

## **Tuning support vector machines for improving four-class emotion classification in virtual reality (VR) using heart rate features**

### **ABSTRACT**

The main objective of this paper is to conduct three experiments using Support Vector Machine (SVM) with different parameter settings to find and compare the accuracy of each SVM setting. Heart rate (HR) signals were collected with a medical-grade wearable heart rate monitor from Empatica (E4 Wristband) and processed using the Empatica Realtime Monitor application during this investigation. HR was employed as the method to capture the test subjects' physiological signals via plethysmography. The three experiments were conducted using a wrist-worn monitor to gain HR signal, and a VR Headset for subjects to view 360 degrees video stimuli. A total of 10 subjects participated in this experiment. Data from the 10 subjects were then processed with Python with SVM. The data was classified for four distinct emotion classes using both inter-subject classification and intra-subject classification testing approaches, with inter-subject classification yielding an accuracy of 53.39% while intra-subject classification ranges from 56.92% to 86.15%. These results demonstrate the potential of achieving higher accuracy results using different parameter settings via the use of HR as the input feature to the machine learning classifier, which appears to be a promising sensor modality for four-class emotion classification in virtual reality using wearable technology.