VARIOUS COMPONENTS OF GENERATIVE AI

**What is AI?**

**In simpler terms, AI is a field which combines computer science and robust data-sets to enable problem-solving.**

**AI can provide solutions to our problems based on the input or prompts.**

**AI is a machine’s ability to perform the cognitive functions we usually associate with the human minds.**

**AI can simplify the things we struggle in our day-to-day life. AI is a very powerful tool it can be integrated with other software and electronic devices to ease our tasks / work. However, AI, is capable of working effective but it can’t replace an effort of a highly skilled human mind. AI has both advantages and disadvantages of its own.** **AI is a powerful tool, but it's not a replacement for human creativity.**

**Let’s dive deeper into the vast topic of AI,**

**AI is simply a component of technology, such as machine learning.** **AI requires a foundation of specialized hardware and software for writing and training machine learning algorithms.**

**Practical applications of AI:**

AI is being tested and used in the healthcare industry for suggesting drug dosages, identifying treatments, and for aiding in surgical procedures in the operating room. Other examples of machines with artificial intelligence include computers that play chess and self-driving cars.

Technologies like Siri, Alexa and Google Assistant that are ubiquitous in every household today are excellent examples of conversational AI. These conversational AI bots are more advanced than regular chatbots that are programmed with answers to certain questions.

How artificial intelligence is used in Siri?

When it detects "Hey Siri", the rest of Siri parses the following speech as a command or query. The "Hey Siri" detector uses a Deep Neural Network (DNN) to convert the acoustic pattern of your voice at each instant into a probability distribution over speech sounds.

If we discuss about the applications of AI, it would be a never-ending process and it can’t be concluded within a single blog.

So, let’s move forward to learn more about the limitations of AI:

LIMITATIONS OF AI:

As we all know that the basic limitation of AI is that it has no empathy towards humans.

To be precise it doesn’t have any feeling towards humans since it works based on the

Assigned functionality and coding.

AI can cause severe threats to the human-kind in several ways like the major dangers of AI include misinformation (including creating convincing fake images and video known as deepfakes), privacy concerns, the loss of jobs, bias and discrimination, market and financial volatility, and a so-called singularity in which AI surpasses human intelligence.

AI’s major drawback is it can’t replace certain jobs that require high emotional intelligence like therapists, nurses, doctors, lawyers and social workers.

AI can’t think out of the box problems it can provide solutions to only what it has been designed or asked to solve.

ADVANTAGES OF AI:

AI is highly accurate and its use reduces human error

AI allows automating repetitive tasks in different industries

AI can easily handle and process Big Data

AI can fetch insights faster from processed data which allows faster Decision-Making. AI also has continuous availability and does not require breaks like humans.

AI-powered Digital Assistants can easily interact with customers and reduce workloads of customer service staff by resolving customer queries through chats.

AI helps to mitigates risks as AI systems can be deployed in environment which are hazardous to humans.

DIS-ADVANTAGES OF AI:

AI increases human dependency on machines which can lead to laziness.

AI implementation requires businesses to invest in advanced infrastructure and training the employees which makes AI expensive.

AI implementation can likely cause an increase in unemployment as AI systems can perform work of multiple human workers at once

AI uses a set of algorithms for predictions which makes AI systems practical. These are less creative and innovative in challenging situations.

AI cannot understand emotions which is a key aspect in sales and [marketing](https://www.knowledgehut.com/blog/others/what-is-marketing).

It is difficult to implement ethics in AI systems.

WHAT IS GENERATIVE AI?

Any time an AI technology is generating something on its own, it can be referred to as “generative AI.” This umbrella term includes learning algorithms that make predictions as well as those that can use prompts to autonomously write articles and paint pictures.

Generative AI, or generative artificial intelligence, is a form of machine learning that is able to produce text, video, images, and other types of content. ChatGPT, DALL-E, and Bard are examples of generative AI applications that produce text or images based on user-given prompts or dialogue.

**Generative AI** (GenAI) is a type of Artificial Intelligence that can create a wide variety of data, such as images, videos, audio, text, and 3D models.

Worker augmentation: Generative AI can augment workers' ability to draft and edit text, images and other media. It can also summarize, simplify and classify content; generate, translate and verify software code; and improve chatbot performance.

What is the difference between AI and generative AI?

The Key Difference  
  
Traditional AI systems are primarily used to analyze data and make predictions, while generative AI goes a step further by creating new data similar to its training data. In other words, traditional AI excels at pattern recognition, while generative AI excels at pattern creation.

What is an example of generative AI in robotics?

For example, robots equipped with Generative AI can identify and navigate through obstacles, recognize human gestures, and even learn from their mistakes, making them ideal for applications such as manufacturing, logistics, and healthcare.

How to use generative AI in daily life?

Generative AI models are used for creating realistic voiceovers, personalized copywriting, generating high-quality code, designing unique artwork, enhancing gaming experiences, improving ad targeting in media and advertising, and rapidly generating design options in the design sector.

# VARIOUS COMPONENTS OF GENERATIVE AI:

* Generative Adversarial Networks (GAN’s)
* Variational Autoencoders (VAE’s)

Generative Adversarial Networks (GANs): GANs consist of two neural networks, a generator, and a discriminator, which compete against each other in a game-like setup. The generator creates synthetic data, while the discriminator tries to differentiate between real and fake data. This adversarial process leads to the generation of highly realistic content.

Applications of GAN:

1. Can generate high resolution images of persons that don’t exist
2. Can generate real word images from sketches
3. Can create facades based on the blue-prints
4. Can create generate doodle images based on real person images
5. Face de-pixelizer can generate high resolution pictures using high quality pixels
6. Can convert old camera quality videos into high resolution videos

A GAN is based on two neural networks working against each other.

GAN can generate data and it has self-supervised learning setting.

GAN’s need raw data and fake data

Discriminator discriminates the passed image is real or not

IF the image is not real the data comes from the generator (neural network).

IF the discriminator and generator don’t co-exist and work properly it would be having convergence problems

Variational Autoencoders (VAEs): VAEs are probabilistic models that map input data into a latent space and then reconstruct the data from the latent representations. They enable sampling from the latent space to generate new data points.

Applications of VAE:

1. Object detection – Identifies location of important objects in that image
2. Language translation – Translates from one language to another
3. Audio Classification – Eg: If the audio is about barking, it will be identified that a dog is barking
4. In all the above cases they have one thing in common, the neural network will process the input sample and it will spit out some results that gives us some additional information about the input.

What is the principle of VAE?

Principle of VAE  
  
The encoder takes an image and outputs two vectors where each one represents the mean and the standard deviation. We sum the mean vector and the standard deviation vector, which is first multiplied by a random small value as a noise, and get a modified vector, which is the same is size.