

# RECOGNIZING EMOTIONS ON FACE USING HAARCASCADE METHOD

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**Abstract** - Human emotion recognition plays important role in the social relationship. Emotions are reflected from verbalisation, hand, gestures of a body, through outward appearances and facial expressions. The purpose is to present strategy dependent on facial recognition to identify student's comprehension of the entire distant learning process. Emotion recognition model comprises of three phases, feature extraction, subset feature and emotion classifier. A Haar cascade technique is utilised to identify the input image, a face, as a reason for the extraction of eyes and mouth, and afterwards through the sobel edge detection to get the characteristic value. Through training neural network classifier, six various kinds of emotion classifications are obtained. The emotion recognition based on the facial expression is feasible on the distance education, allowing recognisable proof as an student's learning status continuously in real time. Therefore, it can assist the teachers to change the strategy of teaching according to the student's emotions.

**Key Words:** Feature extraction, emotion recognition, haar cascade technique, expressions.

## 1. INTRODUCTION

A facial expression is a gesture executed with the facial muscles, which convey the emotional state of the subject to observers. That similarity implies about the facial expression most important role-being a channel of nonverbal communication. Facial expressions are a primary means of conveying nonverbal information among humans, though many animal species display facial expressions too. Human emotions that can be displayed by the face can be categorized into six basic expressions, which are referred to as happiness, sadness, surprise, fear, anger, and disgust. The image processing techniques highly relevant for identifying facial features under uneven lighting and interpreting the face emotion through the processed facial features. To improve accuracy, more video frames are required, increasing computation time. On the other hand, in pursuit of efficiency, we would reduce the accuracy which means collection less feature data. Experimental results from current solutions show that in some cases accuracy is higher, but time spent is also high. To find the best solution for emotion recognition in learning virtual environment, both accuracy and efficiency needs to be

achieved. Optimization of recognition of emotional changes in the facial features of online learners, will allow teachers to adjust teaching strategies and methods, give real-time feedback to students, and achieve the best teaching quality.

## 1.1 OBJECTIVES

The objective is to find the best solution for emotion recognition based on facial recognition in virtual learning environments, in real time. To achieve this goal, it is necessary to improve the accuracy and efficiency of facial recognition systems.

1. To implement emotion recognition models.
2. The best solution offered for recognition of emotion using emotional features.
3. Identify facial expression.
4. To find the best solution for emotion recognition based on facial recognition.
5. Both accuracy and efficiency to be achieved.
6. To find out all the expression of human. [sad, fear, happy, disgust]

## 2. LITERATURE SURVEY

[1] Behaviors, actions, poses, facial expressions and speech; these are considered as channels that convey human emotions. Extensive research has been carried out to explore the relationships between these channels and emotions. This paper proposes a prototype system which automatically recognizes the emotion represented on a face. Thus a neural network based solution combined with image processing is used in classifying the universal emotions: Happiness, Sadness, Anger, Disgust, Surprise and Fear. Humans share a universal and fundamental set of emotions which are exhibited through consistent facial expression.

[2] Humans share a universal and fundamental set of emotions which are exhibited through consistent facial expressions. An algorithm that performs detection, extraction, and evaluation of

these facial expressions will allow for automatic recognition of human emotion in images and videos. Presented here is a hybrid feature extraction and facial expression recognition method that utilizes Viola-Jones cascade object detectors and Harris corner key-points to extract analysis, histogram-of-oriented-gradients (HOG) feature extraction, and support vector machines (SVM) to train a multi-class predictor for classifying the seven fundamental human facial expressions.

- [3] Recognize the human face emotions by computer is an interesting and challenging problem. Face recognition is used in security system effectively compared to other biometric such as fingerprint or iris recognition systems. Face emotion recognition is one of the crucial roles in face recognition system. It is used to recognize the muscle behaviors of the face. The goal of the proposed work is to build an emotion recognition system. It includes face detection, non-skin region extraction and morphological processing finally, emotion recognition.

- [4] An image is a very effective tool for conveying emotions. Many researchers have investigated emotions in images by using various features extracted from images. Author focus on two high-level features, the object and the background, and assume that the semantic information in images is a good cue for predicting emotions. An object is one of the most important elements that define an image, and we discover through experiments that there is a high correlation between the objects and emotions in images in most cases. Even with the same object, there may be slight differences in emotion due to different backgrounds, and we use the semantic information of the background to improve the prediction performance.

### 3. SOFTWARE REQUIREMENT AND SPECIFICATION

A System Requirements Specification (SRS) (also known as a Software Requirements Specification) is a document or set of documentation that describes the features and behaviour of a system or software application. It includes a variety of elements that attempts to define the intended functionality required.

#### 3.1 FUNCTIONAL REQUIREMENTS

- The administrator should have the access to add or remove more questions and answers.

- The information must be entered and managed properly.

#### 3.2 NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements are the characteristics or attributes of the system that can judge its operation.

The following points clarify them:

- **Accuracy and Precision:** The system should perform its process with accuracy and precision to avoid problem.
- **Usability:** The system should be easy to deal with and simple to understand.
- **Maintainability:** The maintenance group should be able to cope up with any problem when encountered suddenly.
- **Speed and Responsiveness:** Execution of operations must be fast.

#### 3.3 TECHNOLOGIES USED

##### 3.3.1 THE PYTHON PROGRAMMING LANGUAGE

Python is programming language introduced by James Guido van Rossum at Centrum Wiskunde. According to the latest TIOBE Programming Community Index, Python is one of the top 10 popular programming languages of 2017. Python is a general purpose and high level programming language. You can use Python for developing desktop GUI applications, websites and web applications. Also, Python, as a high level programming language, allows you to focus on core functionality of the application by taking care of common programming tasks. The simple syntax rules of the programming language further makes it easier for you to keep the code base readable and application maintainable. There are also a number of reasons why you should prefer Python to other programming languages.

It has some of the as following features:

- 1) Readable and Maintainable Code.
- 2) Multiple Programming Paradigms.
- 3) Compatible with Major Platforms and Systems.
- 4) Robust Standard Library.
- 5) Many Open Source Frameworks and Tools.
- 6) Simplify Complex Software Development.
- 7) Adopt Test Driven Development.

### 3.3.2 PyCharm

PyCharm is an integrated development environment(IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains. It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems (VCSes), and supports web development with Django as well as Data Science with Anaconda. PyCharm is crossplatform, with Windows, macOS and Linux versions. The Community Edition is released under the Apache License, and there is also Professional Edition with extra features released under a proprietary license.

Features:

- 1) Coding assistance and analysis, with code completion, syntax and error highlighting, linter integration, and quick fixes.
- 2) Project and code navigation: specialized project views, file structure views and quick jumping between files, classes, methods and usages.
- 3) Python refactoring: includes rename, extract method, introduce variable, introduce constant, pull up, push down and others.
- 4) Support for web frameworks: Django, web2py and Flask.
- 5) Integrated Python debugger.
- 6) Integrated unit testing, with line-by-line code coverage.
- 7) Google App Engine Python development.

## 4. SYSTEM DESIGN AND IMPLEMENTATION

### 4.1 BLOCK DIAGRAM

The following figure shows the system architecture of the facial expression recognition system, where the video frame is given as input to the system. The system detects the face, processes and provides the output according to the facial expressions.

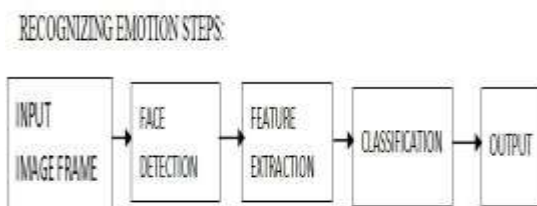


Fig. -1: Block Diagram

### 1. Input Image Frames

A video with different emotions is given as input, from which different face images are taken as input image frames.

### 2. Face Detection

The main purpose of this step is to detect face from the images from dataset. In this step individual images are taken from the dataset, scanned and then verified whether the image contains a face or just background image. The face determination system determines if the input data(image) is a face. After this step the result is sent for pre-processing so that facial features can be extracted from the face image.

### 3. Feature Extraction

This step is critical step as it extracts the features using the applied feature extraction algorithm. The steps performs compression of information, reduction irrelevant features as well as removing the noise of the data. After this, the facial region is converted into a vector with a given dimension in which the facial features correspond to their locations. After the prior step is done, analysis of the features is done and then the recognition part is used to learn each person's face and then store it in the database. After the model is trained, then the model is tested against a given input image. All the previous steps like pre-processing and others are performed again.

### 4. Classification

This is the last step for any image processing system. There are numerous methods and techniques to classify images. Neural network is a very powerful technique for classification. It works for both linear and non linear dataset. It works even for images not in the dataset as it is a self learning model which consists of many hidden layers.

### 4.2 DATA FLOW DIAGRAM

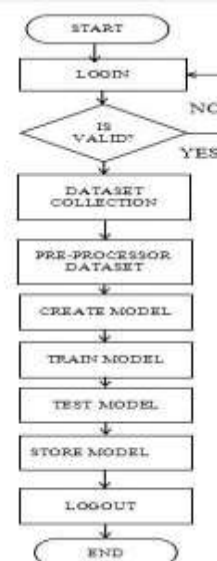


Fig. -2: Admin flow Diagram

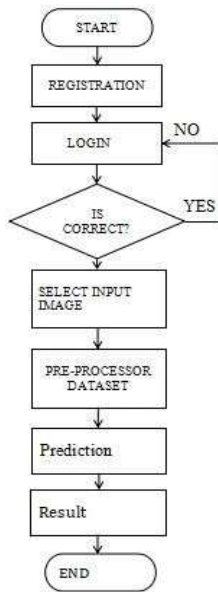
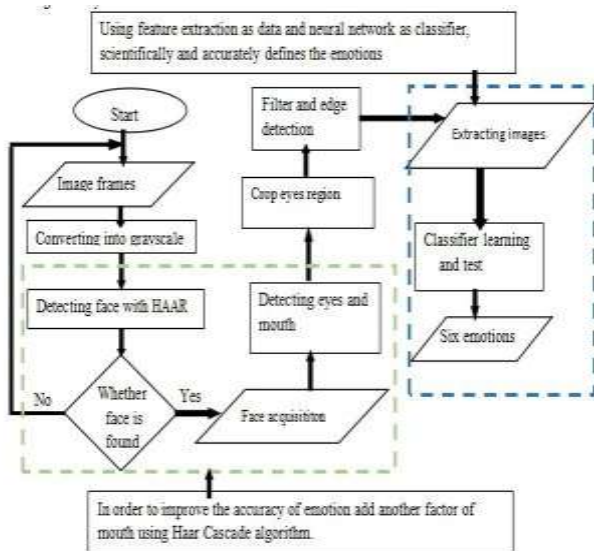


Fig. -3: User Data Flow Diagram

### 4.3 EVENT FLOW DIAGRAM

The following figure shows the flow of execution of events in the facial expression recognition system.



### 5. RESULTS AND SNAPSHOTS

This chapter contains the snapshots of the user interface of the proposed system showing the interface and the intermediate results.

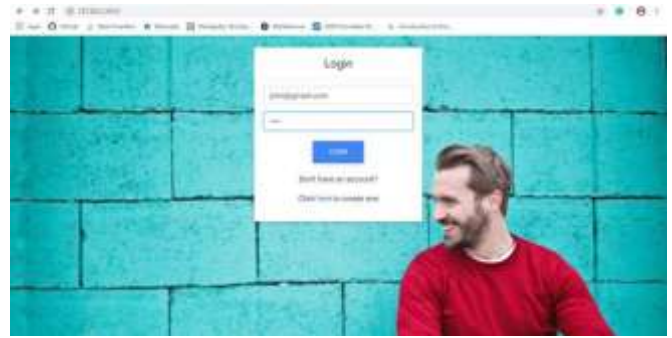


Fig. -3: Water Level 1 Representation



Fig: Registration form



Fig: Facial expression detection



Fig: Result of expression detection

## 6. CONCLUSIONS

Automation of the various components around us has been A proposed model to solve the problems of emotion recognition based on facial recognition in virtual learning environments, and the efficiency and accuracy are considered at the same time. Using HAAR Cascades to detect eyes and mouth and identify all kinds of emotion through the neural network method.

The application of emotion recognition in virtual learning environments is a much-researched topic. In addition to the change of uncertainty factors makes teachers and students face pattern is more complex, so the emotion recognition in the online learning network application mode is a very challenging topic.

## REFERENCES

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