

Chapter 5

Overview of ChatGPT Model Architecture

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ABSTRACT

This chapter provides a detailed exploration of the ChatGPT model architecture, a cutting-edge natural language processing (NLP) model that has revolutionized conversational AI. Developed by OpenAI, ChatGPT is built upon the GPT-3.5 architecture, a state-of-the-art language model. This chapter presents an extensive study about ChatGPT using a comprehensive analysis of its various recent literatures. This study also focuses on ChatGPT evolution from ELIZA to ChatGPT. In this chapter various reviews of literature, related issues, its architecture, various layers, various ChatGPT versions and its specialization, comparative study of various models, and application is presented. In order to do the comprehensive study various papers from different databases like ACM digital library, Scopus, IEEE, IGI Global, and Willey have been included for the study. Papers selected for the comprehensive study have been reviewed extensively in order to get the details and comprehended information for the readers. Various issues like security, biasness, training, misuse, etc. have been mentioned.

1. INTRODUCTION TO CHATGPT (GENERATIVE PRE-TRAINED TRANSFORM)

Recent development in the technology has empowered human being and enabled us to think in various dimensions but it has generated lot of digital data in the real world. The generated digital data are efficiently stored and managed by various repositories and companies because data is everything. Every invention is the need of the hour and the rapid development in the field of machine learning and natural language processing has revolutionized the world and has lead to the development of various AI based language models [1].

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This chapter presents a details study about the AI generated language like ChatGPT and a comprehensive and understandable explanation of the key components, design principles, and workings of the different model of ChatGPT and its evolutions from ELIZA to ChatGPT. The article offering insights into how ChatGPT processes and generates output, as well as its applications and implications through comparison of different architecture. The content will provide a clear and accessible explanation of the fundamental architectural elements and design principles that underlie ChatGPT. The inclusion criteria for selecting an article for the study are as follows: (1) the article are selected from the standard database like ACM digital library, Scopus, IEEE, IGI Global, Willey etc. (2) various keywords like “ChatGPT”, “AI-based generative language”, “generative language model”, “Natural language processing”, “issues”, “ChatGPT Evolution” etc. is used for selecting articles. (3) Various papers especially from the year 2020-2023 have been selected extensively for the study.

Papers selected for the comprehensive study has been reviewed extensively in order to get the details and comprehended information for the readers. Starting with its evolution we can state that these models can create material in a variety of different fields, such as text, music, codes, and others [2-3]. AI can work similar like human brain and the use of AI has begin in the late 1960 when ELIZA was first developed in 1966 based on AI and after then long journey is done by the developers to develop tools that can mimic human response. From 1960 to presently various AI based tools has been developed like SHAKEY (1966), WABOT-1 (1970), STANFORD CART (1970), WABOT-2 (1980), ABBERWACKY and CLEVERBOT (1990), ALICE CHATBOT (1995), DEEPBLUE (1997), AIBO (1999), ASIMO (2000), ROOMBA (2002), DRIVER-LESS-CAR (2009), SIRI (2011), CORTANA (2014), SOPHIA (2016), BERT (2018), BIXBY (2018) [4] etc. In all these AI based model one thing is common that they have the ability to understand what human says and can also interact with the humans. They are also able to mimic human brains. Chatbots are AI based tools that uses artificial intelligence (AI) and natural language processing (NLP) to understand customer questions and automate responses to them, simulating human conversation.

ChatGPT 3.5 is based on the GPT-3 model. ChatGPT can generate text, translate languages, create other types of creative material, and provide you with enlightening answers to your queries. It is a part of the GPT-3.5 series, often known as the Generative Pre-trained Transformer 3.5. With the aid of cutting-edge language processing techniques, ChatGPT can hold intelligent and human-like discussions with users while taking context into account [5-6]. The GPT models are transformer-based neural networks that use the attention mechanism to process and generate text. Transformers are known for their ability to capture contextual relationships in language effectively.

The primary advantage of ChatGPT lies in its ability to deliver responses that closely resemble human language. This level of skill is acquired by extensive practise with various types of text data. The model can comprehend language and produce grammatically sound, meaningful phrases [7]. It's crucial to remember that ChatGPT's responses may not always be exact or factually true because they are created based on statistical patterns in the training data. To guarantee the ethical and responsible usage of ChatGPT, OpenAI has taken a number of steps. They worked to overcome biases in the model's responses and built the Moderation API to filter out unsuitable or harmful content. In order to continuously develop the system and address any potential shortcomings or problems, OpenAI also welcomes user feedback.

The objective of the chapter is to provide a comprehensive study about the AI generative languages like ChatGPT and related review of literatures and recent issues related to ChatGPT and also a solution to the issue. The chapter also aims at providing the comprehended content about evolution of ChatGPT from the ELIZA and its various versions and its application in detail.

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