Real time Human Expression Using Artificial Intelligence and Augmented Reality

Ms.A.Sheebha
Dept of Information Technology
Dr.N.G.P. Institute of Technology

Abstract- *In computer vision and artificial intelligence, detecting and understanding human emotion is a major difficulty Emotions have an important role in human communication. The majority of communication is done through emotion. The Aim of the project is to achieve Augmented Reality with real time human expression using artificial intelligence. Some emotions, such as anger, sadness, happiness, surprise, fear, disgust, and neutral.*

Keywords- facial detection, Haar Cascade classifier, Convolutional Neural Network.

I. INTRODUCTION

One of the most potent tools of communication is human emotion and facial expression. Our ambitions have skyrocketed with the invention of modern technology, and they know no limitations..The looks on our faces disclose our emotions In interpersonal communication, facial expressions are crucial. Facial expression is a nonverbal scientific gesture in which our emotions are expressed in our faces. Real-time face expression is vital in artificial intelligence and robotics, and it is thus a generational requirement. Several projects in these domains have already been completed, and our goal will not only be to produce an augmented reality out of real-time facial emotions. To integrate real-time functionality into social networking apps for entertainment. This project can be used to research the many facial expressions that a machine can't recognize, as well as a filter for social media platforms like Facebook,Instagram,Snapchat The Aim of this project is to achieve Augmented Reality with Real Time human expressions using artificial intelligence and to convert the Realtime facial expressions into augmented reality.

A. Motivation

The emotions shown in the world-famous painting of Mona Lisa have sparked heated controversy in the past.

According to the British weekly "New Scientist," she is a mix of many distinct feelings, with 83 percent of her being pleased, 9 percent disgusted, 6 percent afraid, and 2 percent angry Observing the benefits of physically challenged people such as the deaf and dumb has also inspired us..However, if a normal human or an automated system can deduce their demands from their facial expression, it becomes much easier for them to persuade a fellow human or automated system to deduce their needs.

B. Learning Methods

The following are the several types of learning:

Supervised learning**:** Classifiers are learned from training data, and class labels are assigned to test data.

Unsupervised learning: There is no way to learn without any training data.

C. Problem Definition

Happy, sad, surprise, fear, anger, disgust, and neutral are the seven primary emotions that may be easily classified in human facial expressions. The activation of various sets of facial muscles expresses our facial emotions These seemingly modest, yet complex, signals in an expression frequently convey a wealth of information about our mental state. We can measure the effects of content and services on the audience/users using a simple and low-cost approach called facial emotion recognition. Retailers, for example, may use these indicators to assess client interest. Using extra information regarding patients' emotional states during therapy, healthcare providers can give better service. In order to continuously deliver desired material, entertainment producers can track audience involvement during events. Humans are well-trained in reading other people's emotions; in fact, babies as young as 14 months old can discern the difference between joyful and sad.Can machines, on the other hand, access emotional states better than we can? In order to address the question, we created a convolutional neural network that allows machines to infer our emotional states.To put it another way, we provide them with eyes to view what we see. Our project's problem statement is as follows:1.Frames are a sort of artificial intelligence data structure that represents "stereotyped circumstances" and is used to partition knowledge into substructures.2.In a

monochrome display or printing, grayscale refers to a range of gray tones ranging from white to black. Grayscale images are the most widely utilized in image processing because developers can do more complicated operations in less time with smaller data.is a computer technique that uses artificial intelligence (AI) to discover and identify human faces in digital photographs. Face detection has a substantial impact on the application's ability to perform consecutive activities. The act of retrieving a picture from an external source for subsequent processing is known as image acquisition. Filtering is a method of altering or improving an image. Edge detection is an image processing approach that identifies points in a digital image that have discontinuities, or sudden changes in image brightness. Feature extraction is a step in the dimensionality reduction process, which divides and reduces a large set of raw data into smaller groupings. As a result, processing will be simpler.

A. AUGMENTED REALITY

Augmented reality (AR) is an interactive experience of a real-world environment in which computer-generated perceptual information is used to augment the items in the real world, sometimes spanning many sensory modalities such as visual, aural, haptic, somatosensory, and olfactory. AR improves user engagement and interaction while also providing a more immersive experience.AR has been demonstrated to boost the perceived value of items and companies in studies. AR is mobile and personal, it is readily available to a fast rising smartphone market. Digital information may be superimposed and merged into our physical surroundings using Augmented Reality (AR). With so many of us at home due to a global epidemic, augmented reality is a technology that can help us turn our local surroundings into learning, work, and leisure areas. The main advantage of Augmented Reality is that it can be utilized by everyone, including people who are mentally or physically challenged. It blurs the border between the virtual and physical worlds, making it more usable and effective in the field of application. It has a highly interactive nature that allows it to examine multiple scenarios in advance. To assist psychiatrists in determining a person's mood level. It can also be used to implant emotions into robots in the robotics area. It aids in determining a person's dopamine level.

II. PROPOSED WORK

This application can read the Physical expressions real time and convert them into augmented reality.
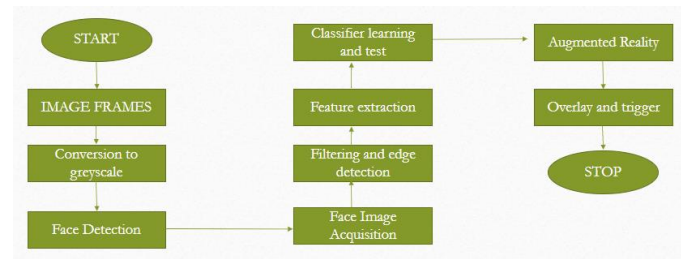
A. Training dataset

The first data needed to train machine learning models is known as training data (or a training dataset).Machine learning algorithms are taught how to make predictions or perform a task using training datasets.

B. Validation dataset

A validation dataset is a sample of data from your model's training that is used to estimate model competence while tuning the model's hyper parameters.

There are a number of facial datasets available on the internet, including:

1. Japanese Female Facial Expression (JAFFE)
2. FER
3. CMU MultiPIE
4. Lifespan
5. MMI
6. FEED
7. CK

C. Dataset

Face expression recognition dataset by Jonathan Oheix which is available in Kaggle is used.

D. Convolutional Neural Network

A convolutional neural network is a sort of artificial neural network that is specifically built to process pixel input and is used in image recognition and processing.

E.Support Vector Machine

The support vector machine (SVM) is a linear model for regression and classification issues. The concept of a support vector machine is straightforward. The method draws a line or a hyperplane through the data, dividing it into classes.

F. Haar Cascade Classifier

It is a machine learning object detection application that recognises items in a photograph. The haar cascade classifier is a good approach to recognise objects.

G.Eigen Face

Eigen face is the name given to a set of eigenvectors.

H.Cascade Classifier

It is a machine-learning-based method in which a cascade function is learned using a large number of positive and negative photos. It is then used in other images to detect objects. To train the classifier, the system requires a large number of positive(Images of faces) and negative images(images without faces) at first.

WEB AR

Web-based augmented reality (webAR) is a technology that allows consumers to access augmented reality experiences right from their smartphones People may enjoy the immersive and unique experience of AR on-demand on most operating systems, mobile devices, and web browsers because there is no need to download anything. WebAR uses a combination of technologies such as WebRTC, WebGL, WebVR, and contemporary sensor APIs to give web-based augmented reality through the web browser. The Frameworks used in Web AR:AR.js, ARtoolkit,argon.js, Awe.js, Three.ar.js, X3DOM.

The WebAR supported browsers are: Apple safari, Google Chrome, Microsoft Edge, Mozilla Firefox, Mozilla WebXR viewer, Samsung Internet, Servoset sets Simply open your phone's camera app, point your lens at the QR, and you'll be prompted to tap into your new WebAR experience You may easily integrate interactive content anywhere with this technology. You can list or publish your AR-enabled URL instead of utilizing QR codes if you wish.   (9)

SOFTWARE REQUIREMENTS

- FRONTEND:WEB AR FRAMEWORK
- LANGUAGE USED: Python version 3
- EDITOR USED: Visual Studio Code
- DATABASE STORAGE: Microsoft Excel
- OPERATING SYSTEM: Windows 8

HARDWARE REQUIREMENTS

- PROCESSOR: Intel Core i5 processor with minimum 2.9GHz speed

- RAM: Minimum 4 GB
- HARD DISK: Minimum 500 GB

IMPLEMENTATION DETAILS

The Database: The dataset used to train the model comes from a Face expression recognition dataset by Jonathan Oheix. The goal is to categorize each face into one of seven categories based on the emotion expressed in the facial expression (0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Neutral, 5=Sad, 6=Surprise).

Emotion labels in the dataset:

0: -3993 images- *Angry*
1: -436 images- *Disgust*
2: -4103 images- *Fear*
3: -7164 images- *Happy*
4: -4982 images- *Neutral*
5: -4938 images- *Sad*
6: -3205 images- *Surprise*

The Library & Packages :

OpenCV:

OpenCV (Open Source Computer Vision Library) is a free software library for computer vision and machine learning. OpenCV was created to provide a common infrastructure for computer vision applications and to help commercial goods incorporate machine perception more quickly. OpenCV is a BSD-licensed product, it is simple for businesses to use and alter the code. More than 2500 optimised algorithms are included in the library, which contains a comprehensive mix of both classic and cutting-edge computer vision and machine learning techniques. $x(x_i)$ and $Min(x_i)$ denotes the respective minimum and maxi These algorithms can be used to detect and recognise faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from flash images, follow eye movements, recognise scenery, and establish markers to overlay it with augmented realityOpenCV has a user group of about 47 thousand members and an estimated number of downloads of over 14 million. The library is widely used by businesses, research groups, and government agencies.It supports Windows, Linux, Android, and Mac OS and offers C++, Python, Java, and MATLAB interfaces. OpenCV is primarily used for real-time vision applications, and it makes use of

MMX and SSE instructions when they are available. CUDA and OpenCL interfaces with full functionality are currently being developed. Over 500 algorithms exist, with roughly ten times as many functions that compose or support them. The following are some of the areas where OpenCV can be used:

- 2D and 3D feature toolkits
- Facial recognition system
- Augmented reality etc..

KERAS:

Keras is a Python-based high-level neural network API that can operate on top of Tensor Flow, CNTK, or Theano. It was created with the goal of allowing for quick experimentation.

Keras includes many implementations of common neural network building components like layers, objectives, activation functions, optimizers, and a slew of other tools for working with picture and text data.The code is maintained on GitHub, and community support forums include a Slack channel and a GitHub problems page.Keras enables deep model productization on smartphones (iOS and Android), the web, and the Java Virtual Machine.It also enables distributed deep learning model training on clusters of Graphics Processing Units (GPU).Keras is a human-centric API, not a machine-centric one.It prioritizes the user's experience.

Keras adheres to best standards when it comes to decreasing cognitive burden. It provides consistent and simple APIs, reduces the number of user actions for common use cases, and provides clear and actionable feedback in the event of a user error. There are no separate declarative model configuration files. Models are written in Python code, which is small, easy to debug, and extensible.

III. CONCLUSION

The facial expression recognition system presented in this research work contributes a Realtime human expressions using Artificial Intelligence and Augmented Reality which can bring in the real time experience in Social Media apps like Instagram, Snapchat. The Main Scope of the project was to create a Real Time Filter for Social Media applications.
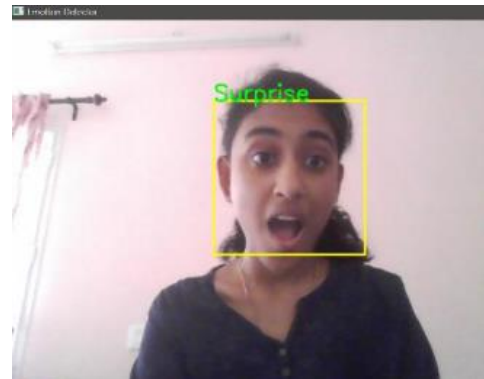
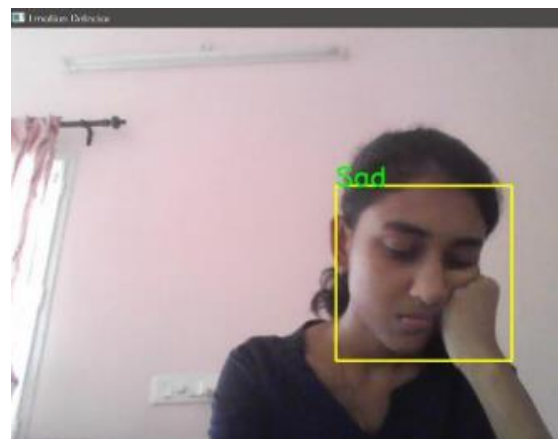**IMPLEMENTATION**

i. IMPLEMENTATION TEST(NEUTRAL)

ii. IMPLEMENTATION TEST(HAPPY)
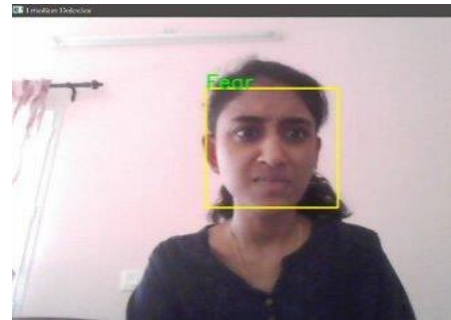
iii. IMPLEMENTATION TEST(FEAR)

iv. IMPLEMENTATION TEST(SURPRISE)

v. IMPLEMENTATION TEST(SAD)

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