

Chapter 6

Deep Learning for Emotion Detection in Speech: Techniques and Applications

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ABSTRACT

This chapter delves into the pivotal role of deep learning-based emotion detection in speech, shaping human-computer interactions. The authors guide readers through crucial stages, encompassing data collection, preprocessing, feature extraction, model architecture selection, and performance evaluation. Exploring diverse deep learning architectures like CNNs, RNNs, and CRNNs, the chapter highlights their efficacy in decoding sequential speech patterns. Practical aspects, including fine-tuning parameters and real-time optimization, enhance efficiency. Ethical considerations, addressing privacy and data biases, ensure responsible deployment. Real-world applications spanning human-computer interaction, customer service, and mental health underscore the transformative impact of deep learning in daily life. This chapter offers a comprehensive exploration of applying deep learning techniques to analyze emotions in speech, catering to researchers and practitioners alike.

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INTRODUCTION

Decoding Emotions in the Fabric of Speech

As we all know, speech is a fundamental aspect of human interaction that allows us to convey emotions. One challenge of artificial intelligence is to help bridge the gap between human-machine communication by analyzing, interpreting, and decoding human speech and all of its components. This chapter explores the methods to analyze emotions in speech with the help of deep learning techniques.

The Relevance of Speech Emotion Analysis

With the development of artificial intelligence, speech emotion analysis becomes increasingly important. Recognizing the true meaning of emotions conveyed through speech is vital to improving human-computer communication (Abbaschian et al. 2021). This knowledge significantly enhances the user experience leading to improved comprehension and happiness in the feedback loop of these systems. The various fields of application of sentiment extraction, such as customer feedback analysis, lie detection systems, and online support, all highlight the important and powerful influence of speech emotion analysis. However, compared to its text processing equivalent, speech analysis has received less attention due to the intricacy of speech patterns and the inescapable impact of background noise.

Navigating Challenges in Speech Emotion Recognition

Recognizing emotions in speech pose formidable challenges. Emotional states are often a blend of several fundamental emotional states. It becomes essential to recognize these complex feelings in order to accurately assess the speaker's emotional condition. At the same time, speech feature extraction requires effectiveness in order to create a direct correlation between speech patterns and discrete emotional states. The multitude of emotional states further complicates the classification process, confounding many traditional learning techniques in navigating this intricate landscape of emotional features (Akrami et al. 2017).

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