Multimodal Emotion Recognition using EEG and Eye Tracking Data

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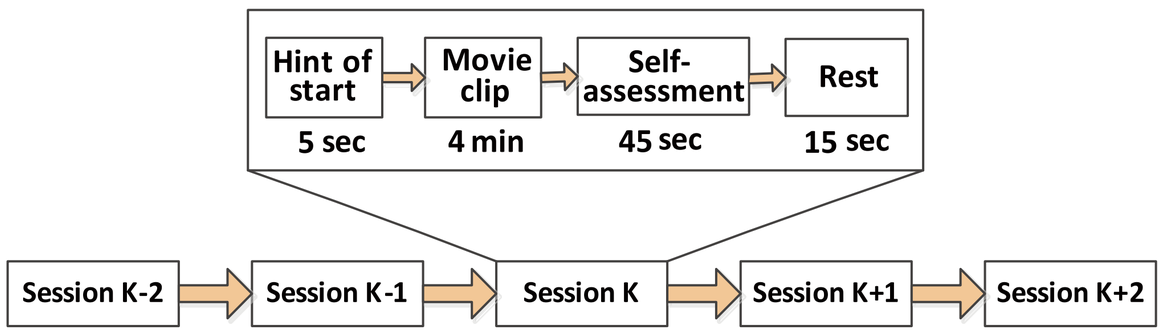
Introduction

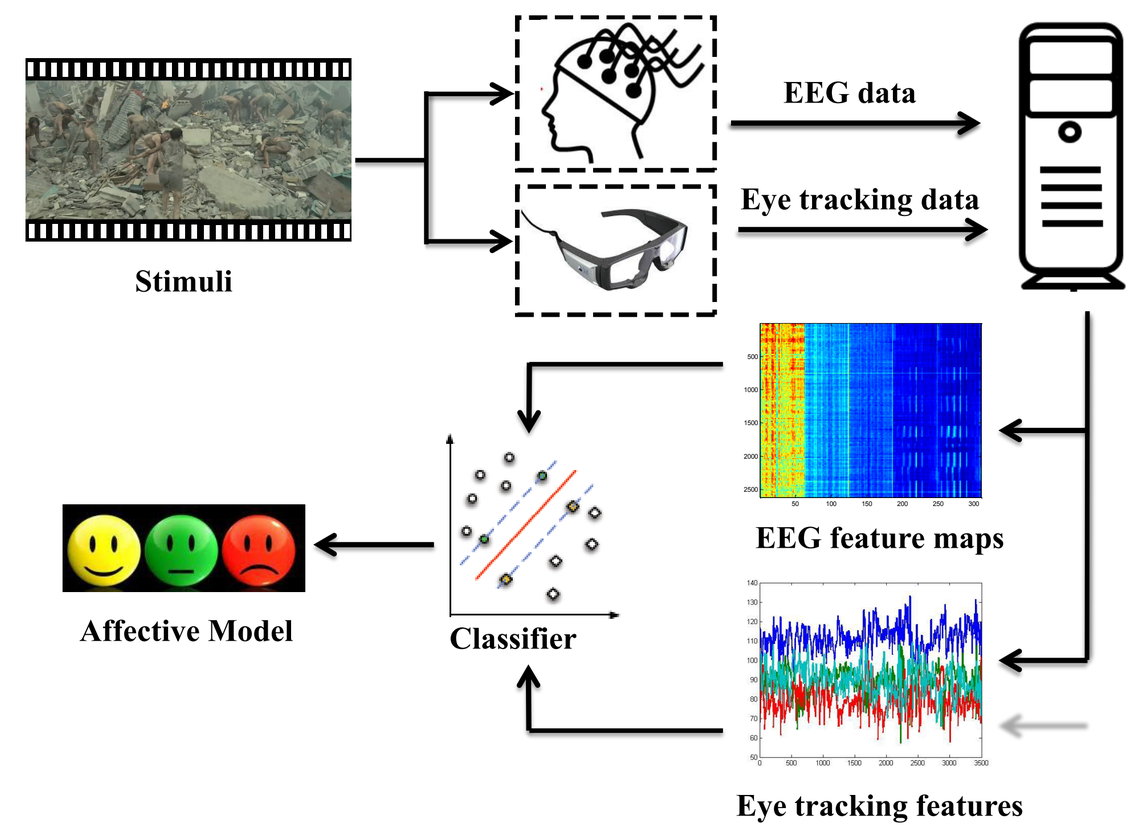
In the past few decades, an increasing number of researcheson emotion recognition have been done since emotion recognition has great significance and wide applications, especially its crucial role in human-machine interaction systems. Possible applications of emotion recognition cover a vast scope, whether at a personal or a social level. For driving safety, we can design an affective user interface to monitor drivers' emotional and cognitive states and response to drivers to regulate their emotions.



The Protocol of the Experiment

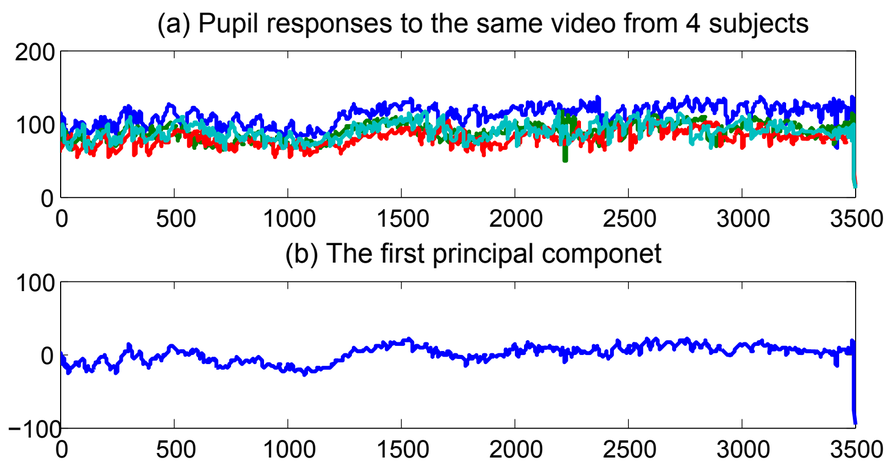
Method

In our experiment, 15 emotional film clips were selected to elicit three emotions: positive, neutral and negative. Each emotion had 5 video clips for a session and each clip lasted for around 4 minutes.



The Framework of our Experiment Processing

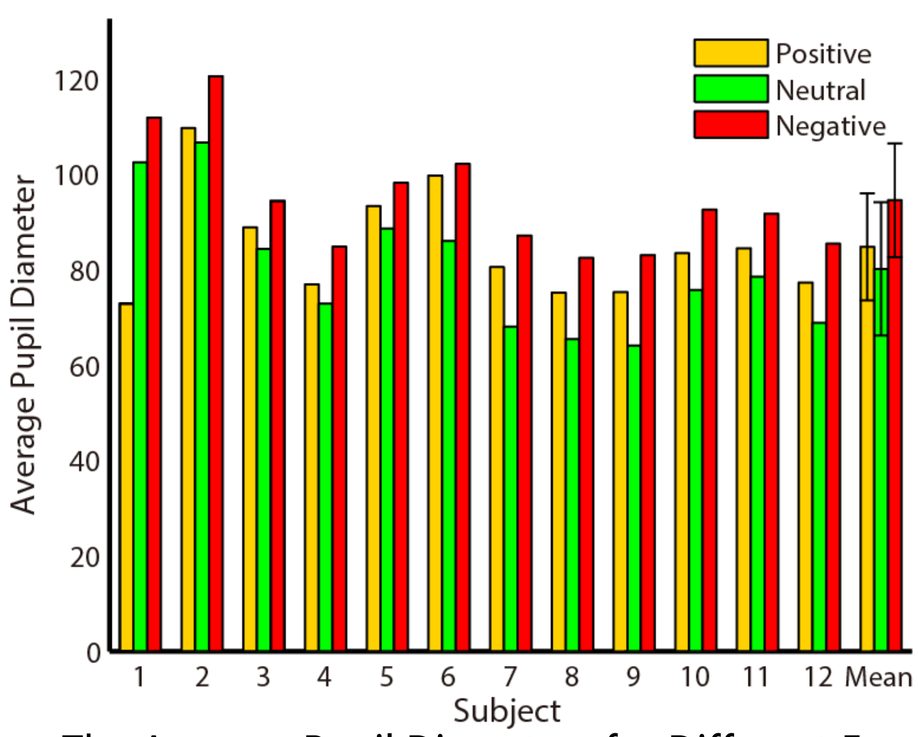
For EEG data, we extracted different features from five frequency bands. For eye tracking data, we extracted mean values, standard deviations and spectral powers of frequency bands from pupil responses. We applied fusion methods of feature level fusion and decision level fusion combining features from EEG signals and eye tracking data.



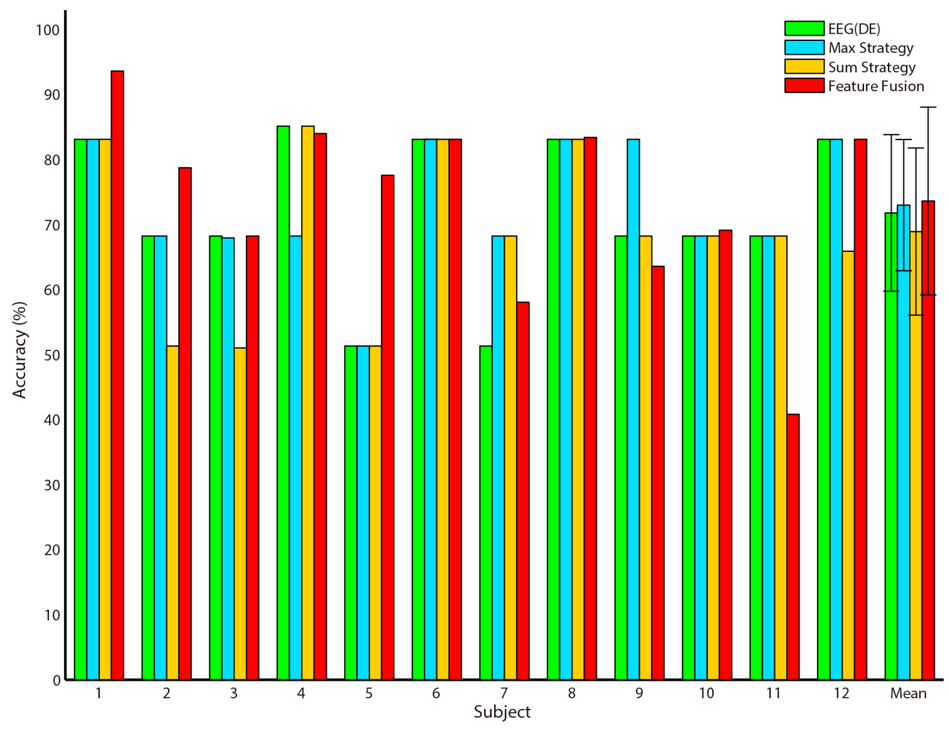
Light Reflex Model using PCA to approximately Remove Luminance Influences

Conclusion

Here, we employed two fusion strategies (feature level fusion and decision level fusion) to build emotion recognition models which achieved the best classification accuracies of 73.59 % and 72.98 %, respectively.



The Average Pupil Diameters for Different Emotions



The Accuracies of 12 Experiments using Fusion Strategies

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