INTRODUCTION TO THE SPECIAL ISSUE ON SENTIMENT ANALYSIS AND AFFECTIVE COMPUTING IN MULTIMEDIA DATA ON SOCIAL NETWORK

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In the Age of Multimedia and Social Networks, the proliferation of user-generated data has been nothing short of meteoric. This wealth of information necessitates careful analysis and processing to truly comprehend the subjective perceptions of users. At the intersection of this data-driven revolution, two critical fields emerge: Sentiment Analysis and Affective Computing. Sentiment analysis delves into the intricate realm of people's opinions, sentiments, evaluations, attitudes, and emotions as expressed through written language. On the other hand, Affective Computing focuses on the development of systems and devices capable of recognizing, interpreting, processing, and even simulating human emotions. It is, in essence, the fusion of Emotion AI and other affective technologies, with the overarching goal of enhancing people's lives.

With the exponential growth of user-generated data, thanks to social networks, wikis, and social tagging systems, it has become imperative to decipher the high-level semantics and user subjective perceptions embedded in this vast sea of information. Emotions and sentiments, in particular, stand out as significant facets of user-generated data, often carrying the emotional imprints of their creators. The concurrent advancement of computational techniques for sentiment analysis and opinion mining has been accompanied by a surge in the utilization of psychological and cognitive models and theories. These are being harnessed to model sentiments and emotions, often in synergy with social computing techniques such as social network analysis and personalization, user review mining, and user profiling within social networks, among others. The synergy between affective/sentimental models and social computing techniques is not merely an academic endeavor; it paves the way for comprehending big data at a semantic level and enhances the performance of a wide array of social computing applications in this era of big data. This convergence not only combines affective and sentimental models with social computing but also charts a promising direction replete with opportunities for developing novel algorithms, methods, and tools.

It is a privilege for us to introduce the Special Issue on Sentiment Analysis and Affective computing in Multimedia Data on Social Network. Among the numerous research papers we received (50 in total), we meticulously selected 18 papers for publication. The overarching objective of this special issue is to delve into the recent advancements and disseminate state-of-the-art research related to sentiment analysis and affective computing in multimedia data within social networks and the technologies that make this possible. This special issue represents a showcase of new dimensions of research, offering researchers and industry professionals an illuminating perspective on sentiment analysis and affective computing in the realm of multimedia data within social networks.

We sincerely hope that the contributions in this special issue will not only inform but also inspire future research endeavors, leading to a deeper understanding of the multifaceted world of sentiment analysis and affective computing in the age of multimedia and social networks.

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Shuaizhi Shen in the paper titled "User sentiment analysis methods for elderly social media networks" delves into sentiment analysis within social media networks tailored for the elderly population. Initial stages involve the extraction of emotional sentences for the classification of movie reviews. Subsequently, user search behavior in social networks is scrutinized for elderly demographics, and their movie reviews are employed for predictive rating analysis. Three sentiment classification algorithms—Dirichlet, maximum entropy, and support vector machine—are employed, revealing accuracy rates of 87.1%, 86.9%, and 86.5%, respectively. Notably, first-level classifiers exhibit robust accuracy, ranging from 87.4% to 90.7%. The proposed method surpasses Slope One in predictive analysis, showcasing its potential to elevate emotional analysis accuracy in film review texts for the elderly.

"Deepjyoti Choudhury et al., in the paper titled "A Deep Community Detection Approach In Real Time Networks" introduces a novel deep learning approach for real-time community detection in social networks, overcoming issues with traditional proximity matrices. By reorganizing matrices and extracting spatial attributes, the proposed method, evaluated on ten datasets, outperforms existing techniques, showcasing its effectiveness in identifying superior clusters in real-time networks.

Anureet Chhabra et al. in the paper titled "A Statistical Analysis of Tweet Sentiment on Drug Usage Across High, Middle, and Low-Income Countries" conducted a comprehensive statistical analysis of tweet sentiments related to drug usage across countries with varying income levels. This paper examines drug sentiment on Twitter, analyzing 35,337 drug-related tweets from high, middle, and low-income countries. Findings reveal varying positive sentiments (39.509%, 26.0148%, and 23.644%) across income categories, highlighting cultural and legal factors as influencers. The study underscores the importance of these insights for shaping global drug prevention policies and promoting public health education.

Purushottama Rao K and B Janet in the paper titled "Detecting Academic Affective States of Learners in Online Learning Environments Using Deep Transfer Learning" addresses the limitations of Online Learning Environments (OLEs) in recognizing students' emotions by customizing the DAiSEE dataset and training an AffectXception model. The model outperforms transfer learned and state-of-the-art methods, achieving high accuracy (77% to 91.87%) in detecting academic affective states like Boredom, Engagement, Confusion, and Frustration. The findings suggest the potential of adapting teaching strategies based on learners' emotional states for more effective online education.

Koyel Ghosh et al., in the paper titled "Hate Speech Detection in Low- Resource Bodo and Assamese Texts with ML-DL and Bert Models" addresses addresses the contemporary issue of hate speech detection in natural language processing, driven by the unrestrained use of social media leading to toxic comments and posts. Recognizing the impact on violence at various levels, the study introduces two North-East Indian Hate Speech datasets (Assamese and Bodo). It trains baseline machine learning, deep learning, and state-of-the-art transformer models on these datasets, evaluating their performance and conducting detailed error analysis to contribute insights into hate speech detection challenges, particularly in low-resource languages.

Jigna Patel et al., in the paper titled "ConColla - A Smart Emotion-based Music Recommendation System for Drivers" introduces ConCollA, a hybrid music recommender system, focusing on user emotions for a more personalized experience. By incorporating facial expression recognition through a CNN model, ConCollA accurately identifies driver emotions and tailors music recommendations. The evaluation indicates superior performance compared to traditional collaborative-based recommender systems.

Souvik Sengupta and Saurabh Pal et al., in the paper titled "Mapping Learner's Query to Learning Objects using Topic Modeling and Machine Learning Techniques". This paper addresses the challenge of mapping learner queries to suitable Learning Objects (LOs) in e-learning by proposing a recommender system. Employing a combination of supervised and unsupervised Natural Language Processing (NLP) and Machine Learning (ML) methods, the model is trained on a handcrafted dataset to map queries to predefined topics. Additionally, dynamic topic modeling on learning content from popular e-learning portals enhances the system's ability to recommend the most appropriate LO based on similarity scores.

Qingyuan Li et al., in the paper titled "Speech Emotion Analysis of Short English Readings based on the CAM-SPAT Model". This study introduces a deep learning-based model to assess the emotion of speech in English reading aloud, aiding language learners in effective communication. The model incorporates a cross-modal attention mechanism and a two-layer attention-based bi-directional long- and short-term memory

network for emotion classification. Evaluation metrics reveal high efficacy, with mean F1 values of 98.54% for classification, 85.13% for detection, and 73.55% for speech emotion analysis, providing valuable strategies for enhancing spoken English skills in language learners.

Huihong Li, in the paper titled "Personalized Artwork Recommendation System", highlights the rising importance of spoken English in global communication. The proposed deep learning model, incorporating cross-modal attention mechanisms, effectively assesses emotion in reading aloud English texts, offering valuable strategies for enhancing language learners' spoken English skills. Evaluation metrics indicate the model's high efficacy in speech emotion analysis.

Tulika Ranjan et al, in the paper titled "Multilingual Code-Mixed Sentiment Analysis in Hate Speech" addresses the limitation of existing sentiment analysis works, predominantly focused on English, by presenting a multilingual code-mixed language model. The model efficiently identifies sentiments in a hate speech dataset from Twitter, using a transformer-based pretrained sentiment analysis model for labeling. Six machine learning models are trained, demonstrating effective sentiment analysis across multiple languages, including code-mixed languages, with results indicating negative sentiment in hate speech and positive or neutral sentiment in non-hate speech.

Vipin Jain et al., in the paper titled "Ensemble Hybrid Model for COVID-19 Sentiment Analysis with Cuckoo Search Optimization Algorithm", address the global impact of COVID-19 on mental and physical health. Utilizing Indian tweets about COVID-19, two datasets are developed, covering periods from January to March 2021 and December 2021 to May 2022. Employing natural language processing and the Valence Aware Dictionary for Sentiment Reasoning, the study utilizes three word embeddings techniques for feature extraction and integrates a cuckoo search optimization algorithm for optimal features selection.

Piyush Kanungo et al., in the paper titled "A Feature Extraction-Based Improved Sentiment Analysis on Apache Spark for Real-Time Twitter Data", focus on enhancing sentiment analysis using Apache Spark for real-time Twitter data.This paper seeks to enhance sentiment analysis accuracy on real-time Twitter data using Apache Spark, focusing on generic content. Unlike existing works on offline data, this study employs six classification algorithms on N-gram and TF-IDF feature extraction methods, demonstrating the superiority of trigram feature extraction for Logistic Regression and Support Vector Machine in analyzing general tweets on Apache Spark.

Gowtham Dora Pappala, in the paper titled "Sentiment Analysis and Speaker Diarization in Hindi and Marathi using Fine-Tuned Whisper", extends the capabilities of the Whisper Automatic Speech Recognition (ASR) model. The enhancements encompass speaker diarization, text summarization, emotion detection, text generation, and question answering. Specifically fine-tuned for Indian regional languages, such as Hindi and Marathi, on the Common Voice 11 dataset, the model exhibits a significant 50% reduction in Word Error Rate (WER), promising improved ASR accuracy and advancements in human-machine communication applications.

Xiao ShiXiao et al., in their paper titled "Real-Time Sentiment Analysis on Social Networks using Meta-Model and Machine Learning Techniques", introduces a real-time sentiment analysis system for social networks, employing a meta-model and machine learning techniques to enhance accuracy by integrating both textual and visual data. Evaluation against state-of-the-art methods demonstrates superior performance in accuracy, precision, recall, and F1-score, highlighting the system's suitability for applications like social media monitoring. The proposed system's capacity to handle multimodal data positions it as a robust solution with implications for social media analysis.

Tara Rawat et al., In the paper titled "Emotionally Wrapped Social Media Text: Approaches, Opportunities, and Challenges", explores the evolution of online platforms and the growing trend of sharing emotionally charged data. The literature review, spanning 2001-2022, categorizes selected papers into granularity, contextual, and cognition levels, offering a comprehensive analysis of approaches to identify emotional states in unstructured textual data. The paper concludes with insights into challenges, applications, and future directions in emotion mining for researchers in diverse domains.

R. L. Keerthana etal., in the paper titled "Explaining Sarcasm of Tweets Using Attention Mechanism", focuses on improving sarcasm detection, a challenging emotion to identify in textual data. The proposed strategies in the paper significantly enhance sarcasm detection model performance, setting a new state-of-the-art on the TweetEval benchmark dataset. Additionally, an attention-based interpretability technique is

introduced, shedding light on token importance and aiding in the understanding of contextual embeddings crucial for decision-making in sarcasm detection models.

The paper "Improving Bert Model Accuracy for Uni-modal Aspect-Based Sentiment Analysis Task" provides an overview of aspect-based sentiment analysis and the issue of overfitting.

To address the issue of insufficient coverage in the current sentiment lexicon and the difficulty of constructing sentiment lexicon in specific fields, the paper "Design of Sentiment Analysis Framework of Digital Media Short Text Based on Multi-pattern Sentiment Lexicon" proposes a multi-modal emotional thesaurus.

In summary, this special issue of Scalable Computing: Practice and Experience explores the dynamic landscape of sentiment analysis and affective computing within the realm of multimedia data in social networks. The featured research papers span diverse applications, from sentiment analysis tailored for elderly social media users to real-time community detection in social networks. The studies delve into areas such as drug sentiment on Twitter, academic affective states in online learning, hate speech detection in low-resource languages, personalized artwork recommendations, speech emotion analysis, and COVID-19 sentiment analysis. These contributions not only showcase advancements in computational techniques but also highlight the intersection of affective models with social computing, offering valuable insights for understanding and harnessing user-generated data in the age of multimedia and social networks.