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Prototype Development of Speech Depression Prediction System Using TensorFlow Lite on Edge Computing
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Abstract
Depression, a significant contributor to global suicide rates, poses unique diagnostic challenges in traditional clinical settings, resulting in frequently delayed diagnoses and potential patient misrepresentation. To address this issue, we presented an innovative prototype that combines edge computing and deep learning for improved and faster detection of depression through speech behavior analysis. Our model used a one-dimensional Convolutional Neural Network (CNN) with TensorFlow Lite on an NVIDIA Jetson Nano platform. A MAONO AU903 Studio-Quality USB Microphone was used to achieve optimal audio quality. By analyzing speech behavior, this setup effectively distinguished between depressive and non-depressive speech patterns. A data augmentation procedure that included noise in audio data increased the model's robustness. Because of its suitability and an extensive collection of interviews with subjects in various depressive states, the Distress Analysis Interview Corpus - Wizard of Oz (DAIC-WOZ) database was used for training and testing. The successful operation of the prototype demonstrates the method's diagnostic potential for clinical depression. While the developed model's accuracy could be improved by investigating alternative deep learning architectures, it provided a solid foundation for future development. The study emphasized the importance of further research into real-time depression prediction using speech analysis, which has the potential to revolutionize mental health diagnostics. © 2023 IEEE.

Author Keywords
deep learning; depression diagnosis; edge computing; mental health diagnostic; real-time testing; TensorFlow Lite

Index Keywords
Audio acoustics, Convolutional neural networks, Deep learning, Edge computing, Speech analysis; Clinical settings, Deep learning, Depression diagnose, Edge computing, Mental health, Mental health diagnostic, Prediction systems, Prototype development, Real-time testing, Tensorflow lite; Diagnosis

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