1. What is Artificial Intelligence

Artificial Intelligence (AI) is about making computers capable of doing tasks that usually require human intelligence. Think of it as teaching computers to think and act like people in certain situations.

1.1. How did it come about?

- **Early Ideas (1950s-1960s)**: The idea of artificial intelligence (AI) started with Alan Turing's theories and simple computer programs that could do basic tasks.
- **Building Blocks (1970s-1980s)**: Researchers focused on creating early AI systems based on rules and began developing the basics for machine learning and neural networks.
- **Neural Networks (1990s-2000s)**: The focus shifted to improving neural networks, which are computer systems designed to mimic the human brain. This set the stage for modern AI technologies.
- **Big Advances (2010s)**: Major breakthroughs occurred with deep learning technologies like GANs (Generative Adversarial Networks) and Transformer models (like GPT), making AI much more powerful and creative.
- **Today and Future (2020s and Beyond)**: Generative AI is now a big part of technology, with exciting new applications and future possibilities for growth and innovation.

1.2. Basic concepts

Deep Learning

Deep learning is a type of machine learning where computers learn from large amounts of data using neural networks, which are inspired by the human brain. This helps them recognize patterns and make decisions.

NLP (Natural Language Processing)

NLP stands for Natural Language Processing. It involves teaching computers to understand, interpret, and respond to human language in a way that is both meaningful and useful.

Language Translation

Language translation in AI is the process where computers are used to convert text or speech from one language to another automatically.

Sentiment Analysis

Sentiment analysis is a technique in AI where computers analyze text to determine the sentiment or emotion behind it, such as whether it is positive, negative, or neutral.

Chatbots

Chatbots are AI programs designed to simulate conversation with human users. They can answer questions, provide information, and carry out tasks through text or voice interactions.

Text Summarization

Text summarization is the process where AI takes a long piece of text and creates a shorter version that includes the main points, making it easier to understand quickly.

Named Entity Recognition (NER)

Named Entity Recognition (NER) is a technique in AI where the computer identifies and classifies key information in text, such as names of people, organizations, locations, dates, and other entities.

Robotics

Robotics involves creating robots that can perform tasks automatically or semi-automatically. AI helps these robots learn from their environment and make decisions.

Computer Vision

Computer vision is a field of AI where computers are taught to understand and interpret visual information from the world, such as images and videos, similar to how humans see and process visual information.

1.3. How does it work?

Artificial Intelligence (AI) is the science of making computers perform tasks that normally require human intelligence. Here's a simple breakdown of how AI works:

Data Collection:

AI starts with data. This data can come from various sources such as text, images, audio, or video. For example, a language translation AI needs text data in different languages.

Data Processing:

Once data is collected, it needs to be cleaned and organized. This step ensures that the data is accurate and relevant. For instance, removing duplicates or correcting errors in the data.

Algorithms:

AI uses algorithms, which are sets of rules or instructions, to process data. These algorithms help the AI learn from the data. There are many types of algorithms, but two common ones are machine learning and deep learning.

Training:

In the training phase, the AI system learns from the data. It analyzes patterns and relationships within the data. For example, a chatbot learns how to respond to questions by analyzing past conversations.

Models:

The result of training is a model. A model is a program that can make predictions or decisions based on new data. For example, a trained language translation model can translate new sentences it has never seen before.

Evaluation:

The AI model is then tested to see how well it performs. This is done by comparing its predictions or decisions against known outcomes. For example, testing a sentiment analysis model by seeing if it correctly identifies the sentiment of new texts.

Deployment:

Once the AI model is trained and evaluated, it can be deployed to work in real-world applications. For instance, integrating a chatbot into a customer service website to interact with users.

Feedback and Improvement:

AI systems can improve over time with feedback. They can learn from new data and adapt to changes. For example, a computer vision system for identifying objects in images can improve as it is exposed to more diverse images.

2. Application in education

Multiple fields of education can be helped with the application of AI. To name a few:

Generation of Questions:

Use generative AI to create exercises for students, ensuring questions are accurate and relevant.

Individualized Learning:

AI can provide personalized learning experiences tailored to each student's pace and needs.

Automatic Scoring:

Streamline assessment processes with AI-driven automatic scoring of assignments and tests.

Curriculum or Course Co-design:

Collaborate with AI to design and optimize educational curricula and courses.

Generative Chatbot as Teaching Assistant:

Deploy AI-powered chatbots to assist students with instant feedback and guidance.

Language Skills Coach:

AI can help improve language proficiency through interactive exercises and feedback.

Art Coach:

Utilize AI to assist in artistic training, providing insights and suggestions for improvement.

Conversational Diagnosis of Learning Difficulties:

AI can analyze and identify learning challenges through interactive conversations with students.

Coach for Coding or Arithmetic:

Provide personalized coaching in technical skills such as coding or arithmetic using AI-based tutoring systems.

AI-powered Accessibility Tools:

Enhance accessibility for learners with hearing or visual impairments, enabling them to access a broader range of educational content.

🔎 **Tools you can use:**

- iSpring Page
- Canva Magic Write
- Magic School
- Education Copilot
- Teachy
- Eureca
- Mettzer
- Classcraft

3. Ethical controversies

Data and Computing Power Disparities:

GenAI development requires vast amounts of data and significant computing power, resources primarily available to major international tech companies and a few wealthy economies (mainly the U.S., China, and parts of Europe). This creates a situation of 'data poverty' in many Global South countries, exacerbating existing inequalities and concentrating AI wealth in the Global North.

Current GenAI models reflect the values and norms of the Global North, making them less relevant and potentially harmful to data-poor communities.

Regulatory Challenges:

Dominant GenAI providers are often criticized for not subjecting their systems to independent academic review and for protecting their technologies as corporate intellectual property. The rapid pace of GenAI development outstrips the ability of national and local agencies to draft appropriate legislation, leading to difficulties in managing legal and ethical issues.

Use of Content Without Consent:

GenAI models are trained on data scraped from the internet without owner consent, raising intellectual property concerns. This practice can violate regulations like the EU's GDPR, particularly the right to be forgotten, as it is impossible to remove someone's data from a trained model.

Lack of Transparency and Explainability:

GenAI models operate as 'black boxes', making it difficult to understand how specific outputs are generated. This opacity leads to trust issues and the perpetuation of biases present in the training data.

Pollution of the Internet with Biased Content:

GenAI-generated content, which often appears accurate but can be biased or incorrect, is spreading across the internet. This pollution risks reinforcing existing biases and errors in future models trained on this content.

Misleading Convincing Text:

GenAI can produce text that seems convincing but often contains errors or harmful statements. These models do not understand the text they generate, leading to potential trust and reliability issues in educational contexts.

Marginalization of Minority Voices:

GenAI tends to reflect dominant views and marginalizes less common perspectives, particularly those of already disadvantaged communities.

Generation of Deepfakes:

GenAI makes it easier to create deepfakes, leading to ethical, moral, and legal concerns around misinformation, hate speech, and unauthorized use of individuals' likenesses.

Implications for Education and Research:

Researchers, teachers, and learners must critically assess GenAI outputs and be aware of the biases and potential inaccuracies in these systems; There is a need for regulations to protect the rights of data owners and ensure ethical, safe, and equitable use of GenAI in education.