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DEVELOPMENT OF A MACHINE LEARNING-BASED EMOTION ANALYSIS SYSTEM FOR DIALOGUE PROCESSING

The rapid development of artificial intelligence technologies has increased interest in systems capable of understanding not only the semantic meaning of text but also its emotional content. Modern chatbots, virtual assistants, customer support platforms, and educational services increasingly rely on Natural Language Processing (NLP) techniques to improve interaction with users. In such systems, emotion recognition contributes to more adaptive communication and enhances the overall user experience.

Traditional sentiment analysis methods are primarily focused on determining whether a message is positive, negative, or neutral. However, this approach often fails to capture the complexity of human emotions. Emotion analysis provides a more detailed understanding by identifying specific emotional states such as joy, sadness, anger, fear, surprise, or admiration (Demszky et al., 2020). One of the major challenges in this field is the interpretation of messages within a conversational context. Many existing solutions analyse utterances independently and do not consider previous messages in the dialogue. As a result, important contextual information may be lost, reducing classification accuracy (Zhong et al., 2019).

To address this challenge, a software system for context-aware emotion analysis was developed. The proposed solution combines machine learning methods, psychological lexicons, and dialogue context processing. The architecture is based on a transformer model deployed through ONNX Runtime, which performs the primary emotion classification. To improve the reliability and interpretability of results, the system integrates NRC Emotion Lexicon and DepecheMood, which provide additional

lexical information about emotional categories and intensity (Mohammad & Turney, 2013; Staiano & Guerini, 2014).

The software system was implemented using Java 21 and Spring Boot. The developed REST API enables integration with external applications such as chatbots, customer support platforms, and educational systems. Redis is used as an in-memory data store for maintaining dialogue history and supporting context-aware analysis.

The emotion recognition process consists of several stages. First, the input text undergoes preprocessing and normalization. Next, the transformer model performs inference using ONNX Runtime. In parallel, the message is analysed using NRC Emotion Lexicon and DepecheMood. The obtained results are combined through an adaptive fusion mechanism that balances the contribution of machine learning predictions and lexical resources. Finally, contextual information retrieved from Redis is incorporated into the analysis, producing the final classification result.

The developed system supports several functional capabilities. It can analyse individual messages, process complete dialogues, track emotional trajectories throughout conversations, and perform context-aware emotion recognition. The REST API also allows retrieval of session history and integration with third-party software solutions.

To evaluate the effectiveness of the proposed approach, experiments were conducted using the GoEmotions dataset developed by Google Research (Demszky et al., 2020). The performance of the system was assessed using the F1-score metric. The baseline transformer model achieved an F1-score of 0.715. The integration of NRC Emotion Lexicon increased the score to 0.716, while the combination of NRC Emotion Lexicon and DepecheMood through the adaptive fusion mechanism achieved the highest result of 0.721. These findings demonstrate that lexical resources can improve classification quality without requiring additional model training.

The results confirm the effectiveness of combining transformer-based machine learning models, psychological lexicons, and contextual information within a single architecture. The developed system can be applied in customer support services, intelligent virtual assistants, educational platforms, and other dialogue-based applications. Future research may focus on multilingual emotion recognition, sarcasm detection, and further improvement of context-aware processing mechanisms.

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THE ROLE OF OPERATING SYSTEMS IN MODERN DEVICES

In today’s world of rapid digitalization, global connectivity, and ever-increasing computing power, operating systems (OS) hold a crucial position. With the rise of mobile technologies, cloud computing, and the Internet of Things (IoT), there is a growing need for advanced software capable of coordinating hardware resources effectively. The OS is no longer a passive background utility—it has become the