

Computer Vision Project Proposal

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Problem description

Emotion Recognition using CNN.

Facial Feature Extraction is applicable in many fields, like face recognition system, object recognition systems and in the field of security. Emotion recognition allows a machine to classify the emotion of a person interacting with it by finding an edge, spots, and blank pattern in the face. Emotion plays a major role in each of our lives. If a machine is able to understand the user's emotions, then they will be able to aggregate it with contextual information to provide the required results in the way that is required.

Facial Feature Extraction is a key technology to use in this project which shall be accomplished by the use of Local Binary Patterns. Local Binary Patterns will help us extract the feature vectors of a face and then feed it into the convolutional neural network to predict the emotion of the users.

The Convolutional Neural Network will classify each feature vector into one of the 8 expressions we are looking for.

This is a supervised machine learning problem we will solve by using the Yale Extended database available on Kaggle as - Face expression recognition dataset.

Related Work

The below mentioned are the related work to the emotion recognition.

1. Robust Real-Time Face Detection – Paul Viola and Michael Jones ^[1]
2. A Comparative Study of Multiple Object Detection Using Haar-Like Feature Selection and Local Binary Patterns in Several Platforms ^[2]
3. Multiresolution Gray Scale and Rotation Invariant Texture Classification with Local Binary Patterns ^[3]

Datasets

1. Yale Face dataset [4]

This dataset is available on Kaggle as Face Expression recognition dataset.

It is divided into train and test set. Inside each of these folders the data is divided into face expressions – angry, disgust, fear, happy, neutral, sad and surprise.

Note: The dataset is imbalanced and may need to be enhanced with other data which may make it biased to classify one expression over other. For example, in the training dataset number of images for each expression are:

- a. Angry – 3993
- b. Disgust – 436
- c. Fear – 4103
- d. Happy – 7164
- e. Neutral – 4982
- f. Sad – 4938
- g. Surprise – 3205

Timeline

Emotion Recognition system		March	March	March	March	April	April	April	April	May	May
Srno	Items / Tasks	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
1	Identify objectives and scope										
2	Implementation of standard LBP										
3	Implementation of CNN										
4	Optimization and hyperparameter tuning										

Final Deliverables

The final deliverables for this will be an algorithm that uses the Local binary patterns to create feature vectors and a convolutional neural network to classify the vectors into the appropriate classes defining each emotion. Local Binary patterns also has a variant of itself, known as the Variable Local Binary Patterns which is used for varying accuracies and computation power available to us. I would like to use number of edges in a face as a factor to determine which accuracy level to use.

The objectives of this algorithm are:

1. Take images of each expression
2. Use Local Binary Patterns to extract facial feature vectors.
3. Convolutional neural network to classify the facial feature vectors.
4. Use the model for real time prediction to detect the emotion of the user.

References

1. [Robust Real-Time Face Detection – Paul Viola and Michael Jones](#)
2. [A Comparative Study of Multiple Object Detection Using Haar-Like Feature Selection and Local Binary Patterns in Several Platforms](#)
3. [Multiresolution Gray Scale and Rotation Invariant Texture Classification with Local Binary Patterns](#)
4. [Yale Face dataset](#)