Artificial Intelligence for Emotion Recognition in Low-Resource Language Social Media Texts: A Comprehensive Review

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Abstract

Emotion recognition in social media texts has witnessed significant advancements with the integration of artificial intelligence (AI) techniques. This review explores the utility of AI methods specifically in the framework of low-resource languages, focusing on challenges and methodologies in emotion recognition. Low-resource languages pose unique challenges such as limited annotated data and linguistic resources, which necessitate innovative AI approaches for effective emotion detection. We survey existing literature on traditional machine learning and advanced deep learning models tailored for languages of low-resource, highlighting their strengths and limitations. The review discusses key strategies including transfer learning, data augmentation, and cross-lingual embeddings to mitigate these challenges. Moreover, we identify emerging trends and future research directions to enhance AI-driven emotion recognition in language having low-resource social media texts.

Keywords: Artificial Intelligence, Emotion Recognition, Low-Resource Languages, Social Media Texts, Machine Learning.

I. INTRODUCTION

In recent years, the abundance of social media platforms has transformed how people express their emotions and interact online, generating vast amounts of text data that reflect diverse emotional states. Emotion recognition in texts of social media has thus emerged as a crucial research area with applications in sentiment analysis, personalized recommendation systems, and mental health monitoring, among others. While considerable progress has been made in emotion detection for widely spoken languages such as English, many languages of low-resource have been relatively overlooked due to restricted ease of use of annotated datasets and linguistic resources.

Low-resource languages present unique challenges for artificial intelligence (AI) systems aiming to perform emotion recognition. These challenges include sparse data availability, linguistic diversity, code-mixing, and script variations, which complicate the progress of vigorous sentiment detection models. Addressing these challenges requires innovative AI techniques that can effectively leverage limited resources and adapt to diverse linguistic contexts.

This comprehensive review aims to explore the current landscape of AI-driven emotion recognition specifically in low-resource language social media texts. We will survey existing methodologies, including traditional machine learning approaches and advanced deep learning models that have been adapted or developed for low-resource languages. The review will highlight successful strategies such as transfer learning, data augmentation, and cross-lingual embeddings, which play pivotal roles in enhancing the recital of emotion recognition systems under data scarcity conditions.

II. LITERATURE SURVEY

A. Affective computing from analyzing emotions through single modalities to integrating multiple modalities for improved emotion recognition [1]

Review the evolution of affective computing, from initial single-modality analyses like text and speech to advanced multimodal fusion techniques. They highlight challenges in capturing nuanced human emotions with single modalities and discuss how integrating multiple modalities enhances accuracy and robustness in sentiment identification. The review explores various fusion strategies, including early and late fusion methods, and discusses the relevance of deep learning for multimodal data integration. The paper emphasizes the potential and challenges of these methods in practical applications such as sentiment analysis and human-computer interaction, outlining future research directions and ethical considerations in affective computing.

B. Natural Language Processing (NLP)-based techniques for emotion detection and recognition [2]

The review covers approaches such as lexicon-based methods, machine learning models, in addition to deep learning architectures applied to sentiment and emotion analysis tasks. It discusses the evolution of these techniques, their strengths in capturing nuances of emotional expressions, and challenges such as handling sarcasm and context ambiguity. The dissertation concludes with insights into future research directions aimed at improving the accuracy and applicability of NLP-based emotion recognition systems in real-world applications.

C. Application of big data and Artificial Intelligence (AI) for social media analysis [3]

The paper reviews various AI approaches such as sentiment analysis, topic modeling, and user profiling applied to large-scale social media datasets. It discusses the benefits of using AI in uncovering trends, predicting user behavior, and enhancing decision-making processes in social media analytics. The authors highlight challenges such as data privacy concerns and the need for scalable AI algorithms to handle the volume and velocity of social media data. The manuscript concludes by outlining future research directions aimed at improving the efficiency and effectiveness of AI-driven social media analysis systems.

D. Deep learning techniques applied to sentiment analysis [4]

The survey covers a mixture of deep learning architectures such as Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), and Transformer models used for sentiment classification from textual data. It discusses the advantages of deep learning in capturing complex semantic relationships and contextual information for more accurate sentiment analysis. The thesis concludes with insights into future research directions focusing on improving model interpretability and handling domain-specific challenges in retort analysis using deep learning approaches.

E. Sentiment analysis techniques applied specifically to Arabic text [5]

The review covers various approaches including lexicon-based methods, machine learning algorithms, and deep learning techniques tailored for analyzing sentiment in Arabic text. It discusses the challenges unique to Arabic sentiment analysis such as dialectal variations and lack of annotated data, and explores recent developments aimed at improving accuracy and applicability in real-world applications. The paper concludes by identifying future research directions to further enhance sentiment analysis capabilities in Arabic language processing.

F. Multilingual sentiment analysis techniques [6]

The paper surveys various approaches including lexicon-based methods, machine learning models, and deep learning techniques applied to sentiment analysis in different languages. It presents a comparative evaluation of these methods, discussing their strengths, weaknesses, and applicability across diverse linguistic contexts. The study concludes with recommendations for future research directions to advance multilingual sentiment analysis capabilities and improve cross-lingual sentiment understanding.

G. Multimodal emotion recognition techniques [7]

The survey covers various approaches such as combining facial expressions, speech, and physiological signals to enhance emotion detection accuracy. It discusses the challenges of multimodal data fusion, the effectiveness of deep learning models in this context, and identifies future research directions aimed at improving multimodal sentiment recognition systems for practical applications.

H. End-to-end deep convolutional recurrent network for dialogue sentiment recognition, eliminating the need for handcrafted features [8]

A deep learning architecture that integrates convolutional and recurrent layers to directly learn features from raw speech signals. By bypassing the traditional handcrafted feature extraction process, the model achieves competitive performance in emotion recognition tasks. The study emphasizes the potential of end-to-end learning methods in speech emotion analysis and discusses implications for future research in enhancing the robustness and applicability of such systems across different languages and emotional contexts.

I. Emotion detection and sentiment analysis in social media and online texts [9]
Various approaches including natural language processing techniques, machine learning models, and deep learning architectures used to extract and analyze emotional content from large-scale textual data. It highlights the challenges posed by the informal and noisy nature of social media language and explores future directions for improving accuracy and scalability in emotion-aware systems for online platforms.

J. Deep learning applied to natural language processing (NLP) [10]
Includes various aspects including semantic analysis, sentiment analysis, machine translation, and dialogue systems, highlighting how deep learning models for instance recurrent neural networks (RNNs), convolutional neural networks (CNNs), and transformers have revolutionized NLP tasks. The paper discusses challenges, such as interpretability and robustness, and outlines future research directions aimed at addressing these issues to further advance the capabilities of deep learning in NLP.

K. Hierarchical fusion approach with context modeling for multimodal sentiment analysis [11]
Investigational outcome exhibits the effectiveness of the projected approach in capturing nuanced sentiment expressions across different datasets, highlighting its potential for applications in fields requiring sophisticated sentiment understanding like social media analytics and market research.

L. Opinion mining and sentiment analysis, covering tasks, approaches, and applications [12]
It discusses various tasks including sentiment classification, aspect-based sentiment analysis, and opinion summarization, highlighting their applications in diverse domains such as social media analytics, customer feedback analysis, and market research. The manuscript concludes with insights into future research directions aimed at advancing sentiment analysis techniques for more accurate and context-aware analysis of opinions and sentiments in textual data.

M. Deep LSTM with attention mechanism for message-level in addition to topic-based sentiment analysis [13]
The paper addresses the challenge of capturing context and semantic dependencies in sentiment analysis tasks, demonstrating the efficacy of the projected model in capturing fine-grained sentiment information from textual data. Experimental results showcase competitive performance in sentiment classification across different datasets, highlighting the latent of attention-based LSTM models in enhancing sentiment analysis capabilities for practical applications for instance social media monitoring and opinion mining.

N. Text classification algorithms [14]
The survey categorizes algorithms such as Naive Bayes, Support Vector Machines (SVM), decision trees, in addition to deep learning models, discussing their strengths and weaknesses in unusual text classification scenarios. It covers applications in sentiment analysis, spam detection, topic classification, in addition to more, providing insights into the development of text classification techniques and identifying emerging trends in the field. The paper concludes with recommendations for future research directions aimed at enhancing the performance and scalability of text classification algorithms in handling large-scale and diverse textual data.

O. Data mining techniques applied to social media analysis [15]
The survey covers methodologies such as classification, clustering, association rule mining, as well as sentiment analysis applied to extract insights from large-scale social media datasets. It discusses challenges such as data heterogeneity and scalability, and explores applications including trend detection, opinion mining, and user behavior analysis. The paper concludes by outlining future research directions aimed at advancing data mining techniques to better support decision-making and considerate of social media dynamics.

P. Sentiment analysis techniques applied to social media platform [16]
Lexicon-based methods, machine learning algorithms, and deep learning models employed to analyze sentiment from diverse social media sources. It discusses challenges including data noise, language variations, and the self-motivated temperament of social media content, and explores applications in areas such as brand monitoring, public opinion analysis, and crisis management. The document concludes with insights into future research directions to enhance the accuracy and adaptability of sentiment analysis techniques for analyzing sentiments expressed on social media platforms.

Q. Sentiment analysis and opinion mining [17]
It covers topics such as sentiment classification, opinion retrieval, and opinion summarization, discussing both traditional approaches like lexicon-based methods and machine learning algorithms, as well as advancements in deep learning models. It addresses challenges such as context dependency, sarcasm detection, and domain adaptation in sentiment analysis, offering insights to evolution of techniques and future research directions to improve sentiment analysis in various applications, from social media to customer feedback analysis.

R. Analyzing affective text, focusing on understanding emotional content in language [18]
The paper discusses various approaches such as lexicon-based methods, machine learning models, and semantic analysis techniques applied to recognize and interpret emotions expressed in textual data. It highlights challenges such as ambiguity in emotional expression and the subjective nature of sentiment analysis, and discusses applications in areas such as sentiment analysis, opinion mining, and affective computing. The study contributes to advancing methods for understanding and processing emotional language in computational linguistics and natural language processing.

S. Sentiment in opinions, focusing on computational linguistic approaches [19]
It discusses challenges like context sensitivity and linguistic nuances, emphasizing the magnitude of context and domain-specific knowledge in accurate sentiment analysis. The study contributes foundational insights into sentiment analysis methods, setting the stage for advancements in opinion mining and sentiment classification in textual data.

T. Emotion detection in textual data [20]
The survey covers various approaches including lexicon-based methods, machine learning models, and deep learning techniques applied to recognize and categorize emotions expressed in text. It discusses challenges such as handling sarcasm, context awareness, and cross-cultural differences in emotional expression, highlighting the evolution of techniques and identifying future research directions to enhance emotion detection capabilities for practical applications like sentiment analysis and emotional computing.

U. Applications in affective text generation [21]
The survey covers techniques such as rule-based systems, machine learning models, along with deep learning approaches used to generate text with emotional content. It discusses challenges such as maintaining coherence and authenticity in generated text, and explores applications in areas like creative writing, personalized content generation, and human-computer interaction. The dissertation concludes with insights into future research directions aimed at advancing the capabilities of affective text generation systems to better understand and retort to emotional cues in textual communication.

V. Combining long-term spectral features with perceptual and world knowledge for improving emotion recognition [22]
The method integrates long-term spectral features with perceptual and world knowledge cues to capture both acoustic properties and contextual information relevant to emotional expression. Experimental evaluations demonstrate the efficacy of the projected approach in accurately identifying emotional states across different datasets. The paper concludes by discussing the potential applications of this technique in various domains, highlighting its contribution to advancing emotion recognition technology.

W. Convolutional Multiple Kernel Learning (MKL) approach for multimodal emotion recognition and sentiment analysis [23]
This paper presents a novel approach using Convolutional Multiple Kernel Learning (MKL) for integrating multiple modalities in emotion recognition and sentiment analysis tasks. The paper addresses the challenge of efficiently gathering information from diverse sources such as text, audio, and visual cues by leveraging MKL to learn the optimal combination of kernels. Tentative outcome display the effectiveness of the anticipated approach in achieving competitive performance in both emotion recognition and sentiment analysis compared to conventional methods. The paper concludes by discussing the potential applications of this advance in real-world scenarios and suggesting future research directions to further enhance multimodal emotion analysis techniques.

X. Convergence of computational literary studies and social computing [24]
This paper highlights the intersection of computational techniques with literary studies and social computing. They highlight how computational methods can enhance traditional literary analysis by extracting and analyzing textual features at scale. The paper explores various applications for instance sentiment analysis, stylistic analysis, and thematic exploration using computational tools, demonstrating the potential intended for interdisciplinary collaboration between humanities and computer science. It concludes with a call for further integration of computational approaches in literary studies to deepen insights into literary texts and cultural phenomena.

Y. Evolution of affective computing from analyzing emotions through single modalities to integrating multiple modalities for improved emotion recognition [25]
This paper surveys the evolution of affective computing. It critiques the limitations of unimodal approaches in analyzing emotions through single modalities like text or speech and explores the advancements in multimodal techniques that integrate information from multiple sources to enhance emotion recognition accuracy and robustness. The review discusses various fusion strategies and highlights the claim of deep learning for integrating multimodal data, emphasizing

potential applications in sentiment analysis and human-computer interaction. It concludes with future research directions and ethical considerations in affective computing.

Z. Deep learning techniques for sarcasm detection [26]
This paper surveys the relevance of deep learning methods in detecting sarcasm from textual data. They begin by discussing the complexities involved in sarcasm exposure due to its context-dependent and often subtle nature. The review covers an assortment of deep learning architectures and techniques employed for sarcasm detection, highlighting the evolution from early approaches to more sophisticated models capable of capturing semantic nuances and contextual cues. The authors also explore the challenges in sarcasm detection such as data sparsity and ambiguity, and discuss how deep learning advancements address these issues through feature learning and representation. The thesis concludes with insights into future research directions, emphasizing the potential for integrating multimodal information and leveraging large-scale datasets to further improve sarcasm detection accuracy in real-world applications.

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