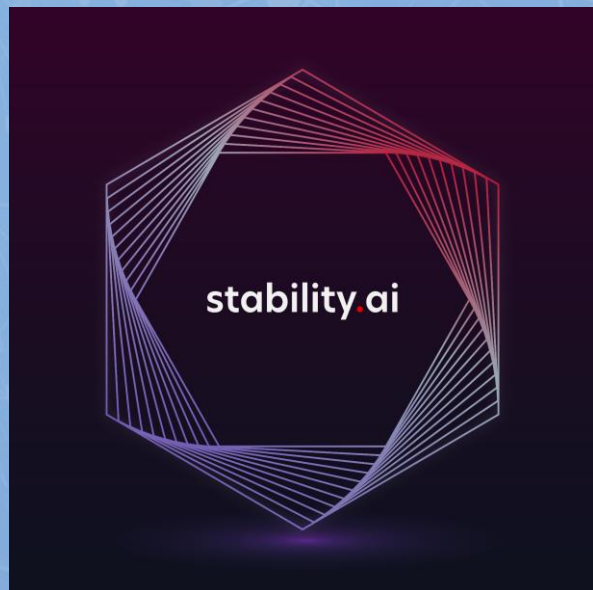
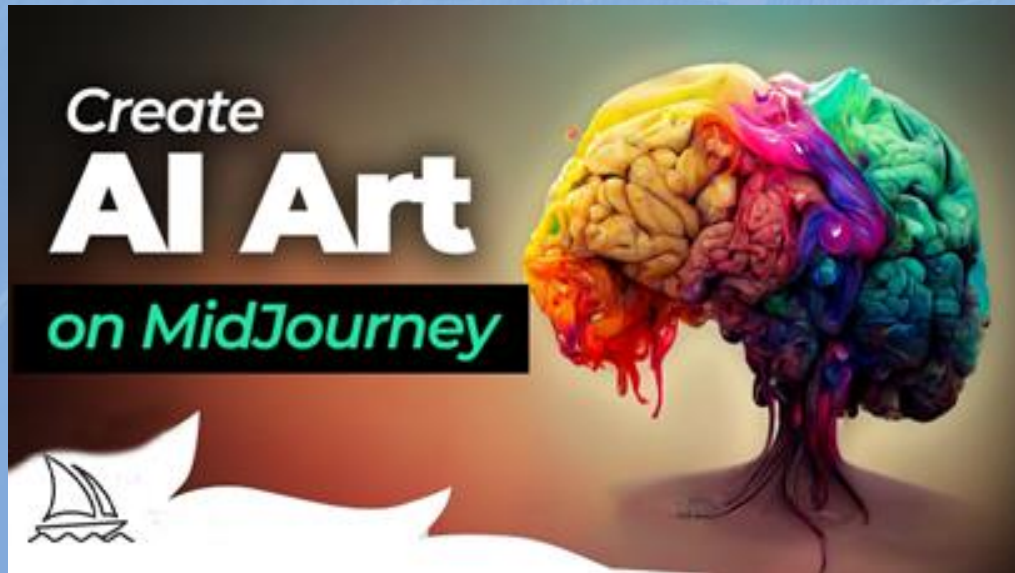


The Tools

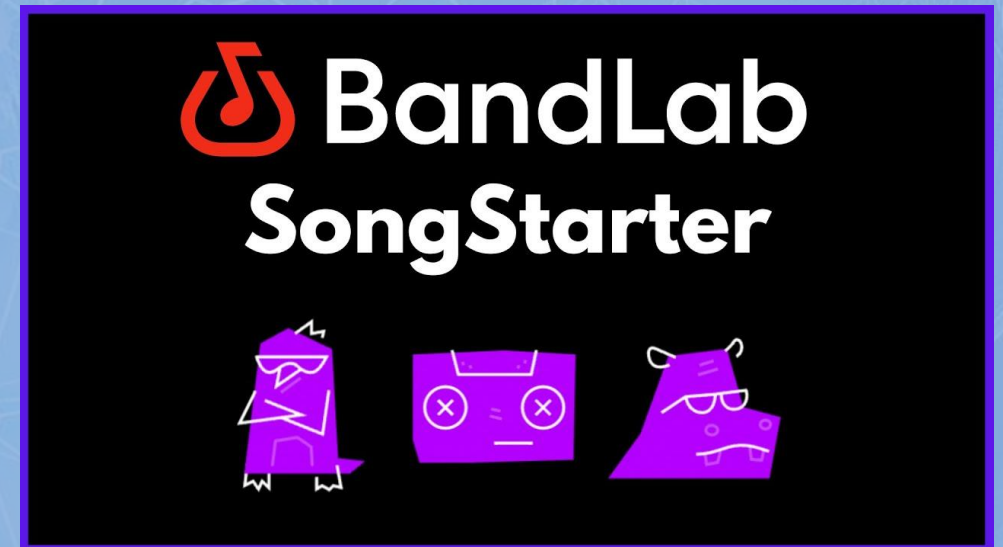
AI Tools - Chatbots



AI Tools – Image Creators



AI Tools – Others





Let's Play

The End

Thank You

