

# Assessment of Human Emotional States by Optimizing the Electrodermal Activity Signals with Two-dimensional Representations and Machine Learning

**Abstract:** This study explores emotion recognition through Electrodermal Activity (EDA) signals using advanced decomposition and machine learning techniques. By leveraging the CASE dataset, EDA signals are pre-processed, decomposed using two methods—cvxEDA and BayesianEDA—and analyzed to extract meaningful features for emotion classification. The methodology emphasizes optimizing signal segmentation, decomposition, and temporal- and texture-based feature extraction, employing machine learning classifiers such as SVM, RF, and XGB. Results demonstrate the superiority of phasic EDA signals and cvxEDA decomposition, achieving a classification accuracy of 97.08% using SVM with STFT spectrograms. These findings provide a foundation for real-time emotion recognition systems and personalized interventions, with implications for healthcare, human-computer interfaces, and wearable technology.



**Speaker's Bio:** Dr. Sriram Kumar P (Member, IEEE) received his B.Tech. degree in Electronics and Communication Engineering from Jawaharlal Nehru Technological University, Hyderabad, India, in 2007, and his M.E. degree from Osmania University, Hyderabad, in 2009. He earned his Ph.D. from the prestigious Indian Institute of Technology (BHU), Varanasi, India, in 2024. Dr. Sriram's research interests include signal processing, emotion recognition, and machine learning. During his Ph.D. tenure, he published extensively in reputed journals, including IEEE Transactions on Instrumentation and Measurement, International Journal of Neural Systems, Expert Systems with Applications, Biomedical Signal Processing and Control, along with two SCI-indexed journals and numerous conference papers. With over 12 years of teaching experience, Dr. Sriram is currently an Assistant Professor in the Department of Artificial Intelligence and Machine Learning at the Symbiosis Institute of Technology, Symbiosis International (Deemed University), Hyderabad, India.