



Natural Language Processing and Its Applications

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Abstract

Natural Language Processing (NLP) is a rapidly developing area of Artificial Intelligence that focuses on enabling computers to understand, interpret, process, and generate human language. With the rapid growth of digital information, NLP has become increasingly important for extracting meaningful insights from large volumes of text and speech data. This paper provides an overview of the fundamental concepts, techniques, and applications of Natural Language Processing. It discusses major NLP approaches, including text classification, sentiment analysis, machine translation, speech recognition, information extraction, question answering, and conversational systems. The paper also examines the role of machine learning and deep learning, particularly transformer-based models, in improving the accuracy and effectiveness of NLP applications. Despite significant advances, challenges such as ambiguity, multilingual language processing, limited training data, bias, privacy, and contextual understanding remain important concerns. The study highlights the growing significance of NLP across healthcare, education, business, social media, customer service, and other domains. The paper concludes that continued advances in NLP can contribute to more intelligent, accessible, and human-centered computing systems.

Keywords: Natural Language Processing, Artificial Intelligence, Machine Learning, Deep Learning, Text Mining, Sentiment Analysis, Machine Translation, Conversational AI

