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**PROJECT PROPOSAL**

**TOPIC**

FACIAL EXPRESSION RECOGNITION INTELLIGENT SECURITY SYSTEM FOR REAL TIME SURVEILLANCE.

**ABSTRACT**

Facial Expression Recognition is a part of biometric authentication that focuses on uniquely recognizing human facial appearance based upon one or more intrinsic physical or behavioral traits and inside emotions portrayed on one’s face. This project is based on improving current surveillance systems by adding facial expression recognition to make a system that will detect a person’s expression and

The system captures ones feeling/expressions through a camera and send the footage for preprocessing before it can be extracted to see if the emotion/expression captured has the intentions of causing harm.

**PROBLEM STATEMENT**

The proliferation of AI has resulted in a surge of IoT-enabled systems for healthcare analytics, activity recognition and smart energy consumption. Since public safety is still a significant concern in many developing countries, security and surveillance are essential

components of an IoT-enabled smart home. Strangers or intruders who are overly aggressive towards vulnerable groups, such as women and children, commit most of these crimes, including break-ins, physical/sexual assaults, and rioting. The failure to identify the intentions of these intruders, which facilitates their evil designs. To tackle this alarming issue, a smart security and surveillance system that predicts human intentions can play a critical role in ensuring the safety of the people.

**METHODOLOGY**

**1.Emotion data acquisition.**

We will be using FER 2013 dataset which consists of people with distinct facial features like beard and moustache, different ethnic backgrounds, and varied facial complexions.

**2.Image to arrays**

The array module in NumPy ( nd.array ) is used to convert an image into an array and obtain the image attributes. So, we convert images with their respective attribute in pixels to a 2 dimensions and size 48 × 48 pixels

**3.Image to landmarks**

The haarcascade library is used to detect facial landmarks. This process consists of two steps, localize the face in an image and detect the facial landmarks.

**4.CNN architecture**

Machine learning models can be built and trained easily using a high-level Application Programming Interface (API) like Keras. In this project, a sequential CNN model is developed using Tensorflow with the Keras API since it allows a model to be built layer by layer.

**5.Compiling the model**

Compiling the model requires two parameters, optimizer and metrics. The optimizers used is Adam. The optimizer is used to update the weights in a DL model based on the loss. The metrics used are accuracy, categorical cross-entropy loss, precision, recall and F-score.

**6.Training the model**

To train the model, A function is used split the dataset into training and testing sets. A training ratio of 0.90 means 90% of the dataset will be used for training and the remaining for testing the model.

**7.Real-time face detection**

The facial visual information of a person is used for emotion analysis; therefore, accurate face detection in real-time with low latency is of prime importance. In this project, the haar facial cascade algorithm is adopted for the face detection module of the system. During real-time validation, suppose, in a video sequence frame, there exists a person in the video frame, the haar facial cascade algorithm is applied to extract the facial image from the frame using the Haar facial feature-based cascade classifier. The area of interest (AOI), i.e., the face is first localized, and a four-corner bounding box is formed to crop the AOI. The cropped facial image is fed into the system, which sends feedback after appropriate analysis.

**8.Emotion analysis strategy**

The facial emotion analysis system is triggered when the camera detects a person in the vicinity of the building, followed by the human face detection by the face detection module. Since a hostile or dangerous situation is governed by common expressions such as anger or aggression, the facial emotion analysis for such negative valence is conducted precisely as long as the face is in the frame. The security module is invoked if aggressive or angry faces are captured.