Chapter 11
Revolutionizing Conversational AI:
Unleashing the Power of ChatGPT–Based Applications in Generative AI and Natural Language Processing

C. V. Suresh Babu
https://orcid.org/0000-0002-8474-2882
Hindustan Institute of Technolgy and Science, India

P. M. Akshara
https://orcid.org/0009-0004-8498-0196
Hindustan Institute of Technology and Science, India

ABSTRACT

The emergence of advanced NLP models, like ChatGPT and other conversational AI models, has triggered a revolutionary transformation. This chapter explores the burgeoning field of ChatGPT applications, conducting a comprehensive analysis of their impact across various domains. The chapter assesses their capabilities, challenges, and potential uses, examining the underlying architecture and training methods that enable them to generate contextually relevant and coherent responses. Ethical considerations are also addressed, encompassing concerns about bias, misinformation, and user privacy in real-world conversations. The chapter also acknowledges drawbacks, including occasional inaccuracies or sensitive content generation. In conclusion, ongoing research is vital to enhance model robustness, user experience, and ethical deployment in conversational AI. ChatGPT and similar models are poised to reshape human-machine communication, fostering dynamic, engaging, and valuable conversations.

DOI: 10.4018/979-8-3693-0502-7.ch011

1. INTRODUCTION

Over the past few decades, the field of artificial intelligence (AI) has undergone significant evolution. Initially, AI systems were designed for specific tasks, such as playing chess or go. Advances in machine learning and deep learning have driven considerable progress in AI's development, resulting in enhancements across various applications like robotics, healthcare, finance, and image recognition. (Suresh Babu C.V., 2022),

AI systems now possess decision-making abilities honed through machine learning and deep learning algorithms, enabling them to analyze vast datasets and uncover patterns, insights, and correlations that may elude human perception. This data-driven approach empowers AI systems to make precise decisions in diverse domains.

One pivotal milestone in AI's journey was the invention of neural networks in the 1950s, inspired by the human brain's learning process. These networks revolutionized AI by enabling the execution of previously impossible tasks. They empowered AI systems to accurately transcribe human speech, and recognize objects, individuals, and situations in images.

Deep learning models, particularly transformer-based designs like Bert and GPT (generative pre-trained transformers), have significantly enhanced natural language processing (NLP) capabilities. Tasks such as machine translation, chatbot development, sentiment analysis, and other language-related applications have advanced due to their ability to comprehend and generate human-like language.

2. INTRODUCTION TO CHATGPT

2.1 Understanding its Architecture and Training

GPT models, a type of large language model (LLM) developed by OpenAI, are trained on extensive datasets, including text and code, to perform various NLP tasks like text generation, summarization, and conversation. ChatGPT, based on the GPT-3.5 architecture, is specially designed for understanding and generating human-like text.

Its architecture is based on an attention-based model known as a deep neural network with numerous layers of transformers that is particularly effective at extracting contextual information from text. These transformers are placed one on top of the other to create a complex architecture that allows ChatGPT to comprehend and produce human-like text. Its 175 billion parameters are learned during training using a huge amount of text data. Due to its comprehensive pre-training, ChatGPT can comprehend a variety of subjects and give thoughtful responses. It uses a decoding technique to produce answers word by word during inference while taking the input's context into account. Additionally, adjustments are made to make ChatGPT's output generation process safer and more in control. With the help of this architecture, ChatGPT can carry out a variety of activities with impressive adaptability and fluency, including text production, question-answering, and natural language interpretation. ChatGPT finds applications in conversational AI, including chatbots, virtual assistants, language translation, educational tutoring, content creation, therapeutic conversations, language learning support, travel guidance, personalized shopping experiences, and more.

This chapter explores the transformative potential of conversational AI applications based on ChatGPT across various domains. It delves into the deployment of chatbots and virtual assistants, highlighting