What is Generative AI?

Generative AI is a subfield of artificial intelligence (AI) and machine learning (ML) that involves the creation of original data or content, including images, video, text, code and 3D renderings. This subfield has been developing over several decades and is rapidly evolving, due to advances and availability in computational power, large datasets and significant improvements in machine learning algorithms.

Generative AI models are based on deep learning algorithms that learn to recognize patterns and relationships from vast amounts of input data, which then generate new outputs that are similar in style and structure to the data they were trained on. The ability of these models to self-formulate new and varied outputs represents a paradigm shift in the field of AI because they are not being explicitly programmed to follow pre-determined rules, or generate specific outputs, like other AI systems. This will likely lead to a change in how we interface with computers, and more broadly, in how we access, understand, and produce knowledge and information

Building Blocks of Gen AI

Supervised and semi-supervised learning - A machine learning technique that helps algorithms learn to recognize patterns and make predictions based on categorized or labeled data. In the case of semi supervised learning, algorithms are trained on both labeled and unlabeled data to detect patterns and make predictions.

 Deep learning - A machine learning technique that uses layers of neural networks to process data and make decisions.

Neural networks - An AI method that simulates the structure and function of the human brain. Neural networks process information through interconnected nodes that are organized in a layered structure. This computational model serves as the basis of deep learning and is used in various types of generative models. Core Concepts

Generative Adversarial Network (GAN) - A machine learning model that uses two neural networks—a generator and a discriminator—to produce new data that is similar to a given data set. GANs have become a popular approach for generative AI in various domains, such as image and video generation.

Transformer - A type of neural network that uses encoders and decoders to generate the best probability for the following word in a sentence. Transformers enable the development of powerful generative models.

Large Language Model (LLM) - A statistical AI model that is trained on massive amounts of text data and predicts the probability of sequences of words to produce human-like text responses.

Natural Language Processing (NLP) - A subfield of AI that is at the intersection of linguistics, computer science and machine learning. NLP enables computer programs to process and analyze large amounts of natural language data. It uses a range of computational methods and algorithms to allow machines, such as chatbots and voice assistants, to understand and mimic written or spoken human language.

Generative Pre-trained Transformer (GPT) - A type of LLM developed by the research lab OpenAI that uses deep learning and NLP techniques. GPT underlies the user-facing, general-purpose chatbot, ChatGPT, which produces humanlike conversational responses in reaction to short user prompts.

INDUSTRY-SPECIFIC GENERATIVE AI USE CASES

In addition to the information we've gathered for everyone interested in generative AI, we've also collected some helpful insights for specific industry groups. There are three industries we've put together additional information for:

<u>Banking, Financial Services, and Insurance</u>

The BFSI industry is already making good use of machine learning technology – and there's still room to grow in that regard. Machine learning models are already in place at many banks and insurance companies seeking to accelerate underwriting decisions and loan applications, as well as monitoring for financial crime and fraud. These are great uses for discriminative machine learning, tasks that are well suited to the technology's superhuman skill at finding patterns and outliers.

Consultants and thought leaders in the BFSI sector have expressed interest in using generative AI to automate data gathering and report generation for compliance purposes. Another use case BFSI folks are excited about is extracting data from corporate disclosures, quarterly earnings reports, and other unstructured data and generating a summary report on the findings. In each of these cases, generative AI can do this task, but it would likely be more cost effective to use a discriminative model to do the data gathering, extraction, and synthesis, and saving the report-writing process for the LLM.

<u>Manufacturing</u>

Manufacturing and heavy industry can sometimes be on the cautious side; the large capital investitures these organizations often have to make fosters risk aversion and a measured approach to adopting new technologies. But there are job functions and analytical tasks where discriminative AI models are already proving their worth. A lot is being left on the table here, metaphorically speaking, in terms of capacity for automation.

<u>Aerospace and Defense Enterprises</u>

In aerospace engineering and defense manufacturing have special needs and high standards. Security is paramount for essentially every aspect of their business and so they will want to be especially mindful of the privacy risks associated with generative AI models. All data will need to be totally isolated. The good news is that defense contractors and national departments of defense are some of the few entities with the monetary and personnel resources to build their own foundation models.