Chapter 3
Exploring the Core Principles, Architectures, and Advancements of Large Language Models

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ABSTRACT

Language is necessary for human interaction because it helps in communication, learning, and the creation of rules and agreements that advance society. Although computers have historically had difficulty understanding and producing human language, advances in artificial intelligence, especially with regard to large language models (LLMs), have significantly enhanced computers' ability to grasp and produce natural language. LLMs, which are based on deep learning architectures such as transformers, have revolutionized natural language processing (NLP) by facilitating complex text generation and comprehension. Even with their successes, LLMs have drawbacks, like as theoretical issues and possible political and cultural biases in the training set. This chapter explores the underlying theories and architectural frameworks of LLMs, as well as the principles that guide their operation. The impact of these potent models on how humans engage with information and technology is highlighted, and it also covers current study on the difficulties and moral issues surrounding their use.

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INTRODUCTION

The advent of language processing technology has been a recent milestone in artificial intelligence (AI), allowing us to create more intelligent systems with a deeper comprehension of language than ever before. "Large Language Models (LLMs)," also known as large pre-trained transformer language models, significantly increase the capabilities of text-based systems. The purpose of LLMs is to comprehend and produce text that is similar to that of humans. They are trained on enormous datasets that contain text from books, journals, websites, and several other sources. They are constructed using neural networks, more especially deep learning (DL) architectures, (Bommasani et al., 2022a).

Figure 1. Outline of proposed workflow

As outlined in Figure 1, this chapter will delve into the theoretical underpinnings of LLMs, examining the principles that drive their success and the foundational theories that enable their remarkable performance. While challenges persist, ongoing research and a commitment to ethical AI practices pave the way for a future where large language models continue to shape our interaction with information and technology. It is essential to recognize the potential, challenges, and responsibilities