

Chapter 8

Unlocking Human Emotions: The Power of Deep Learning in Sentiment Analysis

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ABSTRACT

Emotion detection, a crucial element of human connection, has received considerable focus in recent years, driven by advancements in machine learning and deep learning methodologies. This chapter presents a thorough examination of machine and deep learning methods used to recognise emotions in many forms, such as text, voice, and pictures. The authors start by comparing standard methods with deep learning techniques, and then examine the intricacies of emotion recognition in text, audio, and images. They focus on the methodology, difficulties, and progress made in each of these areas. In addition, they explore the new area of multimodal emotion detection, which combines data from several sources to improve the accuracy and reliability of emotion identification algorithms. This chapter aims to offer insights into the transformative capacity of machines and deep learning techniques in comprehending and interpreting human emotions. By synthesising research findings and future directions, it paves the way for technology-mediated interactions and applications that foster empathy in various domains.

DOI: 10.4018/979-8-3693-4143-8.ch008

INTRODUCTION

Humans need emotions like love, sorrow, and hate. These complex emotional states have long captivated philosophers, psychologists, and scientists, inspiring their research into human emotion. This study relies on emotion identification from facial expressions, speech intonations, and text. Emotion detection involves psychology, linguistics, neuroscience, and CS. Cognitive and affective neuroscience and early psychologists like William James and Carl Lange's physiological theories of emotion underpin modern emotion detection methods. Computational tools have also made emotion detection automated, a significant area in artificial intelligence and affective computing. Important patterns and qualities from text, audio, and images are used to discern emotions. Manual annotation and heuristic-based algorithms hampered conventional emotion recognition's scalability and application. However, machine learning and deep learning enable data-driven algorithms to create complex representations from raw data, changing emotion detection. Machine and deep learning have changed emotion detection, improving accuracy and scalability across applications. These technologies, from social media sentiment analysis to human-computer interaction affective computing, have improved our understanding of human emotions and computational systems with emotional intelligence. Multimodal data streams allow researchers to capture the richness of emotions, boosting our understanding of emotional expression and interpersonal interactions. Despite great progress in emotion identification, important issues remain. To safely apply emotion recognition technology, privacy, data security, and algorithmic bias must be studied and minimised. Universal models of emotions are difficult to build since they are subjective and context-dependent.

TEXT-BASED EMOTION DETECTION

Text-based emotion recognition automatically tags and classifies emotions in text. With the rise of social media, email, and online forums, text-based emotion recognition is useful for sentiment analysis and personalised user experiences. We examine deep learning architectures and methods for text-based emotion detection in this part.

Recurrent Neural Networks (RNNs)

RNNs are good at sequential data processing, making them ideal for text data analysis. RNNs capture temporal relationships and contextual information in text by iteratively applying the same weights to each sequence piece.

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