

Unlocking the Power of Generative AI

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Artificial Intelligence, What is it?

- AI is defined as “**A system that shows behavior that could be interpreted as human intelligence.**” - Doug Rose
- AI thrives in an environment where there are **defined rules and patterns** that it can work with. This is where AI will seem the most “Intelligent”.
- If you have used **any of the following**, you have used AI:
 - Google Translate, Alexa, Siri, Chat GPT etc.

Artificial Intelligence (AI)

Artificial Intelligence deals with Design and development of computer systems that are able to perform tasks that Normally require human intelligence.

Key Technologies in AI

Machine Learning

Improve performance without specific instruction.

Learn Big Data Analytics

Natural Lang. Processing

Work with text As humans do

Chatbot

Speech Processing

Transcribe and generate speech with Accuracy

Voicebots -

Computer Vision

Identify objects, scenes, activities from images

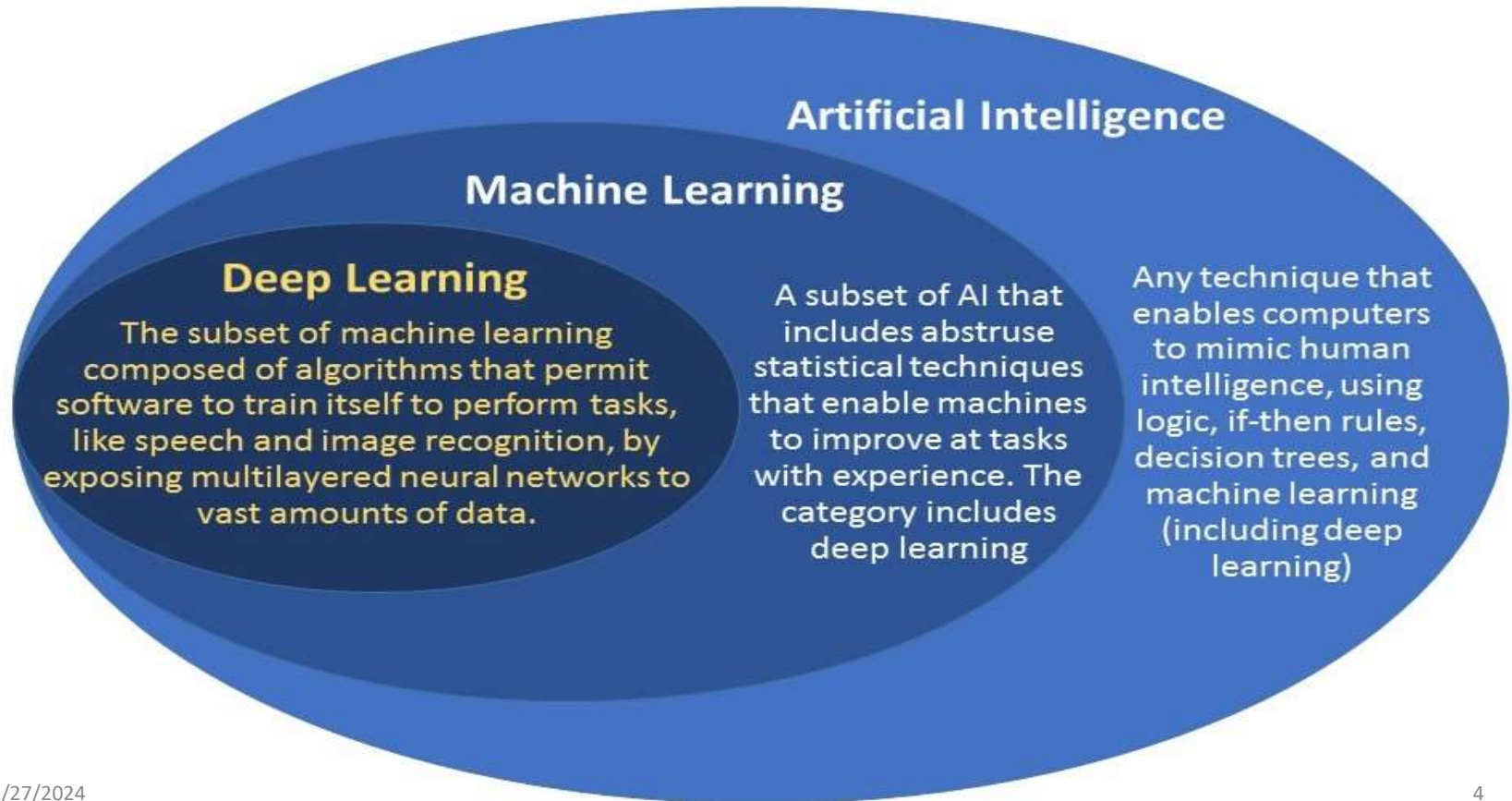
Facial recognition

Robotics

Cognitive tech sensors, actuators.

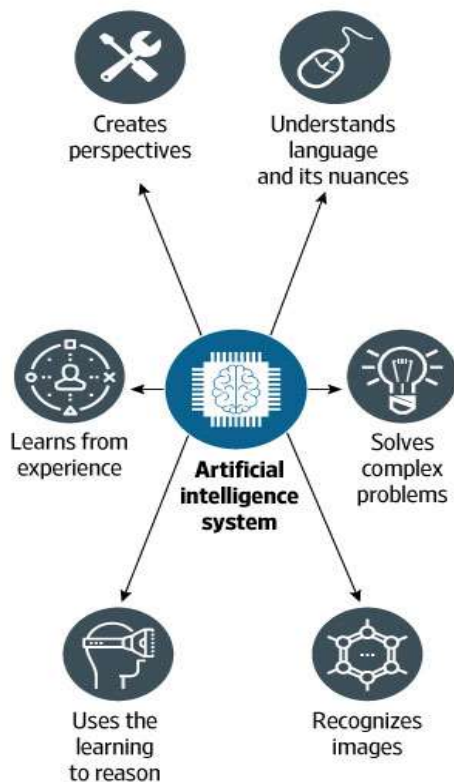
IoT

Emerging Technologies – AI/ML

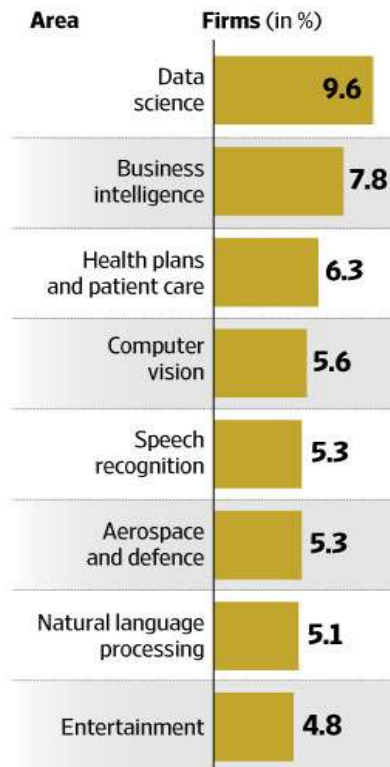


ARTIFICIAL INTELLIGENCE AND OPPORTUNITIES

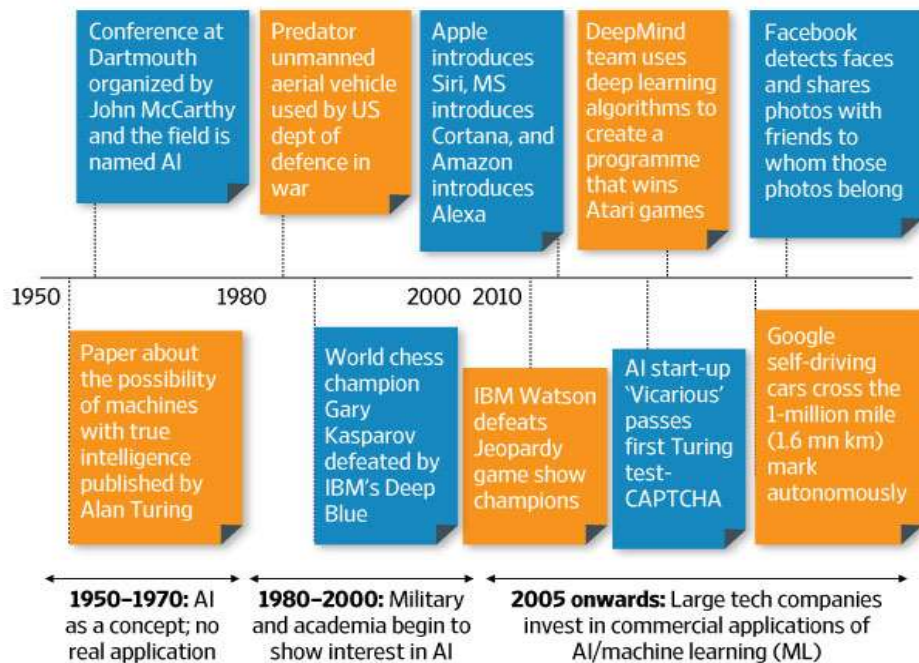
How AI works



Areas of focus for firms looking to exploit AI opportunities

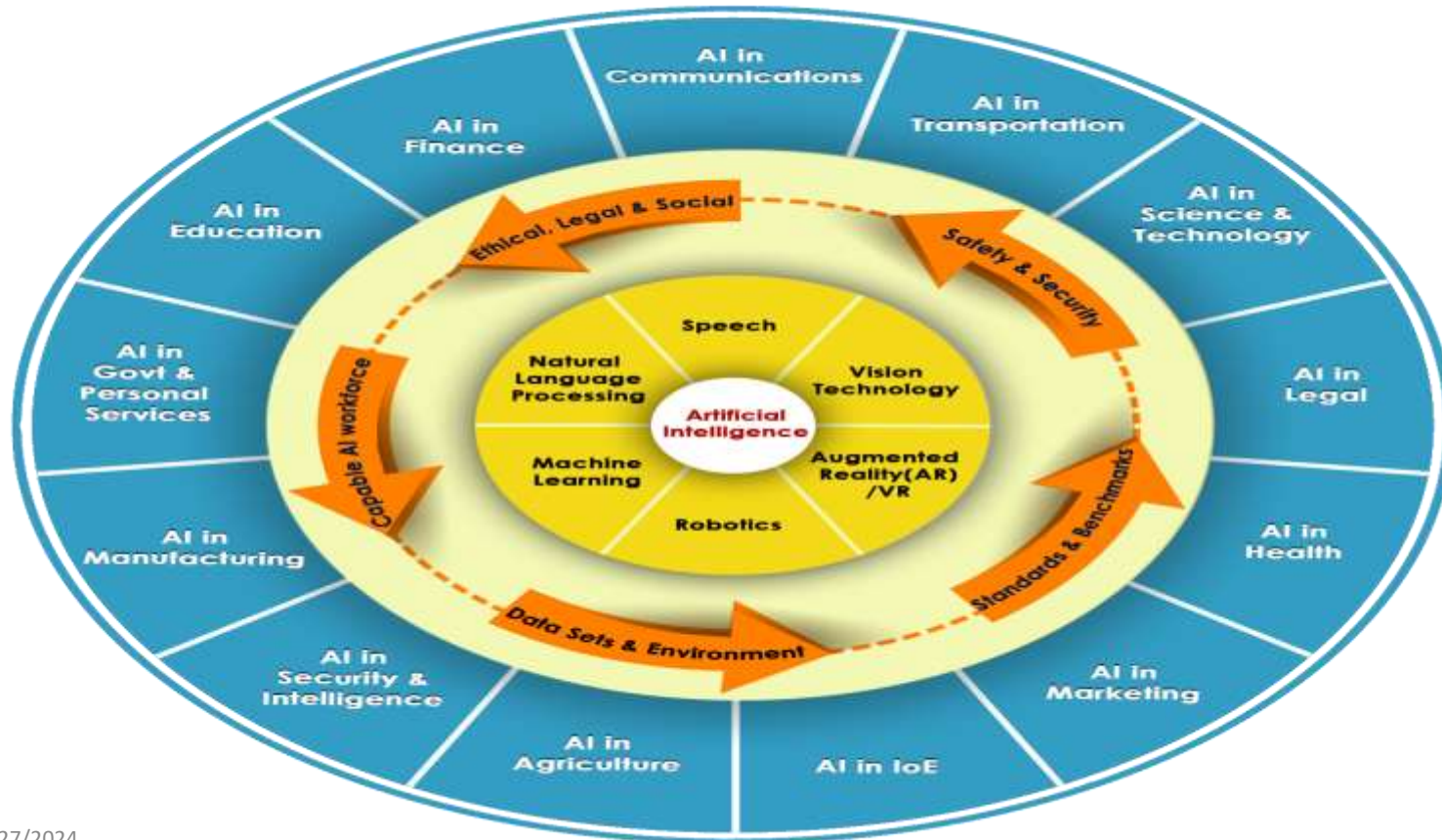


Evolution of AI



AI is currently on the crest of its third wave and given the immense interest in this field, it can be expected to continue at this state for a long time.

AI Core Domains and Applications



AI Impact



**Economic, cultural, social,
... endless disruption**

**Martin Ford,
Rise of the Robots**



**Labour - McKinsey 58%
of jobs automated**



**Elon Musk, artificial intelligence...
existential threat**

Strong AI Vs. Weak AI

- **Strong AI** is AI that acts exactly as a human would, think , the Terminator or Commander Data. They exhibit emotions, real creativity, and can even have a sense of purpose.
- **Weak AI** is AI that is confined to a narrow task, like when a system processes language into text or sorts all the pictures on your pc.
- Examples of Weak AI include: Siri, Cortana, Bing, Netflix, and even ChatGPT.

Introduction to Generative AI

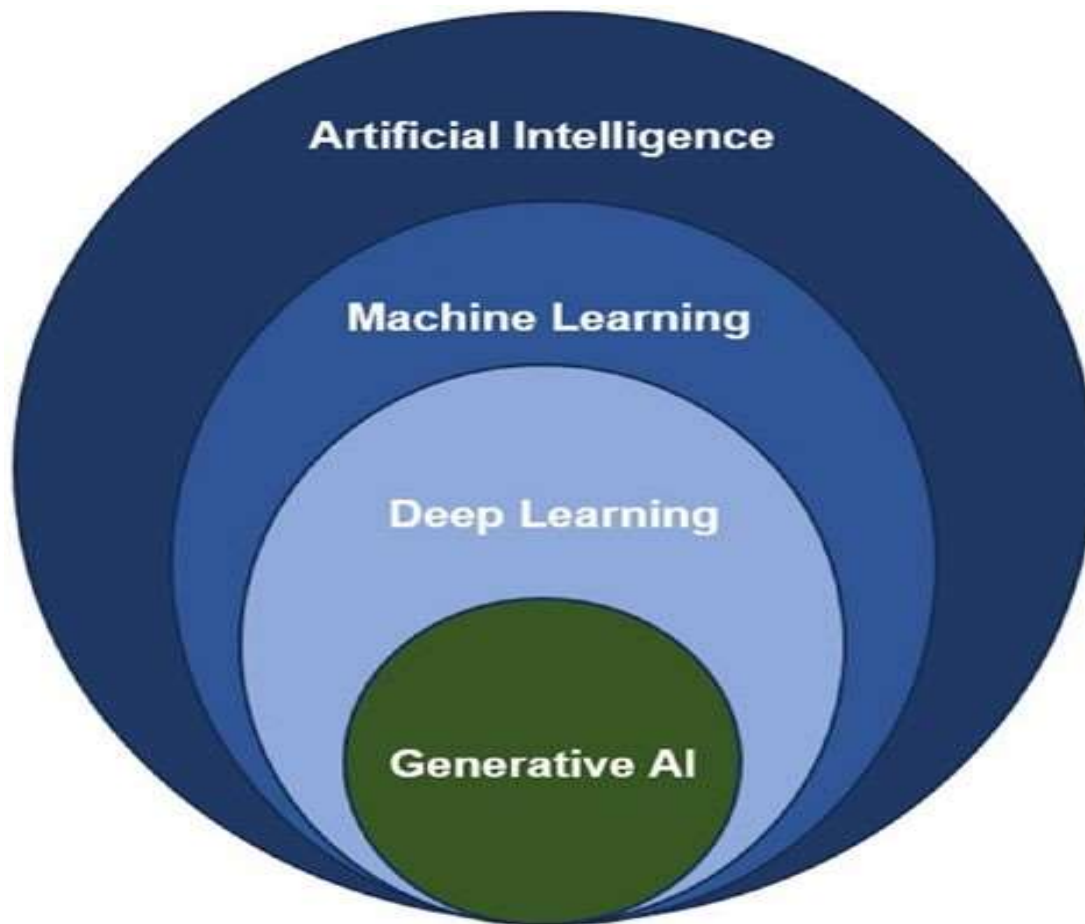
- **Generative AI** refers to a type of artificial intelligence that has the ability to generate content that is, in many cases, **indistinguishable from content created by humans**. This AI can produce text, images, audio, or even video, often in response to a given input or prompt.
- **Generative AI** operates by **learning patterns and structures** from large datasets and **then using that knowledge to produce new content** that fits within those learned patterns. It's a type of machine learning where the AI model learns to understand and mimic the characteristics of the data it has been trained on.

Introduction

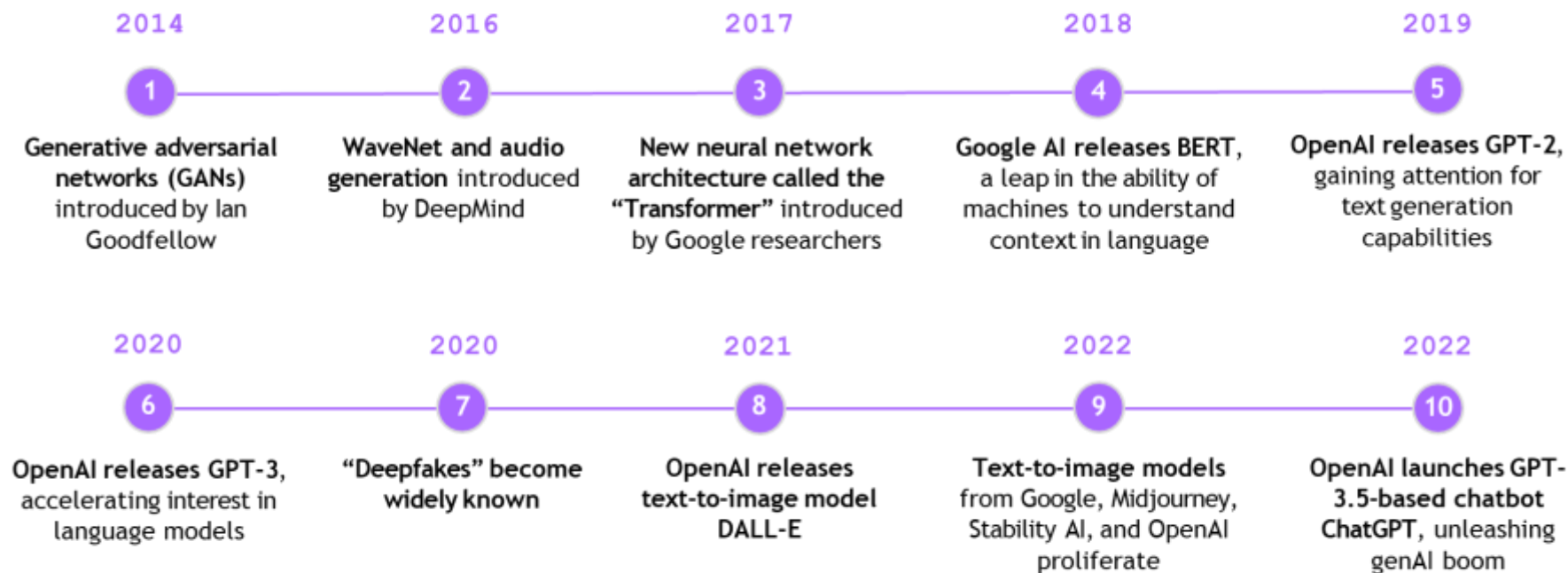
- **Generative AI** refers to a branch of artificial intelligence that focuses on creating models and algorithms capable of generating new, original content, such as images, text, music, and even videos.
- Unlike traditional AI models that are trained to perform specific tasks, generative AI models aim to learn and mimic patterns from existing data to generate new, unique outputs.
- The ability to generate realistic and convincing fake content can be misused for malicious purposes, such as creating deepfakes or spreading disinformation.
- As a result, there is ongoing research and development of techniques to detect and mitigate the potential negative impacts of generative AI.

Components of AI

- Artificial Intelligence (AI): It is the broader discipline of machine learning to perform tasks that would typically require human intelligence.
- Machine Learning (ML): A subset of AI, ML involves algorithms that allow computers to learn from data rather than being explicitly programmed to do so.
- Deep Learning (DL): A specialized subset of ML, deep learning involves neural networks with three or more layers that can analyze various factors of a dataset.
- Generative AI: An advanced subset of AI and DL, generative AI focuses on creating new and unique outputs. It goes beyond the scope of simply analyzing data to making new creations based on learned patterns.



How did we get here? A recent timeline of select events in the development of generative AI



*Generative AI is artificial intelligence that can generate new content (text, code, images, audio, etc.).

Domains of Generative AI

- Text Generation
- Image Generation
- Audio Generation
- Video Generation

Text Generation

- What It Is: Text generation involves using AI models to create humanlike text based on input prompts.
- How It Works: Models like GPT-3 use Transformer architectures. They're pre-trained on vast text datasets to learn grammar, context, and semantics. Given a prompt, they predict the next word or phrase based on patterns they've learned.
- Applications:
 - Text generation is applied in content creation, chatbots, and code generation.
 - Businesses can use it for crafting blog posts, automating customer support responses, and even generating code snippets.
 - Strategic thinkers can harness it to quickly draft marketing copy or create personalized messages for customers.

Chat GPT

- It is a large language model–based chatbot developed by OpenAI and launched in November 2022.
- ChatGPT Uses Large Language Models created by Transformers (a variant of Neural Networks)
- ChatGPT is trained with reinforcement learning through human feedback and reward models that rank the best responses.
- This feedback helps augment ChatGPT with machine learning to improve future responses.

Applications

- Having conversations with users
- Answering questions
- Generating text
- Translating languages
- Writing different kinds of creative content
- ChatGPT can be accessed online at <https://openai.com/blog/chatgpt>



The Wonders of Our Solar System: A Journey Through Space



The Solar System, a captivating cosmic dance of planets, moons, asteroids, and comets, is a majestic spectacle in the vast expanse of space. Our home planet, Earth, is just one of the many celestial bodies that make up this extraordinary cosmic neighborhood. So, let's embark on a journey through the wonders of our Solar System and explore the secrets it holds!

1. The Sun - Our Life-Giving Star:

At the heart of the Solar System shines the Sun, a brilliant ball of hot gas that provides light and warmth to all the planets. Its colossal energy sustains life on Earth and fuels the intricate dance of celestial bodies around it. The Sun's fiery surface is a mesmerizing dance of solar flares and sunspots, revealing its ever-changing nature.

2. Mercury - The Swiftest Planet:

Moving closer to the Sun, we encounter Mercury, the closest planet to our star. This rocky, desolate world is a scorching hellscape during the day and a freezing tundra at night. It speeds around the Sun, completing an orbit in just 88 Earth days, making it the swiftest planet in the Solar System.

3. Venus - The Enigmatic Beauty:

Next, we encounter Venus, often called Earth's sister planet due to its similar size and composition. However, its atmosphere is a toxic mix of sulfuric acid and suffocating carbon dioxide, creating a runaway greenhouse effect. Venus boasts a thick layer of clouds that veils its surface, making it one of the most enigmatic and mysterious planets in our Solar System.

4. Earth - Our Blue Marble:

Our home planet, Earth, stands out as a vibrant oasis in the darkness of space. The only known planet to support life, Earth is adorned with lush forests, vast oceans, and a diverse array of life forms. Its intricate climate systems and ecosystems make it a haven for living beings to thrive.

5. Mars - The Red Planet:

Moving outward, we encounter the captivating Mars, a rust-colored world with a thin atmosphere. Mars has long been the focus of scientific exploration, with its dusty plains, towering volcanoes, and the possibility of ancient water channels hinting at past signs of life.

6. Jupiter - The Giant Among Giants:

Entering the realm of the gas giants, we meet Jupiter, the largest planet in the Solar System. Its mesmerizing bands of clouds, raging storms (like the iconic Great Red Spot), and numerous moons, including the four Galilean moons, make it a celestial wonder to behold.

7. Saturn - The Ringed Beauty:

Saturn's majestic rings, made of icy particles, are an awe-inspiring sight. This gas giant's golden hue and graceful ring system make it a true wonder of the Solar System. Its moon Titan, with its dense atmosphere and liquid methane lakes, remains one of the most Earth-like worlds beyond our home planet.

8. Uranus and Neptune - The Ice Giants:

The final two gas giants, Uranus and Neptune, are known as the ice giants due to their significant icy and rocky components. Neptune's vibrant blue color and its intriguing moon Triton, with geysers erupting from its surface, add to the allure of these distant worlds.

9. Pluto and the Kuiper Belt:

As we venture beyond Neptune, we reach the icy realm of the Kuiper Belt, home to countless icy bodies and dwarf planets. Among them is Pluto, once considered the ninth planet, now reclassified as a dwarf planet. Pluto's fascinating system of moons and icy plains make it a captivating world in its own right.

10. Moons, Comets, and Asteroids:

Throughout our journey, we encounter a myriad of moons, comets, and asteroids. From Jupiter's moon Europa, with its subsurface ocean, to the icy geysers of Enceladus around Saturn, and the awe-inspiring comets that streak through the sky, these celestial companions add richness to the tapestry of the Solar System.

The Solar System, with its diverse and captivating array of celestial bodies, continues to inspire exploration and discovery. As we learn more about our cosmic neighborhood, the wonders of the Solar System remind us of the vastness and beauty of the universe, beckoning us to continue our exploration beyond the stars.

Image Generation

What It Is:

- Image generation involves using various deep learning models to create images that look real.

How It Works:

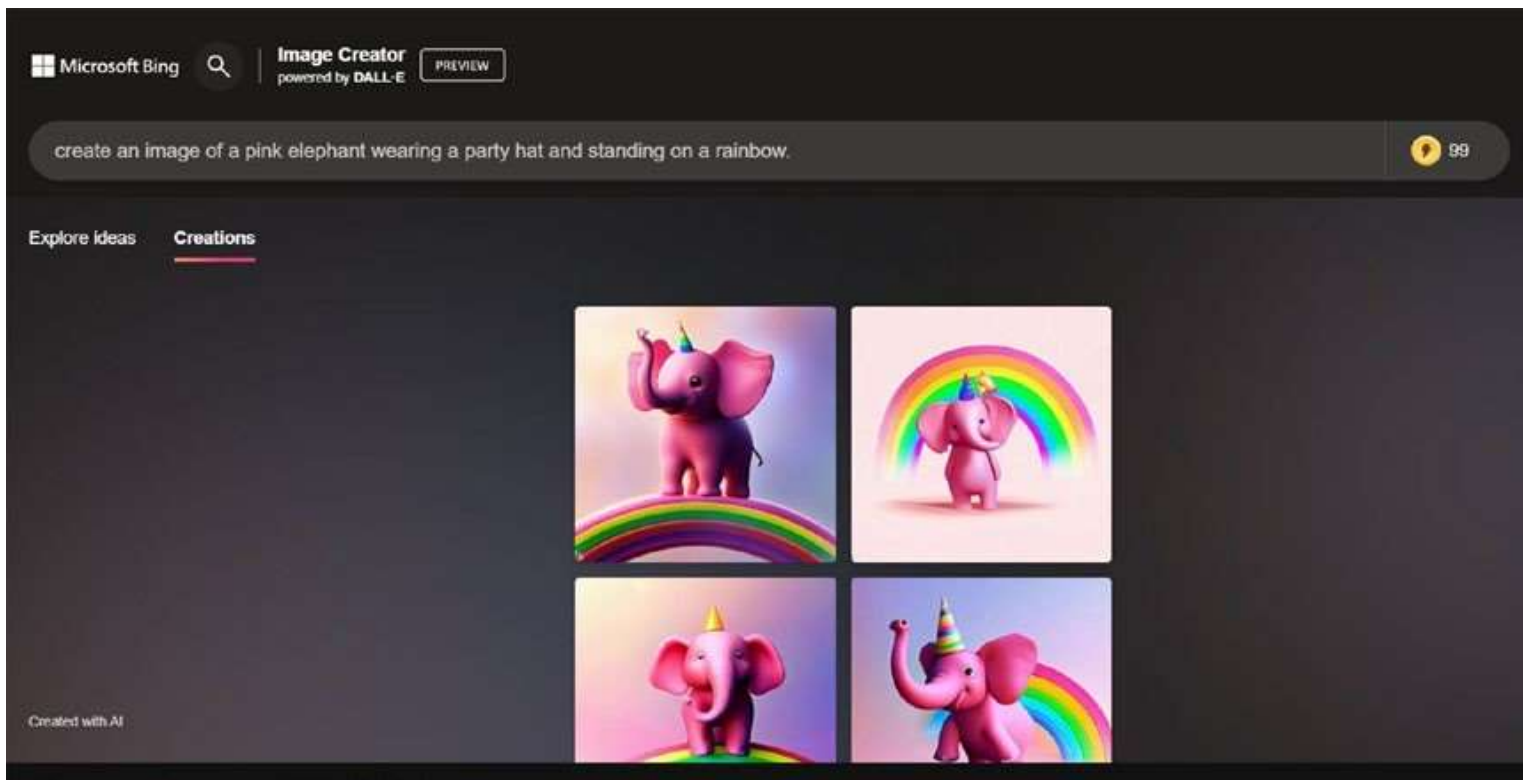
- GANs consist of a generator (creates images) and a discriminator (determines real vs. fake).
- They compete in a feedback loop, with the generator getting better at producing images that the discriminator can't distinguish from real ones.

Applications:

- These models are used in art, design, and product visualization. Businesses can generate product mock-ups for advertising, create unique artwork for branding, or even generate faces for diverse marketing materials.

- Microsoft Bing Image Creator is a generative AI tool that uses artificial intelligence to create images based on your text descriptions.
www.bing.com/images/create/
- To use Bing Image Creator, you simply type a description of the image you want to create into the text box.
- Example: “Create an image of a pink elephant wearing a party hat and standing on a rainbow.”
- Bing Image Creator will then generate an image based on your description.

Bing Created Pink Elephant Image



Audio Generation

What It Is:

- Audio generation involves AI creating music, sounds, or even humanlike voices.

How It Works:

- Models like WaveGAN analyze and mimic audio waveforms. Text-to-speech models like Tacotron 2 use input text to generate speech. They're trained on large datasets to capture nuances of sound.

Applications:

- AI-generated music can be used in ads, videos, or as background tracks.
- Brands can create catchy jingles or custom sound effects for marketing campaigns.
- Text-to-speech technology can automate voiceovers for ads or customer service interactions.
- Strategically, businesses can use AI-generated audio to enhance brand recognition and storytelling.

Video Generation

What It Is:

- Video generation involves AI creating videos, often by combining existing visuals or completing missing parts.

How It Works:

- Video generation is complex due to the temporal nature of videos. Some models use text descriptions to generate scenes, while others predict missing frames in videos.

Applications:

- AI-generated videos can be used in personalized messages, dynamic ads, or even content marketing.
- Brands can craft unique video advertisements tailored to specific customer segments.
- Thoughtful application can lead to efficient video content creation that adapts to marketing trends.

Generative AI Platforms

Use Case Vertical Ecosystem



Base / Foundational Model Contenders



Pretrained Language Models



Image Generation



Video Generation



Code Generation



Audio Generation

Generative AI Platforms contd..

- OpenAI: OpenAI is a generative AI research company that was founded by Elon Musk, Sam Altman, and others.
- OpenAI has developed some of the most advanced generative AI models in the world, including GPT-4 and DALL-E 2.
 - GPT-4: GPT-4 is a large language model that can generate text, translate languages, write different kinds of creative content, and answer your questions in an informative way.
 - DALL-E 2: DALL-E 2 is a generative AI model that can create realistic images from text descriptions.

DeepMind:

- DeepMind is a British artificial intelligence company that was acquired by Google in 2014.
- DeepMind has developed several generative AI models, including
 - AlphaFold, which can predict the structure of proteins, and
 - Gato, which can perform a variety of tasks, including playing Atari games, controlling robotic arms, and writing different kinds of creative content.

Anthropic:

- Anthropic is a company that is developing generative AI models for use in a variety of industries, including healthcare, finance, and manufacturing.
- Anthropic's models are trained on massive datasets of real-world data, which allows them to generate realistic and accurate outputs.

Synthesia:

- Synthesia is a company that specializes in creating realistic synthetic media, such as videos and audio recordings.
- Synthesia's technology can be used to create avatars that can speak, gesture, and even lip-sync to any audio input.
 - RealSpeaker: RealSpeaker is a generative AI model that can be used to create realistic synthetic voices.
 - Natural Video: Natural Video is a generative AI model that can be used to create realistic synthetic videos.

RunwayML:

- RunwayML is a platform that makes it easy for businesses to build and deploy generative AI models.
- RunwayML provides a variety of tools and resources to help businesses collect data, train models, and evaluate results.
 - Runway Studio: Runway Studio is a cloud-based platform that allows businesses to build and deploy generative AI models without any coding experience.
 - Runway API: The Runway API is a set of APIs that allow businesses to integrate generative AI into their applications.
- Midjourney: Midjourney is a generative AI model that can be used to create realistic images, videos, and text.
- Midjourney is still underdevelopment, but it has already been used to create some impressive results.

Tools, Platforms, and Software

- **Midjourney/Dall-E3** –text to art
- **Wisdolia** – plugin, generate flash cards for any website, video, or PDF you are on.
- **Microsoft 365 copilot** – brings AI across the entire Microsoft office suite
- **Eleven Labs** – voice recognition. You speak to it, then you can feed it scripts and it will read them in your voice and cadence.
- **Mixo/Sitekick** – type a product idea and it creates a full website.
- **Tome** – makes presentations from simple prompts.
- **Tableau's Ask Data** – ask questions, receive data visualizations as responses.

Generative AI Applications

- **Content Creation:**
 - Text Generation: Automating blog posts, social media updates, and articles, essays, letters email responses, complaint notices etc.
 - Image Generation: Creating custom visuals for marketing campaigns and advertisements.
 - Video Generation: Crafting personalized video messages and dynamic ads.
- **Design and Creativity:**
 - Art Generation: Creating unique artworks, illustrations, and designs.
 - Fashion Design: Designing clothing patterns and accessories.
 - Product Design: Generating prototypes and mock-ups.

Generative AI Applications contd..

- **Entertainment and Media:**
 - Music Composition: Creating original music tracks and soundscapes.
 - Film and Animation: Designing characters, scenes, and animations.
 - Storytelling: Developing interactive narratives and plotlines.
- **Marketing and Advertising:**
 - Personalization: Crafting tailored messages and recommendations for customers.
 - Branding: Designing logos, packaging, and visual identity elements.
 - Ad Campaigns: Developing dynamic and engaging advertisements.

- **Gaming:**
 - World Building: Generating game environments, terrains, and landscapes.
 - Character Design: Creating diverse and unique in-game characters.
 - Procedural Content: Generating levels, quests, and challenges.
- **Healthcare and Medicine:**
 - Drug Discovery: Designing new molecules and compounds.
 - Medical Imaging: Enhancing and reconstructing medical images.
 - Personalized Medicine: Tailoring treatment plans based on patient data.

- Language Translation:
 - Real-time Translation: Enabling instant translation of spoken or written language.
 - Subtitling and Localization: Automatically generating subtitles for videos.
- Customer Service:
 - Chatbots: Creating conversational agents for customer support.
 - Voice Assistants: Providing voice-based assistance for inquiries and tasks.

- Education and Training:
 - Interactive Learning: Developing adaptive learning materials.
 - Simulations: Creating realistic training scenarios and simulations.
- Architecture and Design:
 - Building Design: Generating architectural layouts and designs.
 - Urban Planning: Designing cityscapes and urban layouts.

Generative AI Limitations

- Quality and Coherence : Generative AI can sometimes produce content that is factually incorrect or incoherent.
- Lack of Understanding: Generative models don't have true understanding of the text they generate.
- They generate responses based on statistical patterns rather than comprehension, which means they can't answer questions that require deep understanding or common-sense reasoning.
- Biases: Generative AI can inadvertently perpetuate biases present in the training data.

Generative AI Limitations

- **Safety and Privacy:** In some cases, generative AI can generate harmful or inappropriate content. Ensuring the safety and ethical use of AI-generated text is a significant concern.
- **Inconsistency:** The same prompt given to a generative model may produce different responses at different times. While this can be useful for creativity, it can also result in inconsistent or contradictory answers.
- **Overgeneration:** Generative models can be verbose and tend to over generate content.

Generative AI Limitations

- **Data Dependency:** The quality of the generated text depends on the quality and diversity of the training data. Limited or biased training data can result in poor performance.
- ChatGPT3.5 for example only has data up to September 2021.
- **Prompt Sensitivity:** The way a prompt is framed can significantly impact the output.
- Crafting effective prompts requires skill and experimentation.

Identifying Opportunities for AI

- **Nature of the Task:** What are you trying to generate?
- **Complexity of the Task:** Does it need to be broken into segments?
- **Data Availability:** How recent/prevalent is the data for what you are trying to do?
- **Ethical Considerations:** Use ethical guidelines to avoid harmful or biased content.
- **Human Review/Monitoring:** Human oversight is needed to ensure no errors or biases are present.
- **Scalability:** Assess if the task can be handled efficiently with available computational resources.

Real-World Applications in Universities

(Students)

Study and Homework Assistance:

- Generating explanations and solutions for homework problems.
- Providing study tips and summaries of course materials.
- Offering virtual tutors for a wide range of subjects.
- Explaining complex concepts and answering questions.
- Creating exercises, quizzes, and pronunciation guides.
- Helping students improve their essays, reports, and creative writing.

Personalized Learning Plans:

- Analyzing students' performance data to recommend customized study plans.
- Suggesting additional reading materials and resources.

Career Guidance:

- Providing advice on choosing majors and career paths based on students' interests and skills.
- Assisting in resume and cover letter writing.

Research Assistance:

- Assisting in gathering preliminary research data and suggesting relevant sources.
- Generating citations and bibliographies.

Language Translation:

- Translating foreign language texts and documents for international students.
- Supporting international exchange programs.

Time Management and Organization:

- Creating personalized schedules and reminders for classes and assignments.
- Offering productivity tips and techniques.

Real-World Applications in Universities

(Staff)

Content Generation:

- Automating the creation of course materials, lecture notes, and assessments.
- Generating content for university publications and marketing materials

Administrative Support:

- Assisting in scheduling meetings, managing emails, and handling routine administrative tasks.
- Answering frequently asked questions for staff and faculty.

Research Assistance:

- Analyzing and summarizing research papers and articles.
- Assisting in data analysis and visualization.

Admissions and Enrollment:

- Managing inquiries from prospective students.
- Automating admissions and enrollment processes.

Emergency Response and Communications:

- Providing automated alerts and communication during campus emergencies.
- Offering guidance on emergency protocols and procedures.

Student Support Services:

- Providing automated responses to student inquiries related to registration, financial aid, and campus resources.
- Offering career counseling and internship recommendations

Website and Social Media Management:

- Generating content for university websites, blogs, and social media platforms.
- Monitoring and responding to online engagement.

Grading and Assessment:

- Assisting in grading assignments and exams.
- Analyzing student performance data to identify areas for improvement.

Library and Information Services:

- Assisting in information retrieval and research assistance for both faculty and students.
- Automating library cataloging and resource recommendations.

Case Study #1: Admissions

- Elite University, a renowned higher education institution, has a highly competitive college admissions department that receives thousands of applications each year.
- To improve their efficiency and provide a better experience for applicants, Elite University decided to implement generative AI solutions.
- This case study details how the college admissions department leveraged generative AI to enhance their performance.

Challenges:

- 1. Application Processing:** Reviewing and processing a large volume of applications was a time-consuming and labor-intensive task, often leading to bottlenecks and delays.
- 2. Essay Assessment:** Assessing essays and personal statements for admissions required significant manual effort.
It was difficult to ensure consistency and fairness in evaluations.
- 3. Applicant Support:** Applicants often had questions about the application process, requirements, and deadlines.
Providing timely and accurate responses to these inquiries was a challenge.

Solution:

- **Automated Application Screening:**
 - Integrated AI algorithms to automatically screen and categorize applications based on predefined criteria. This allowed the admissions team to prioritize applications that met minimum requirements.
 - The generative AI system learned from historical admissions data to continuously refine its screening criteria.
- **AI-Enhanced Essay Assessment:**
 - Employed generative AI to assist in the assessment of essays and personal statements. The system provided initial evaluations, highlighting key strengths and areas for improvement.
 - Admissions officers could use the AI-generated assessments as a starting point, saving time while ensuring a standardized review process.

Solution:

- **AI-Powered Applicant Support:**
 - Implemented AI-powered chatbots on the university's admissions website and application portal. These chatbots answered applicant inquiries regarding deadlines, requirements, and procedures.
 - Chatbots were trained using frequently asked questions and were designed to provide accurate and up-to-date information.

Results:

- **Faster Application Processing:**
 - Automated application screening **reduced the time required to process applications**, ensuring that qualified applicants progressed to the next stages more quickly.
- **Improved Essay Assessment:**
 - AI-assisted essay assessments provided consistent evaluations, reducing bias and ensuring fairness in the admissions process.
 - **Admissions officers had more time to focus on nuanced evaluations of applicant essays.**

Results cntd...

- **Enhanced Applicant Experience:**
 - AI-powered chatbots provided **quick and accurate responses** to applicant inquiries, improving the overall applicant experience.
- **Increased Efficiency:**
 - Admissions staff experienced increased efficiency as routine tasks were automated, **allowing them to allocate more time to strategic decision-making.**
- **Data-Driven Insights:**
 - The generative AI system collected and analyzed data on applicant behavior, providing valuable insights into the admissions process and applicant preferences.

Prompt Engineering

- **Prompt engineering is the process of designing and crafting input prompts or queries to generative AI models to elicit desired outputs or responses.**
- The choice of words, format, and context in the prompt can significantly influence the generated content.
- How to structure prompts for desired outputs:
 - Be Clear and Specific
 - Specify the Format
 - Add Context
 - Use Examples
 - Control the Tone
 - Ask the Model to Think Step by Step
 - Use Keywords
 - Provide Constraints
 - Experiment
 - Iterate and Refine

Prompt Engineering Examples

- **Task: Summarize a Report**
 - Ineffective Prompt: "Summarize this report."
 - Effective Prompt: "Provide a concise summary of the key findings and overarching messages of the GLBA Audit Findings: [paste report here]. "
- **Task: Creative Writing**
 - Ineffective Prompt: "Write a story."
 - Effective Prompt: "Create an engaging short story about a time traveler who finds themselves in a parallel universe where gravity behaves differently."
- **Task: Language Translation**
 - Ineffective Prompt: "Translate this sentence."
 - Effective Prompt: "Translate the following English sentence into French: 'The quick brown fox jumps over the lazy dog.'"

Activity

We are going to test chatGPT's effectiveness on some real-world scenarios.

- Warm up: **Consider what aspects of your work could be enhanced or made easier by using Generative AI.**
- **Questions to ask yourself:**
 - what tasks are repetitive in my job?
 - what kind of writing do you do that could be done by AI?
 - what projects could you use help organizing or starting?

Activity

Now that we have thought of a few things that we can use generative AI for in our jobs, let's practice! **Try to get ChatGPT to perform some of the tasks you have thought of.**

Some examples if you need somewhere to get started:

- Write a newsletter to students about essential student services here at the University
- Write a social media post about the DIT University
- Write a project plan/outline
- Draft an email you normally have trouble starting

Information Security, Privacy, and Ethics

- **Do tools and platforms like ChatGPT present an inherent security risk?**
 - From their Terms of Service (TOS): “Use of Content to Improve Services: We do not use Content that you provide to or receive from our API (“API Content”) to develop or improve our Services.
 - **We may use Content from Services other than our API (“Non-API Content”) to help develop and improve our Services.”**
 - OpenAI Recommends using fake names or pseudonyms when interacting with ChatGPT, and to avoid public wi-fi, instead using secured private networks.

Information Security, Privacy, and Ethics contd...

- **Not all platforms follow the same or even similar guidelines**
 - “Copilot seamlessly integrates into Microsoft 365, inheriting your organization's security, compliance, and privacy policies, It utilizes advanced encryption, access control, and permissions to prevent data leakage and maintain compliance with security and privacy policies.
 - Microsoft Copilot places a high emphasis on data security and privacy within Microsoft 365.” - Microsoft

Ethical Concerns

- **Bias and Fairness:** AI systems can inherit biases from the data they are trained on, potentially leading to **discrimination in areas like admissions, hiring, or grading.**
- **Privacy:** AI may **process and store sensitive student or faculty data**, raising concerns about data security and privacy violations.
- **Transparency:** The opacity of some AI algorithms makes it difficult to understand how decisions are reached. **This lack of transparency can raise ethical questions about accountability and trust.**

Ethical Concerns contd...

- **Accountability:** It can be challenging to assign responsibility when AI is used in decision-making processes. **Determining who is accountable for AI-related outcomes or errors is an important ethical consideration.**
- **Data Quality: Garbage in, garbage out:** If AI systems are fed with poor-quality or biased data, the ethical integrity of the resulting decisions is compromised.
- **Consent:** Collecting and using personal data for AI applications should involve informed consent. **Universities must be transparent about data usage and give individuals the option to opt in or out.**

Guidelines for Leveraging Generative AI

- **Understand the Technology**

- Ensure that you and your team have a deep understanding of how generative AI works, its capabilities, and its limitations. This understanding is crucial for responsible use.

- **Data Ethics**

- Use high-quality and diverse training data that is free from bias and sensitive information. Be aware of the potential biases in your training data and take steps to mitigate them.

- **Human Oversight**

- Maintain human oversight and control over AI systems. Fact-check your data and avoid plagiarism.

Guidelines for Leveraging Generative AI contd..

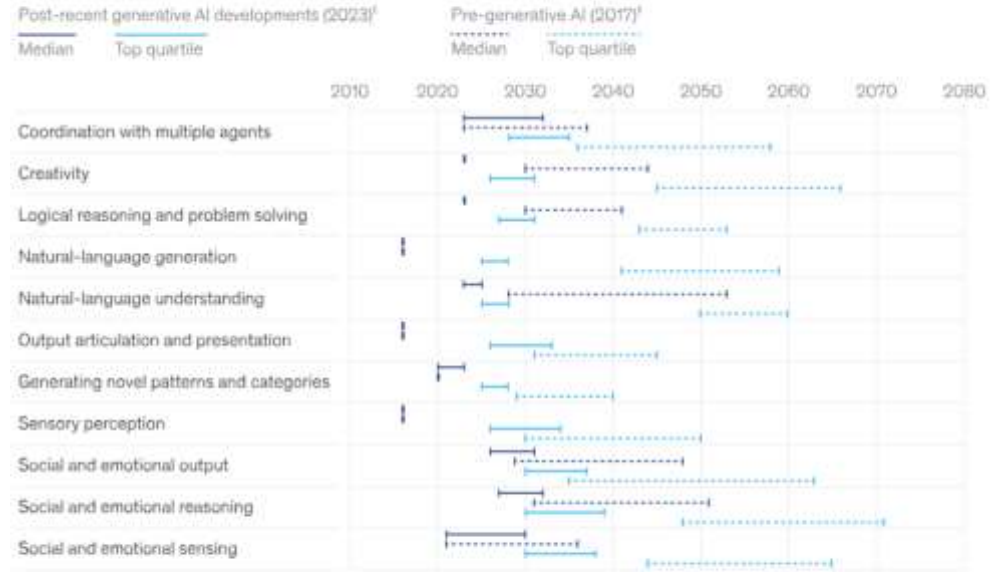
- **Accountability:**
 - Clearly define roles and responsibilities for AI development and deployment. Ensure accountability for the outcomes of AI systems, both positive and negative.
- **Education and Training:**
 - Provide training and guidelines to staff or users interacting with AI systems to promote responsible usage and ethical considerations.
- **Continual Monitoring and Evaluation:**
 - Continuously monitor the performance and impact of AI systems after deployment. Be prepared to make adjustments or take corrective actions as needed.

Future Trends

- For most of the technical capabilities shown in this chart, **gen AI will perform at a median level of human performance by the end of this decade.**
- Its performance will compete with the top 25 percent of people completing any and all of these tasks before 2040.
- **In some cases, that's 40 years faster than experts previously thought.**

Due to generative AI, experts assess that technology could achieve human-level performance in some capabilities sooner than previously thought.

Estimated range for technology to achieve human-level performance, by technical capability



*Comparison made on the business-related tasks required from human workers.
Source: McKinsey Global Institute occupation database; McKinsey analysis

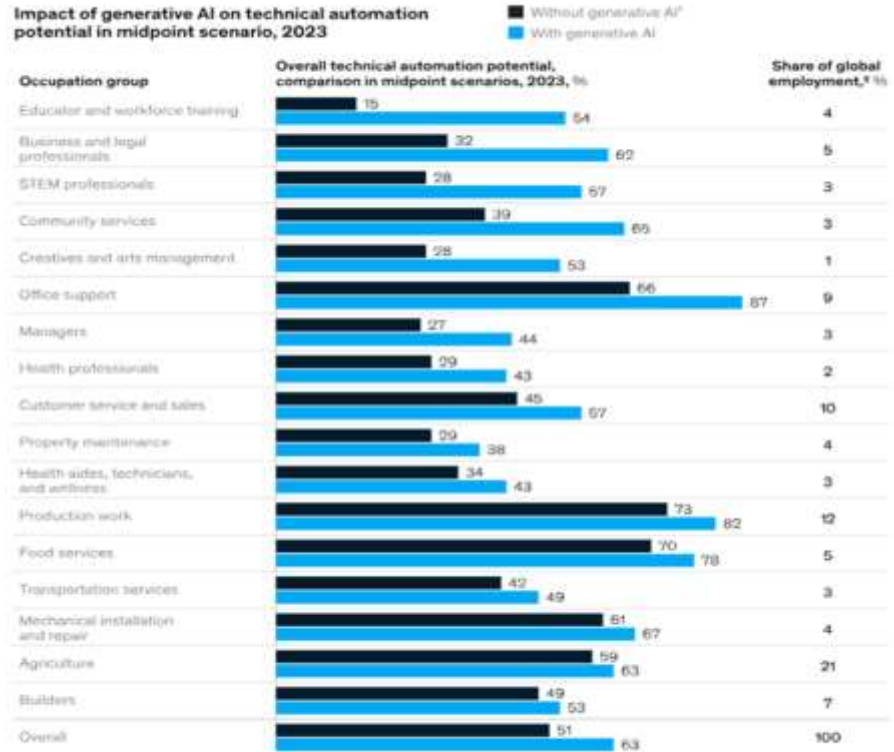
McKinsey & Company

Future Trends

- Previous waves of automation technology mostly affected physical work activities, but **gen AI is likely to have the biggest impact on knowledge work—especially activities involving decision making and collaboration.**
- Professionals in fields such as education, law, technology, and the arts are likely to see parts of their jobs automated sooner than previously expected.
- This is because of generative AI's ability to predict patterns in natural language and use it dynamically.

Advances in technical capabilities could have the most impact on activities performed by educators, professionals, and creatives.

Impact of generative AI on technical automation potential in midpoint scenario, 2023



¹Note: Figures may not sum, because of rounding.
²Previous assessment of work automation before the rise of generative AI.
 Includes data from 47 countries, representing about 85% of employment across the world.
 Source: McKinsey Global Institute analysis.

McKinsey & Company

Summary

- Generative AI, a rapidly evolving domain in artificial intelligence that specializes in creating new, unique content such as text, images, audio, and videos.
- Built upon advancements in deep learning and natural language processing (NLP), these models have various applications, including content creation, design, entertainment, healthcare, and customer service.
- Generative AI also brings ethical concerns, particularly in creating deepfakes or spreading disinformation.
- Various Applications of generative AI for text, image, audio, and video generation—detailing how they work and their practical applications.
- Discussed some of the key players in the industry, like OpenAI, DeepMind, and Synthesia, among others. Lastly, it outlines a wide array of applications across various industries.

What can Artificial Intelligence generate?

- Large language models such as ChatGPT can generate text in multiple languages and styles. They can also interpret text and images.
- Generative programs such as DALL.E2 and Midjourney generate images from text instructions. Others can generate video, audio, and code.
- AI will be increasingly blended into everyday software as a task assistant.
- ChatGPT has an increasing list of plugins that extend the natural language model to connect to services, data, and calculations.

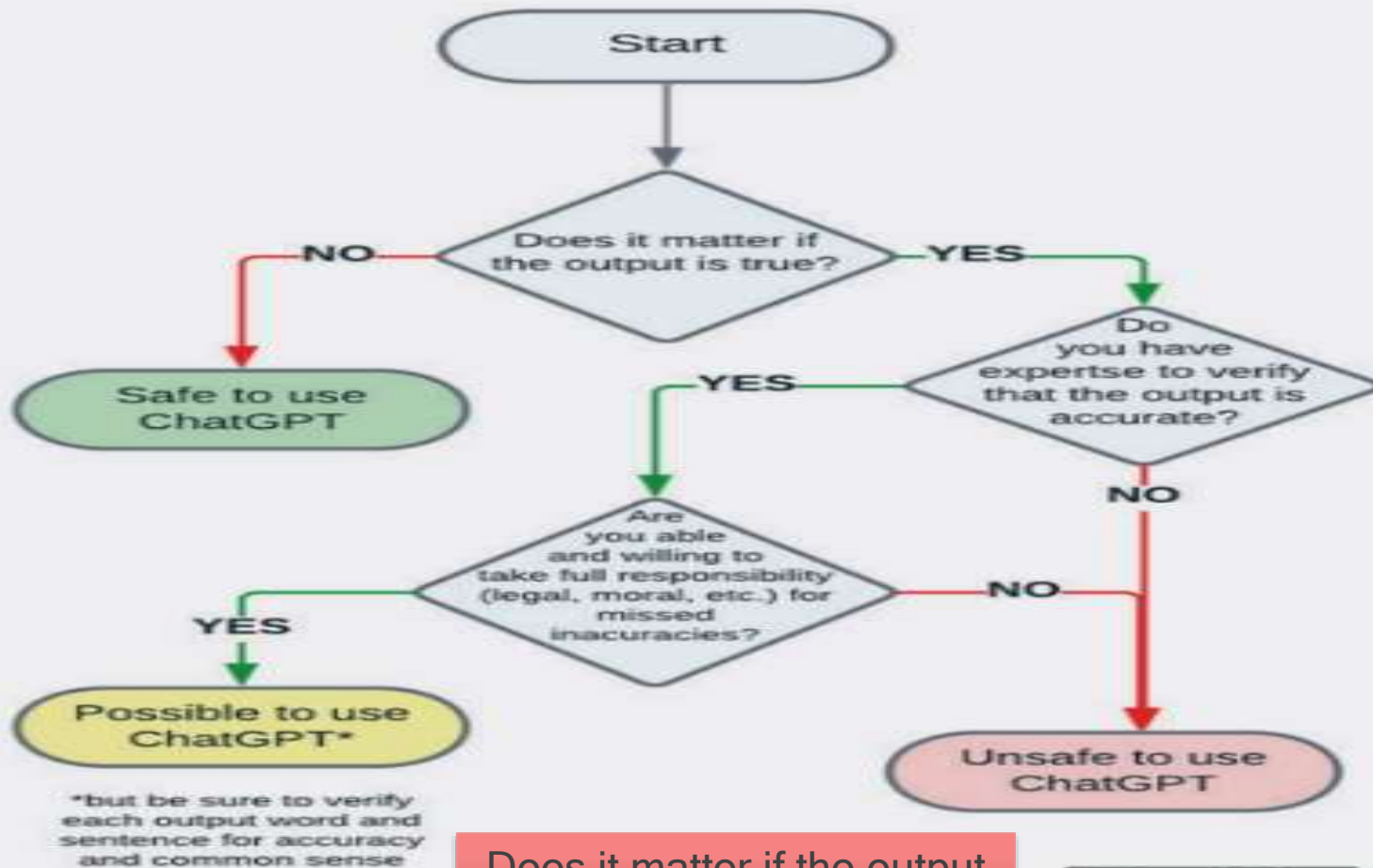
What are large language models (LLMs)?

- Large language models (LLMs) are a type of advanced artificial intelligence system. ChatGPT is an example of an LLM that allows people to interact with a computer in a more natural and conversational way.
- GPT stands for “Generative Pre-trained Transformer” and is the name given to a family of natural language models developed by OpenAI. There are other large language models such as Bard, LLaMA, and Claude.
- These tools are known as **generative AI** because of their ability to produce seemingly original results.
- They are trained on large text datasets to learn to predict the next word in a sentence and, from that, generate coherent and compelling responses. GPT-3 is trained on 300 billion words.

What do you think are some of the negatives of generative AI?

What are its limitations?

- LLMs are highly trained text-predictors.
- Their responses are based on probable language.
- Factual information may therefore contain inaccuracies that sound plausible but are often entirely incorrect.
- For example, LLMs may invent quotes, references, or coding libraries.
- LLMs only have access to the data they were trained on and therefore don't have access to current information.
- LLMs cannot perform complex computations and are not perfect at interpreting language.
- They simply predict the most likely sequence of words.



Does it matter if the output is inaccurate?



What are the broader ethical issues?

Regulation

There is currently no regulation of generative AI. Its rapid development has caused apprehension for many leading figures and calls to pause its development.

Privacy and data

Generative AI is built on information scraped from the internet without permission and often in violation of intellectual property rights. OpenAI has no data regulation policy and may collect sensitive information from users through prompts.

What are the broader ethical issues? Contd..

Cognitive bias

Generative AI has no ethical principles. It is a tool that collects information from databases and texts it processes on the internet. Its predictions repeat the cognitive biases found in that information.

Environment

Training LLMs produce significant carbon emissions. Researchers suggest that training ChatGPT-3, for example, generated 552 tons of carbon dioxide. Equivalent to 123 petrol cars driven for one year.

Human rights

Generative AI requires invisible human labour to build and cleanse. OpenAI employed workers in Kenya in gruelling conditions for less than \$2 an hour.

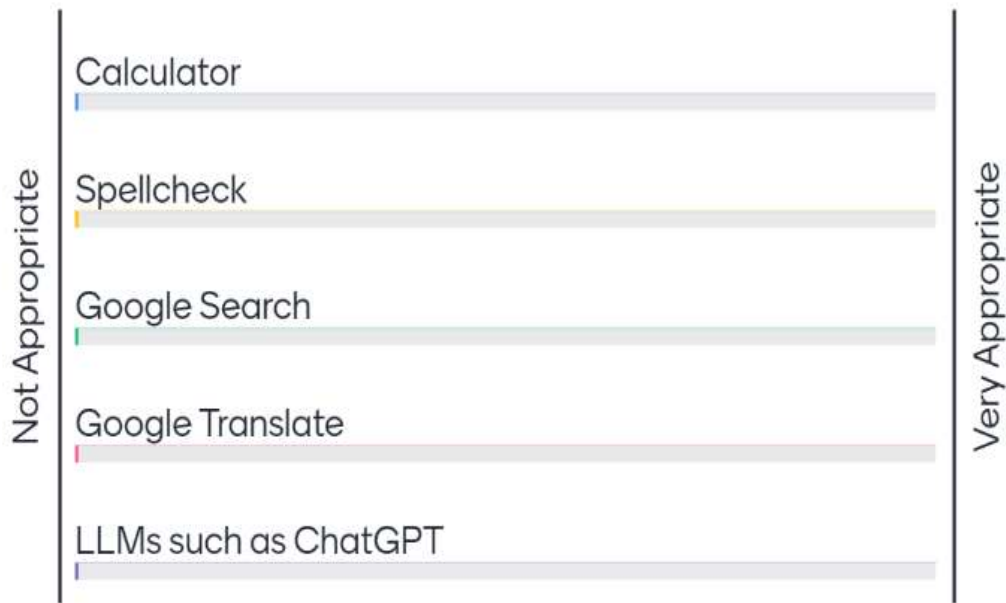
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1. Is it appropriate to use generative AI?

Option 1: Discuss student perspectives on different tools

Is it appropriate?

Is it appropriate to use these tools in your discipline?



Option 2: Discuss student perspectives on ethical usage of generative AI

Option 2: Discuss ethical usage of AI

What would you consider to be ethical and unethical use of AI in your discipline?

Not Appropriate	Submit assessment question into chatbot and submit output as answer.	Very Appropriate
	Generate multiple prompts from on assessment question and compile an answer from outputs.	
	Ask chatbot to summarise an article	
	Ask chatbot to create notes or cue cards from text you need to learn.	
	Write draft answer to assessment and submit to chatbot to improve grammar and style.	

Option 3: Critique of an AI-generated output in your discipline

Can ChatGPT succeed in an exam in Univ?

- Here is an answer that was generated on ChatGPT-4 based on the prompt: Is it helpful to view nations as real or imagined?
- Spend five minutes reading the answer in full. What are your first impressions? Is it an engaging answer? Does it answer the question? Are there any mistakes or “hallucinations,” and do you feel confident that you could spot them?
- Now turn to our undergraduate marking criteria. Where might this answer meet the criteria, and at what level? Where does it fail to meet the criteria?

AI Generated Answer

Is it helpful to view nations as real or imagined?

The question of whether nations are real or imagined entities constitutes a central debate in the field of nationalism studies. This discussion grapples with the intricate interplay between tangible elements such as territory, economy, and governance, and the intangible aspects, such as shared culture identity, and historical memory that shape a nation. Three influential theorists – Benedict Anderson, Ernest Gellner, and Anthony D. Smith – provide distinct perspectives on this debate.

Anderson, in his seminal work, “Imagined Communities,” introduces the concept of nations as socially constructed ‘imagined’ entities, bound by a shared sense of identity despite their citizens rarely meeting face-to-face. Gellner, on the other hand, situates nations in the context of industrialization and modernization, suggesting that they are ‘real’ entities that emerge to meet the homogenization demands of modern societies. Meanwhile, Smith bridges these views with his ethno-symbolist approach, arguing that nations are both ‘real’ – rooted in historical ethnic communities – and ‘imagined’ – constructed through shared symbols and collective memory.

AI Generated Answer contd...

In this essay, we will delve into each theorist's perspective to better understand whether it is more beneficial to view nations as 'real' tangible entities or 'imagined' social constructs, and what these perspectives can offer in our understanding of national identities. The exploration of these three viewpoints will illuminate the multifaceted nature of nations, underlining the complexity inherent in answering whether nations are real or imagined.

Benedict Anderson's groundbreaking concept of "imagined communities" provides a compelling framework for understanding nations primarily as socially constructed entities. In his words, "the nation is imagined because the members of even the smallest nations will never know most of their fellow-members, meet them, or even hear of them, yet in the minds of each lives the image of their communion" (Anderson, 1983, p. 6).

Can ChatGPT succeed in an exam ? (contd.)

Argument and Writing	Evidence and Knowledge	Concepts and Historiography
Analytical introduction that sets the parameters and defines key terms.	Comprehensive knowledge and sophisticated understanding of subject	Good command of concepts relevant to the question
Logical structure enables close engagement with question throughout	Primary and secondary sources provide concise historical detail in ways which are concise, relevant, and analytical	Ability to analytically deploy concepts within argument
Develops coherent and cogent argument that culminates in a clear conclusion.	Moves between generalisations and detailed discussions with confidence and originality	Extensive reading and critical analysis of the historiography
Fluent, coherent, grammatical, accurate writing with appropriate references and bibliography	Independent use of knowledge and evidence that goes beyond paragraphing of other historians	Evaluates the type of historical argument found in the literature, including an appreciation of methodology
Excellent command of scholarly vocabulary to sustain complex argument	Critically reflects on nature and scope of evidence available	Identifies contradictions and disagreements within historiography and positions argument within debate

Can ChatGPT solve physics problems?

- Consider the following 2-part physics problem, what do you think of ChatGPT's answer to the first part?

(1) If a deployment of stratospheric aerosol geoengineering adds 10 million tons of Sulphur to the stratosphere every year, and 10 million tons of sulphur is rained out per year, what is the average amount of sulphur deposited per unit area of the earth per year?

(2) If the global average rainfall rate is 3 mm/day, how much sulphur would be added to each litre of rainfall?

Can ChatGPT solve physics problems?

- **Part 1 ChatGPT Answer**

- To calculate the average amount of sulfur deposited per unit area of the Earth, we need to determine the net amount of sulfur added to the stratosphere.
- Since 10 million tons of sulfur are added each year, and 10 million tons are rained out per year, we can assume that the net addition is zero.
- Therefore, on average, there would be no additional sulfur deposition per unit area of the Earth due to this process.

Can ChatGPT4 solve physics problems?....

- **Part 2 ChatGPT Answer**

1. Determine the total amount of rainfall per yr:

- Average rainfall rate = 3 mm/day
- There are 365 days in a year.
- Total rainfall per year = (3 mm/day) * (365 days/year)
- = 1,095 mm/year

2. Convert the total rainfall from millimeters to meters:

- 1 meter = 1,000 millimeters
- Total rainfall per year = 1,095 mm/year / 1,000
- = 1.095 meters/year

3. Calculate the volume of rainfall per year:

- The surface area of the Earth is approximately 510 million square kilometers.
- Total volume of rainfall per year = (1.095 meters/year) * (510 million square kilometers)

4. Convert the volume of rainfall from cubic meters to liters:

- 1 cubic meter = 1,000 liters
- Total volume of rainfall per year = (1.095 meters/year) * (510 million square kilometers) * (1 billion liters/cubic meter)
- = 558.45 billion liters/year

5. Determine the amount of sulfur added to each liter of rainfall:

- Total sulfur added per year = 10 million tons
- Amount of sulfur added to each liter of rainfall = (10 million tons) / (558.45 billion liters/year)

2. What are University rules on academic integrity and AI?

AI and Assessments

There could be three categories to provide guidance for when and how students can use generative AI in their assessments. Each category describes a general approach with examples. You are free to adapt these categories, offer additional clarification, and include different examples. The three categories are:

- Category 1:** Students are not allowed to use generative AI for their assessment beyond what is specified in the rules of the Institute/University
- Category 2:** Students are permitted to use generative AI tools for specific purposes to assist with their assessment.
- Category 3:** Generative AI is an integral part of the assessment and students are supported and encouraged to use it extensively.

Departments and/or module leaders will need to decide which category to employ for their assessments in advance. This should be communicated to students in a standardised manner. Assessment cover sheets could include a statement for students to declare “I have read, understood and abided by the restrictions on the use of generative AI for this assignment.”

Category 1

Students are not allowed to use generative AI for their assessment.

This category is for assessments demonstrating foundation level skills such as independently developing critical thinking skills, and applying knowledge or demonstrating fundamental skills that will be required throughout the programme.

You are not permitted to use AI tools for your assessment beyond the areas permitted by the Institute norms or in specified exceptions for students with a Statement of Reasonable Adjustment (SoRA).

The Institute permits students to use software to check areas of academic writing such as structure, grammar, spelling, punctuation, and language translation. However, this may be considered Academic Misconduct if substantive changes to content have been made by the software, or in cases of language translation if the student is being assessed on their ability to translate or use a language other than English.

Category 2

Students are permitted to use generative AI tools for specific purposes to assist with their assessment.

- AI tools can be utilised to enhance and support the development of specific skills in specific ways, as specified by the tutor and required by the assessment.
- For instance, students might use AI for tasks such as data analysis, pattern recognition, or generating insights.
- Here the tutor should support and guide the students in the use of AI to ensure equity of experience, but the use of AI is not in itself a learning outcome.
- There will be some aspects of the assessment where the use of AI is inappropriate.

Category 3

Generative AI is an integral part of the assessment and students are supported and encouraged to use it extensively.

- AI can be used as a primary tool throughout the assessment process. Students will demonstrate their ability to use AI tools effectively and critically and critically to tackle complex problems, make informed judgments, and generate creative solutions.
- The assessment will provide an opportunity to demonstrate effective and responsible use of AI.
- The tutor should support and guide the students in the use of AI to ensure equity of experience

Acknowledging use of generative AI

Generative AI should not be included as a citation or reference (unless specified by your programme).

UCL, like most publishers, has stipulated that large language models cannot be considered an author. This is because they cannot take responsibility for their work and they do not generate original ideas. Rather, they reformulate ideas found elsewhere, without acknowledgement. It is also impossible for the reader to refer to the original source.

Instead, your use of generative AI should be acknowledged

UCL's rules on academic integrity state that you must be transparent in your use of AI. You must therefore acknowledge when you have used generative AI to assist you in the creation of your academic work, such as editing your prose, translating words or generating an image.

As a minimum, your acknowledgement should include the name, version, and URL of the generative AI tool and a brief description of the context in which the tool was used. For example:

I acknowledge the use of artificial intelligence tools in the production of this report. ChatGPT3.5 (<https://chat.openai.com/>) was used to provide an initial summary of focus group transcripts.

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3. What are our next steps?

How might students use AI?

Role	Description	Example of implementation
Possibility engine	AI generates alternative ways of expressing an idea	Students write queries in ChatGPT and use the Regenerate response function to examine alternative responses.
Socratic opponent	AI acts as an opponent to develop and argument	Students enter prompts into ChatGPT following the structure of a conversation or debate. Teachers can ask students to use ChatGPT to prepare for discussions.
Collaboration coach	AI helps groups to research and solve problems together	Working in groups, students use ChatGPT to find out information to complete tasks and assignments.
Personal tutor	AI tutors each student and gives immediate feedback on progress	ChatGPT provides personalized feedback to students based on information provided by students or teachers (e.g., test scores).

How might students use AI? Contd..

Role	Description	Example of implementation
Study buddy	AI helps the student reflect on learning material	Students explain their current level of understanding to ChatGPT and ask for ways to help them study the material. ChatGPT could also be used to help students prepare for other tasks (e.g., job interviews).
Motivator	AI offers games and challenges to extend learning	Teachers or students ask ChatGPT for ideas about how to extend students' learning after providing a summary of the current level of knowledge (e.g., quizzes, exercises).
Dynamic assessor	AI provides educators with a profile of each student's current knowledge	Students interact with ChatGPT in a tutorial-type dialogue and then ask ChatGPT to produce a summary of their current state of knowledge to share with their teacher/for assessment.

Thank You