# A PROJECT SYNOPSIS

“Facial Expressions Detection System using AI Based Techniques”

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**SUBMITTED TO SAVITRIBAI PHULE PUNE UNIVERSITY**

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**INTRODUCTION**

These Human facial expressions convey a lot of information visually rather than articulately. Facial expression recognition plays a crucial role in the area of human-machine interaction. Automatic facial expression recognition system has many applications including, but not limited to, human behaviour understanding, detection of mental disorders, and synthetic human expressions. Recognition of facial expression by computer with high recognition rate is still a challenging task.

Our emotion is revealed by the expressions in our face. Facial Expressions plays an important role in interpersonal communication. Facial expression is a nonverbal scientific gesture which gets expressed in our face as per our emotions.Facial expressions convey non-verbal cues, which play an important role in interpersonal relations**.** Facial expressions recognition technology helps in designing an intelligent human computer interface.

In this project we applied various deep learning methods (convolutional neural networks) to identify the key seven human emotions:

* **Neutral**
* **Angry**
* **Disgust**
* **Fear**
* **Happy**
* **Sadness**
* **Surprise**

**FACIAL EXPRESSION DESCRIPTION OF SEVEN BASIC EMOTIONS:**

* **Happy**- The eyebrows are relaxed. The mouth is open and the mouth corners upturned.
* **Sad**- The inner eyebrows are bent upward. The eyes are slightly closed. The mouth is usually relaxed.
* **Fear**- The eyebrows are raised ad pulled together. The inner eyebrows are bent upward. The eyes are open and tense.
* **Anger**- The inner eyebrows are pulled downward and together. The eyes are wide open. The lips are tightly closed or opened to expose the teeth.
* **Surprise**- The eyebrows are raised. The upper eyelids and the eyes are wide open. The mouth is opened.
* **Disgust**- The eyebrows and eyelids are relaxed. The upper lip is raised and curled, often asymmetrically.
* **Neutral**- The eyebrows as well as the mouth are relaxed.

**OBJECTIVE OF PROJECT**

It is important to note that there is no specific formula to build a neural network that would guarantee to work well. Different problems would require different network architecture and a lot of trail and errors to produce desirable validation accuracy.

* In this project we got an accuracy of almost 64.2% but due to lack of highly configured system we could not go deeper into dense neural network as the system gets very slow and we will try to improve in these areas in future.
* We would also like to train more databases into the system to make the model more accurate but again resources becomes a hindrance in the path.
* We can use this system to detect deepfake crime.
* We can use this system to prevent driving accidents by detecting whether driver’s eyes are open or not.
* Help people in emotion-related research to improve the processing of emotion data.
* Patient Monitoring in hospitals to judge the effectiveness of prescribed drugs is one application to the Health Sector.
* It can be used for the benefit of physically handicapped people like deaf and dumb. Using which other people or an automated system can understand their needs by observing their facial expression.

***Hardware Interfaces :***

1. Processor: Intel CORE i5 processor with minimum 2.9 GHz speed.

2. RAM: Minimum 4 GB.

3. Hard Disk: Minimum 500 GB

4. Good GPU

***Software Interfaces :***

1.Microsoft Word 2003

2. Database Storage: Microsoft Excel

3. Operating System: Windows10

4. Jupiter notebook

5. Python

6. Anaconda

**Technologies Used**

* **Anaconda**

It is a free and open source distribution of the Python and R programming languages for data science and machine learning related applications, that aims to simplify package management and deployment.

* **Jupyter Notebook**

It is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text.

* **Google Colab**

It allows anybody to write and execute arbitrary python code through the browser, and is especially well suited to machine learning, data analysis and education.

* **Python**

Python is a powerful scripting language and is very useful for solving statistical problems involving machine learning algorithms. It has various utility functions which help in preprocessing. It provides the pandas and numpy framework which helps in manipulation of data as per our need.

**Libraries And Packages**

* **OpenCV**

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products.

* **Numpy**

NumPy is an acronym for "Numeric Python" or "Numerical Python". It is an open source extension module for Python, which provides fast precompiled functions for mathematical and numerical routines.

* **Haar Cascade Classifier in OpenCv**

It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.Here we will work with face expression detection.

* **Keras**

Keras is a high-level neural networks API, written in Python and capable of running on top of TensorFlow, CNTK, or Theano. It was developed with a focus on enabling fast experimentation.

* **TensorFlow**

TensorFlow is a Python library for fast numerical computing created and released by Google. It is a foundation library that can be used to create Deep Learning models directly or by using wrapper libraries that simplify the process built on top of TensorFlow.