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S. Saha, S. Datta, A. Konar and R. Janarthanan (2014): A Study on Emotion Recognition from Body Gestures Using Kinect Sensor , International Conference on Communication and Signal Processing. <https://ieeexplore.ieee.org/document/6949798>

Motivation

The goal of the study is to classify basic emotions (Anger, Fear, Happiness, Sadness and Relaxation) using the features obtained from body gestures with the help of kinetic sensors. Additionally, compare different machine learning models based on the average accuracy and computation time. The improvement in emotion recognition is expected to improve human-computer interaction.

Data

Ten subjects in the age group of 25 ± 5 were instructed to make gestures corresponding to an emotion. The total duration of 60 seconds of each emotion was acquired from each subject. The kinetic sensor acquires the data at the rate of 30 frames per second where each frame is a 3-D human skeleton represented by 20 body joints.

Method

Following nine features were extracted using eleven joints in the upper body.

- The euclidean distance between hand and elbow. (2 features)
- Maximum acceleration of hand and elbow with respect to spine. (4 features)
- Angle between head, shoulder center and spine. (1 feature)
- Angle between shoulder, elbow and wrist. (2 features)

Five models were trained using the above mentioned nine features to classify emotions. The models used were binary decision tree, AdaBoost, k-nearest neighbour, support vector machine with radial basis function kernel and neural network.

Main Result

The classification average accuracy obtained for binary decision tree, AdaBoost, k-NN, SVM and neural network classifier are 76.63%, 90.83%, 86.77%, 87.74% and 89.26% respectively. The results show that AdaBoost achieves the highest accuracy of 90.83%. However, it is worst in terms of computation time. The high average accuracy obtained for different classifiers indicate that the extracted nine features are able to distinguish between different emotions.

Critical Reflection, Limitations

The authors intend to extend the work for more difficult emotion. In my opinion, the study of body gestures is a complex topic as it depends on many factors such as culture and gender. The study does not take into account these factors and the dataset size(10 participants) is also very small. Moreover, the features were only extracted from the upper body parts. The features from lower body could also be helpful.