

## 6 GENERATIVE AI

PJD's opening remarks

In November 2022, the OpenAI company released to the public a new kind of neural network called ChatGPT-3. Despite its obscure name, the Generative Pre-trained Transformer was a smashing success. It was the first AI machine that could carry on human-like conversations in a wide range of topics. Within two weeks, 100 million users had tried the machine and billions of dollars of venture capital appeared to support startups in using this new technology.

This kind of machine has come to be called Generative AI because of its capability to generate human-like speech. Generative AI machines are also called Large Language Models (LLMs) because they speak fluently in our language and are trained from massive amounts of text gathered from the Internet.

These machines transformed the public awareness of AI, bringing on reactions ranging from astonishment and awe to trepidation and horror. They spurred massive investments in new tools for drafting texts, summarizing conversations, summarizing literature, generating images, coding simple programs, supporting education, and amusing humans. To the dismay of many, these machines are likely to respond with fabrications (called "hallucinations") that severely undermine their trustworthiness and make them unsafe for critical applications.

In this lecture, Professor Mathias Kölsch will discuss the mechanics of LLMs. Mathias has been involved with AI and computer vision for many years. He will show how the neural networks in LLMs evolved from those used in computer vision. He will discuss how they are built and the limitations imposed by their structure. The limitations make it extremely unlikely that LLM machines will ever be capable of performing all human tasks at the skill levels of humans. Even though these machines are not capable of general intelligence, their powers continue to surprise us in many ways.