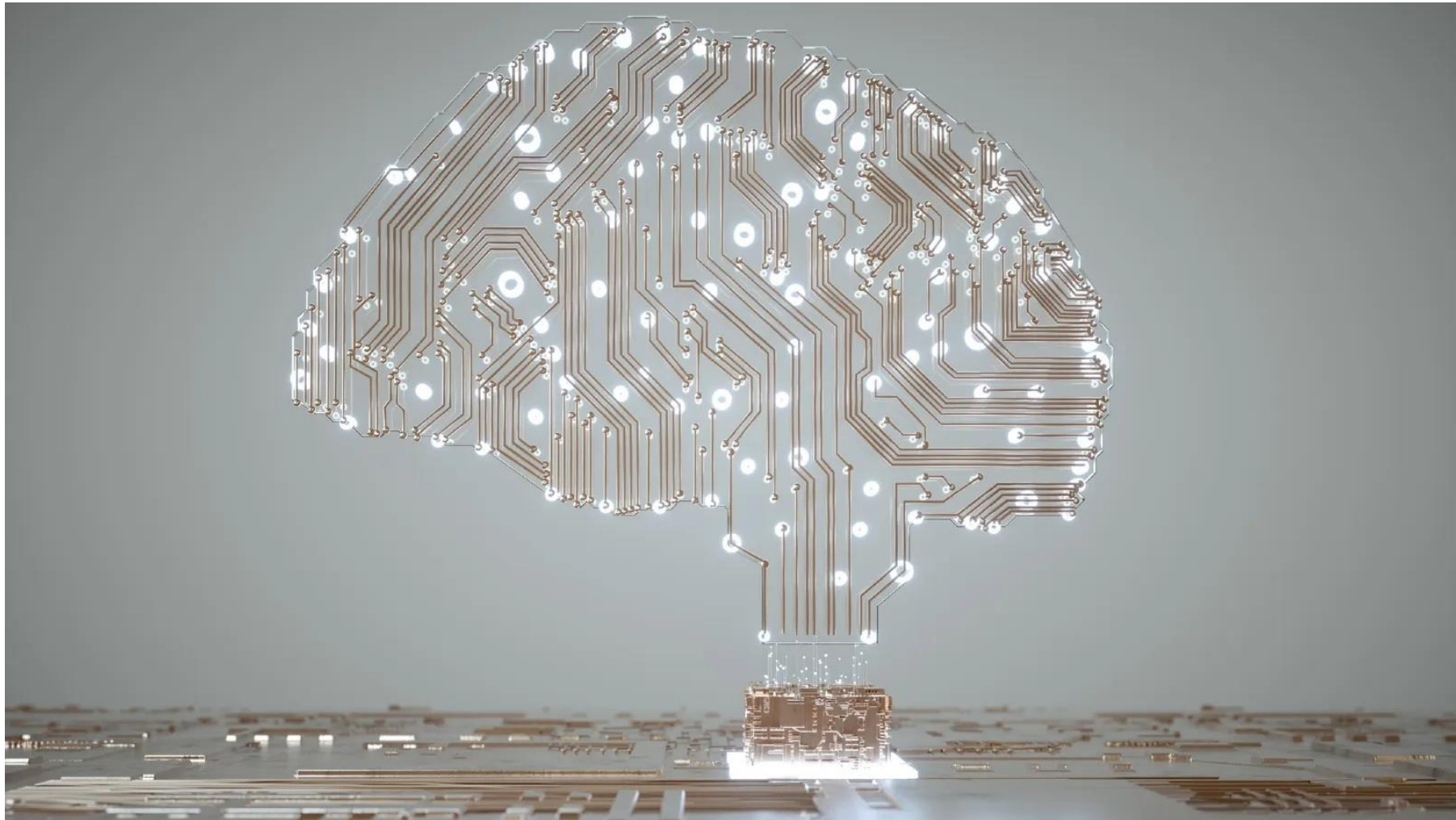




AI and you



# *AI and You*







# *AI and You*

- What is AI (Artificial Intelligence).
- History of AI.
- How does it work.
- Where are we now.
- How do you use it.



# *AI and You*

**Artificial intelligence (AI)**, in its broadest sense, refers to intelligence exhibited by machines, particularly computer systems.

- Whether it's advanced web search engines, recommendation systems, speech recognition, autonomous vehicles, or creative tools, AI plays a significant role in various applications.
- A lot of cutting-edge AI has filtered into general applications, often without being called AI because once something becomes useful enough and common enough it's **not labeled AI anymore**



# *AI and You*

## **Definition of Intelligence:**

- Intelligence refers to the capacity for abstraction, logic, understanding, self-awareness, learning, emotional, knowledge, reasoning, planning, creativity, critical thinking, and problem-solving.
- It involves the ability to **perceive** or **infer information** and retain it as knowledge to be applied in adaptive behaviors within a specific context or environment.
- Human intelligence is marked by complex cognitive feats, motivation, and self-awareness, allowing us to learn, reason, and adapt.



# *AI and You*

## History

- **Alan Turing** was the first person to conduct substantial research in the field that he called machine intelligence ~1936.
- **Artificial intelligence** was founded as an academic discipline in 1956, by those now considered the founding fathers of AI, John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon.



# *AI and You*

## History (cont)

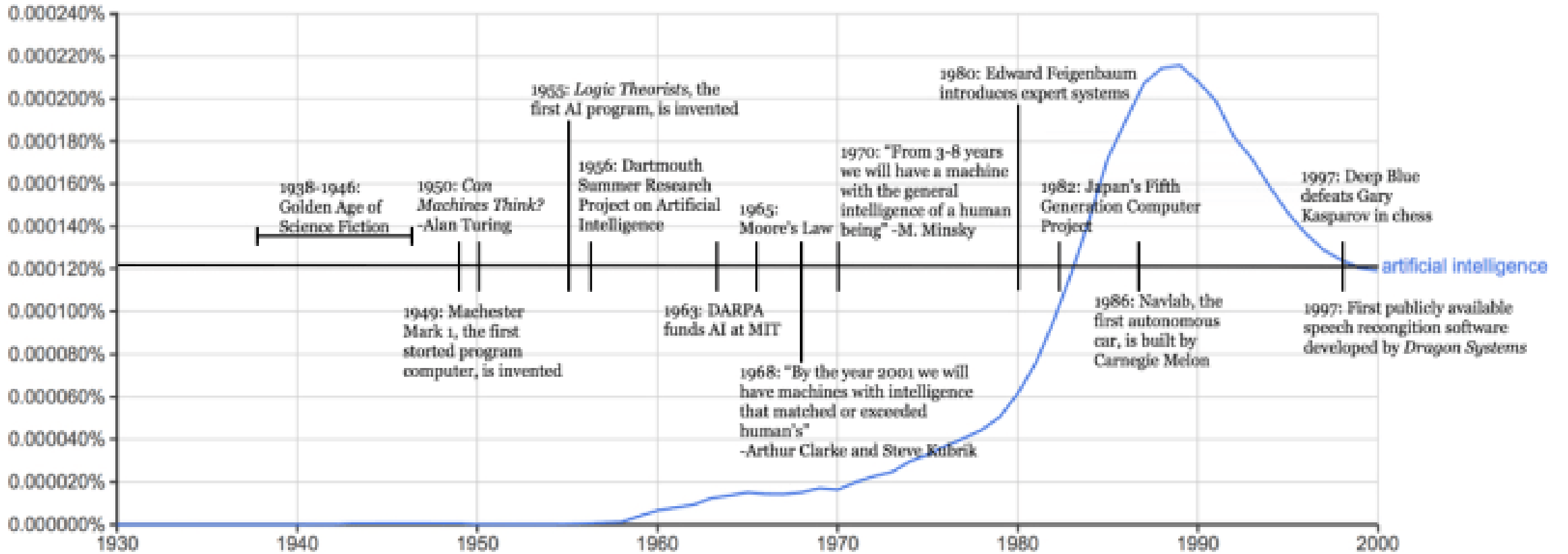
- **The field went through multiple cycles of optimism**, followed by periods of disappointment and loss of funding, known as AI winter.
- **Funding and interest vastly increased after 2012** when deep learning surpassed all previous AI techniques, and after 2017 with the transformer architecture.
- **This led to the AI boom of the early 2020s**, with companies, universities, and laboratories overwhelmingly based in the United States pioneering significant advances in artificial intelligence.





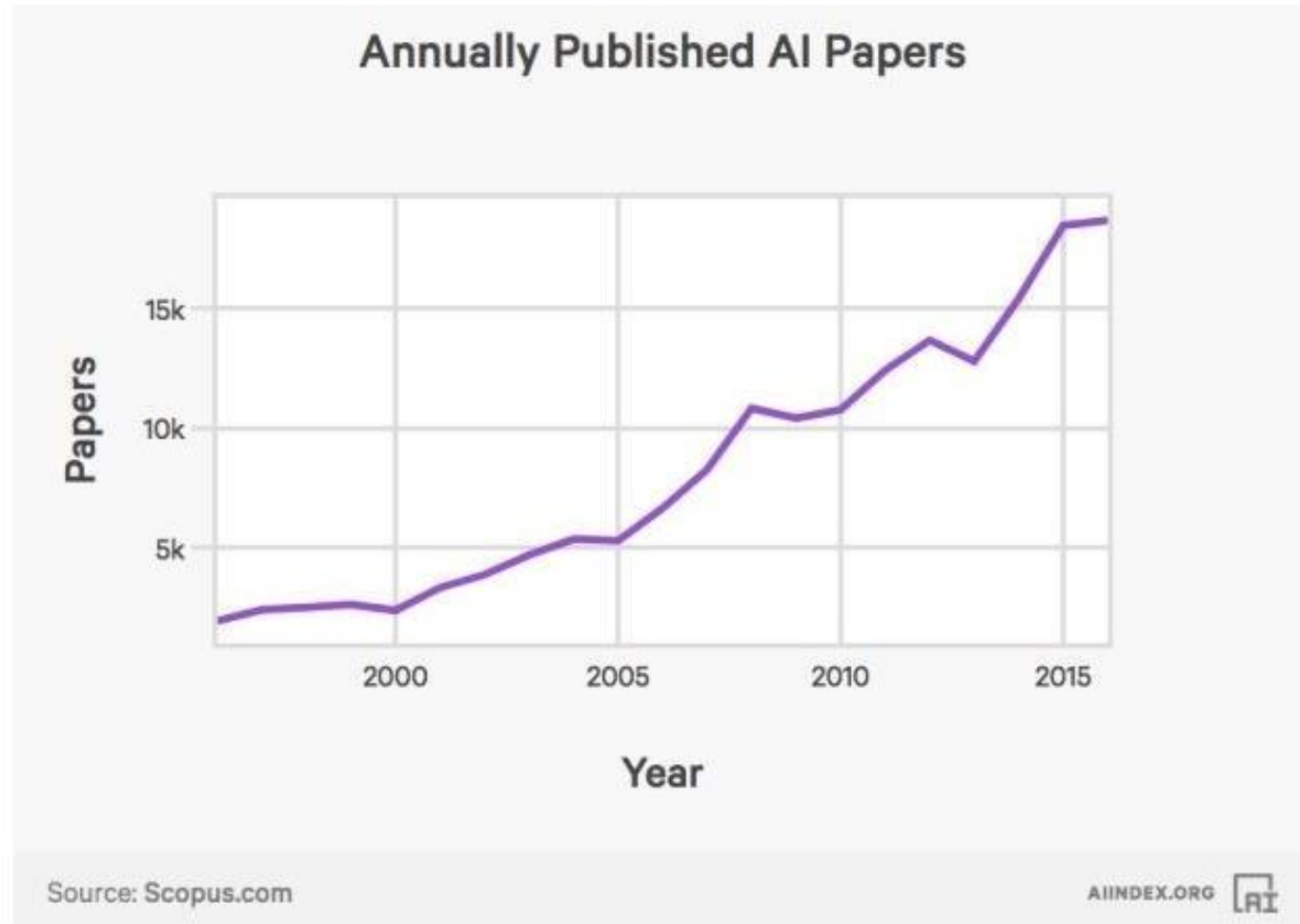
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ARTIFICIAL INTELLIGENCE TIMELINE





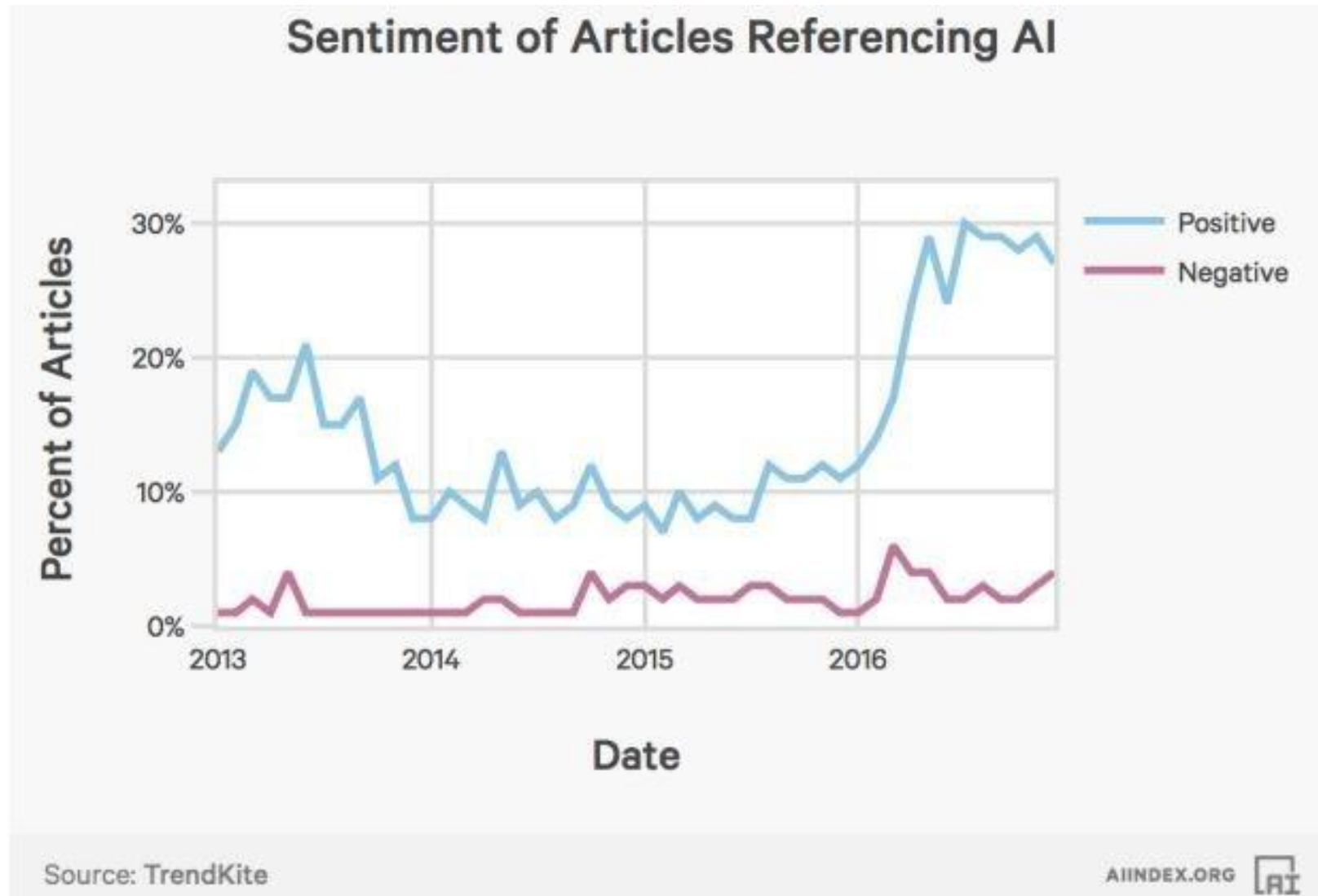
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**9x**

*The number of AI papers produced each year has increased by more than 9x since 1996.*

# AI and You





# *AI and You (How it works)*

## **LOGIC**

Simple logic statement

- IF (...=...), Then (....), Else (....)

Relating to a traffic signal

- IF (light = red), Then (stop), Else ( If (light=green) Then (go), Else (If light=yellow), Then (stop safely), Else (hurry through)

Through experience, we learn when we can execute the statement, which provides guidance for future actions.



# *AI and You (How it works)*

## Supervised Learning Algorithms:

- These algorithms learn from labeled training data, where input-output pairs are provided. They aim to predict output labels for new, unseen data.
- Examples include:
  - **Decision Trees:** Hierarchical structures that split data based on features to make decisions<sup>1</sup>.
  - **Support Vector Machines (SVM):** Used for classification and regression tasks by finding optimal hyperplanes in feature space<sup>2</sup>.
  - **Neural Networks:** Deep learning models inspired by the human brain, consisting of interconnected layers of artificial neurons<sup>2</sup>



# *AI and You (How it works)*

## **Unsupervised Learning Algorithms:**

- These algorithms work with unlabeled data, identifying patterns and structures without explicit output labels.
- Examples include:
  - **K-means Clustering:** Groups data points into clusters based on similarity<sup>2</sup>.
  - **Genetic Algorithms:** Inspired by natural selection, they evolve solutions to optimization problems<sup>2</sup>.



# *AI and You (How it works)*

## **Reinforcement Learning Algorithms:**

- These algorithms learn through interaction with an environment, receiving rewards or penalties based on their actions.
- Examples include:
  - [Q-learning: Used for decision-making in dynamic environments<sup>3</sup>.](#)
  - [Deep Q Networks \(DQN\): Combines deep learning with Q-learning for complex tasks<sup>3</sup>.](#)



# *AI and You (How it works)*

**Generative Adversarial Networks (GANs)** are fascinating algorithmic architectures that have revolutionized the field of generative AI. Let me break it down for you:

## **1. What Are GANs?**

- GANs consist of **two neural networks**: a **generator** and a **discriminator**.
- These networks engage in an **adversarial** process, competing against each other.
- The goal is to generate new, synthetic data instances that closely resemble real data.

## **2. How Do GANs Work?**

- The **generator** creates candidate data samples (e.g., images).
- The **discriminator** evaluates these samples, distinguishing real from fake.
- The generator aims to produce data that fools the discriminator, while the discriminator aims to improve its ability to differentiate real data.





# *AI and (How it works)*

**Large language models (LLMs)** handle context in language generation through their **self-attention mechanism**. Let's break it down:

## **1. Self-Attention:**

- LLMs, like the **transformer architecture**, use self-attention to weigh the importance of different words in a sentence.
- Each word learns to focus on relevant context words, capturing long-range dependencies.

## **2. Contextual Embeddings:**

- LLMs create **contextual word embeddings** by combining word embeddings with self-attention weights.
- These embeddings capture both the word's meaning and its context in the sentence.



# *AI and You (How it works)*

## **3. Positional Encoding:**

- To handle word order, LLMs add **positional encodings** to word embeddings.
- These encodings provide information about the position of each word in the sequence.

## **4. Autoregressive Generation:**

- During text generation, LLMs use **autoregressive decoding**.
- They predict the next word based on the context (previous words) and their learned representations.

## **5. Window of Context:**

- LLMs have a **limited window of context** due to computational constraints.
- However, they maintain context across sentences through hidden states.



# *AI and You (How it works summary)*

Boiling it down:

- The algorithms take piles, piles, .....piles of data and analysis it. The data can be text images, etc. The output is then compared to the data and a “projection/inference” is made after many circular attempts and checks.
- This uses an extremely large amount of computer power.
- Recent computer chip designs has created the capacity.



# *AI and You*

## **Top 10 Takeaways from Stanford University 2024 AI report.**

### **1. AI beats humans on some tasks, but not on all.**

- + Image classification, visual reasoning, and English understanding.
- - Tasks like competition-level mathematics, visual commonsense reasoning and planning.

### **2. Industry continues to dominate frontier AI research in 2023.**

- Industry produced 51 notable machine learning models.
- Academia contributed only 15.
- 21 models resulted from industry-academia collaborations.

### **3. Frontier models get way more expensive.**

- OpenAI's GPT-4 used an estimated \$78 million to compute/train.
- Google's Gemini Ultra cost \$191 million to compute/train.



# *AI and You*

## **4. The United States is the leading source of top AI models.**

- 61 notable AI models originated from U.S.-based institutions.
- European Union's 21 and China's 15.

## **5. Robust and standardized evaluations for LLM are seriously lacking.**

- Significant lack of standardization in responsible AI reporting.
- OpenAI, Google, and Anthropic(Claude) primarily test their models against different AI benchmarks.

## **6. Generative AI investment skyrockets.**

- 2022 spending reached \$25.2 billion for generative AI.
- Major players included OpenAI, Anthropic, Hugging Face, and Inflection, reported substantial fundraising rounds.



# *AI and You*

## **7. AI makes workers more productive with higher quality work.**

- AI workers complete tasks faster with improved the quality.
- AI without proper oversight can lead to diminished performance.

## **8. Scientific progress accelerates even further.**

- AI began to advance scientific discovery in 2022.
- More significant science-related AI applications— from AlphaDev, which makes algorithmic sorting more efficient, to GNoME, which facilitates the process of materials discovery were launched in 2023 rising 37% from 2022



# *AI and You*

## **9. The number of AI regulations in the United States sharply increases.**

- In 2023, 25 AI-related regulations, compared to one in 2016.
- AI-related regulations grew by 56.3% in 2023

## **10. People are more cognizant of AI's potential impact—and more nervous.**

- Those who think AI will positively affect their lives in the next three to five years has increased from 60% to 66%.
- 52% express nervousness toward AI products and services, a 13-percentage point rise from 2022.
- In America, 52% of Americans report feeling more concerned than excited about AI



# AI and You

## 2024 Major Players

### 1. Microsoft

- **Focus:** AI platforms, cloud computing, and enterprise solutions.
- [Notable Projects: Azure AI, Cognitive Services, and OpenAI partnership Copilot<sup>1</sup>.](#)

### 2. Apple

- **Focus:** Consumer electronics, language and image processing, and privacy-centric AI.
- [Notable Projects: Apple Intelligence, Siri, and various AI features integrated into iOS and macOS<sup>1</sup>.](#)

### 3. Alphabet (Google)

- **Focus:** Search algorithms, autonomous systems, and AI research.
- [Notable Projects: Google AI, DeepMind, and TensorFlow<sup>2</sup>.](#)





# AI and You

## 4. NVIDIA

- **Focus:** Graphics processing units (GPUs) and AI hardware.
- **Notable Projects:** AI supercomputing, CUDA, and partnerships with AI research institutions<sup>2</sup>.

## 5. Amazon

- **Focus:** Cloud computing, e-commerce, and AI-driven logistics.
- **Notable Projects:** AWS AI services, Alexa, and machine learning tools<sup>2</sup>.

## 6. Meta Platforms (Facebook)

- **Focus:** Social media, virtual reality, and AI research.
- **Notable Projects:** Meta AI, FAIR (Facebook AI Research), and AI-driven content moderation<sup>1</sup>.

## 7. IBM

- **Focus:** Enterprise AI solutions, cloud computing, and AI ethics.
- **Notable Projects:** IBM Watson, AI for business, and AI ethics initiatives<sup>1</sup>.



# AI and You

## 8. Tesla

- **Focus:** Autonomous driving and AI for electric vehicles.
- **Notable Projects:** [Full Self-Driving \(FSD\) software and AI-driven manufacturing<sup>1</sup>](#).

## 9. Adobe

- **Focus:** Creative software and AI-driven design tools.
- **Notable Projects:** [Adobe Sensei, AI-powered features in Creative Cloud<sup>1</sup>](#).

## 10. Palantir

- **Focus:** Data analytics and AI for government and enterprise.
- **Notable Projects:** [Palantir Foundry, AI-driven data integration<sup>1</sup>](#).

## 11. OpenAI

- **Focus:** General AI research and development.
- **Notable Projects:** [GPT-4, DALL-E, and Codex<sup>2</sup>](#).

## 12. Salesforce

- **Focus:** Customer relationship management (CRM) and AI for business.
- **Notable Projects:** [Salesforce Einstein, AI-driven CRM tools<sup>3</sup>](#).



# *AI and You*

## How we use it:

- **Passkeys**

Provide high level of security compared to passwords.

- Face recognition
- Fingerprint recognition

- **Navigation**

Provide better navigation by evaluating routes for traffic, construction, etc.

- Google Maps
- Waze



# *AI and You*

## **How we use it (continued):**

- **Personal assistants**

Recognize voice input to operate appliances and get information.

- Alexa
- Siri
- Ok Google

- **Internet search assistants.**

Provide deep searching for information on the internet.

- Copilot
- Gemini
- ChatGPT



# *AI and You*

## **How we use it (continued):**

- Computers/Devices
  - Voice Recognition
  - Photo Editing
  - Photo classification
  - Spelling Correction
  - Predictive text
  - Recommendations
  - Internet Advertising



# *AI and You (Examples)*

## Science

- Material Science : GNoME [What is Google GNoME? | Internet Public Library \(ipl.org\)](#)
- Drug Discovery: Deepmind's [What is DeepMind? | Live Science](#)
- [Artificial intelligence in drug discovery and development - PMC \(nih.gov\)](#)
- Food crop production: [How generative AI in agriculture could shape the industry | McKinsey](#)
- [Understanding the potential applications of Artificial Intelligence in Agriculture Sector - ScienceDirect](#)



# *AI and You (Examples)*

## Healthcare

- Diagnostics: SOAP notes: **Subjective, Objective, Assessment, and Plan:** [Mobile EHR Solutions | NextGen Healthcare](#)
- Imaging [AI in healthcare: The future of patient care and health management - Mayo Clinic Press](#)



# *AI and You*

## **Top 10 Most Popular AI Tools to Use in 2024**

### **1. ChatGPT**

- The ubiquitous AI chatbot is based on a large language model (LLM) and trained to provide detailed responses to a prompt in natural, humanlike language.
- The website received around 1.6 billion visits in January 2024 and dominates the traffic to generative AI tools.
- ChatGPT currently has over two million developers and is being used by at least 92% of Fortune 500 companies — not bad for an LLM less than two years old.
- Used in Microsoft Copilot with a MS interface.





# *AI and You*

## **Top 10 Continued**

### **2. Claude AI**

- Claude is becoming extremely popular as 2024 rolls on, with the Anthropic-backed LLM working on text-based tasks, but also returning fantastic results for coding, infographics, chart creation and more.
- Anthropic aims to take care with human values and ethical considerations, with a focus on safety and reliability.
- The latest version, Claude 3.5 Sonnet, is currently blowing people's minds on Twitter.



# *AI and You*

## **Top 10 Continued**

### **3. Google Gemini**

- Google's AI chatbot, previously Bard before being rebranded to Gemini, is a collaborative chat tool that was announced in February 2023 and launched in March 2023. Thanks to Google's might, it has become one of the most famous AI tools.
- The primary difference between Gemini and ChatGPT is that Gemini sources information from the web. And unlike ChatGPT and Microsoft Bing, Gemini was trained on Google's own LLMs – Language Model for Dialogue Applications (LaMDA) and PaLM 2.
- The chatbot boasts a training dataset Size of 750 GB — equivalent to 1.56 trillion words, and 137 million parameters, and saw an average of 142 million users per month across 2023.



# *AI and You*

## **Top 10 Continued**

### **4. QuillBot**

- Quillbot is an online writing assistant that launched in 2017. The tool paraphrases and restructures text, helping users improve their content. The tools also check grammar, detect plagiarism, and translate text into various other languages.
- Averaging 99.6 million monthly visits as of February 2024, it is long established in the realm of AI writers.



# *AI and You*

## **Top 10 Continued**

### **5. MidJourney**

- Midjourney is an AI-powered image generator that launched in July 2022, and creates visuals from natural language text prompts.
- As of March 2024, there are 19.3 million registered users on Discord, which is the place to go to write prompts and see artwork come to life in front of you.



# *AI and You*

## **Top 10 Continued**

### **6. Hugging Face**

- Hugging Face is an AI-based data science platform and community that enables users to build, train, and deploy machine learning models based on open-source code and technologies, share ideas, and contribute to projects.
- Hugging Face reached a \$4.5 billion valuation in 2023, with Salesforce, Google, Amazon and Nvidia as notable backers. It claims to have more than a million models, datasets and apps across the ecosystem.



# *AI and You*

## **Top 10 Continued**

### **7. Character AI**

- Launched in September 2022, Character AI is a chatbot that uses a neural language model to allow users to find or create a character to interact with. The characters on the site include characters based on books, TV shows, and movies, as well as real people. As of the end of 2023, it accounted for 15.77% of the overall AI traffic, totaling 3.8 billion visits, making it one of the top trending AI tools.

### **8. CapCut**

- CapCut is an all-in-one AI platform that enables users to design images, edit, and generate videos within browsers. Launched in 2020, CapCut regularly sits near the top of 'most downloaded app' lists across Apple and Android, and by 2023 claimed at least 200 million active users.



# *AI and You*

## **Top 10 Continued**

### **9. Janitor AI**

- Janitor AI is a character chatbot that launched in May 2023, initially based on ChatGPT, allowing users to create their own characters or interact with characters created by other users to craft immersive roleplay experiences.
- The model has been adapted so that users can engage in not-safe-for-work (NSFW) interactions with the characters.

### **10. Civitai**

- Launched in November 2022, Civitai is a repository for AI art models created for Stable Diffusion, a text-to-image diffusion model. The platform has an extensive collection of models that users



# *AI and You*

## AI Hallucinations?

- An AI hallucination is where a [large language model](#) (LLM) like OpenAI's GPT4 or Google PaLM makes up false information or facts that aren't based on real [data](#) or events.
- Hallucinations are one of the biggest problems with LLM-driven chatbots like ChatGPT, Gemini, etc.
- When a model hallucinates, it makes up information — and the only way to spot it is to verify and fact check answers yourself.
- 89% of ML engineers report that their LLMS exhibit signs of hallucinations.
- Users need to be aware of hallucinations, or they could be misled by misinformation.





# *AI and You*

## AI Hallucination “Prevention”

### NVIDIA open source “Nemo Guardrails”

- Newly released open-source software can help developers guide [generative AI](#) applications to create impressive text responses that stay on track.
- [NeMo Guardrails](#) will help ensure smart applications powered by [large language models](#) (LLMs) are accurate, appropriate, on topic and [secure](#). The software includes all the code, examples and documentation businesses need to add safety to AI apps that



# *AI and You (Examples)*

## **Tests:**

- Look at the results from Chat-GPT, Google Gemini, Microsoft Copilot

### Test 1.

- GNoME, gnome, GNoME materials science, gnome person

### Test 2.

- Atrial fibrillation (AFib) treatments

### Test 3.

- A short story about Larry Laursen from Surprise, AZ.

### Test 4.

- Image of a train in the mountains with snow.



# *AI and You*

**Thank You for your attendance.**

**Happy learning about and using of AI.**