IMPLEMENTATION OF COMPUTER VISION APPLICATION

FACE RECOGNITION

Facial recognition is a way of recognizing or verifying a person's identity by looking at their face. It identifies people in photos, videos, or real-time using facial recognition systems.
 Biometric security includes facial recognition. Also, voice recognition, fingerprint recognition, etc., are examples of biometric software. The technology is mainly used for security and law enforcement. But, there is growing interest in other applications.

FACE RECOGNITION ALGORITHM
Face detection and recognition systems or software have an underlying component named as face detection algorithm. These algorithms are divided into two central approaches by experts.

The geometric approach focuses on distinguishing features. The photo-metric statistical methods are used to extract values from an image. Then, the extracted values are compared to patterns to eliminate variances. Also, there are two other general categories which are feature-based and holistic models. In face detection, artificial neural networks are the most popular and successful methods. Mathematical calculations are used in facial detection algorithms. Because neural networks perform an array of numbers of mathematical operations simultaneously, the algorithm performs three main tasks; detect faces in an image, video, or real-time stream; calculate a mathematical modal of a face; compare models to training sets or databases to identify or verify a person.

When implementing computer vision in face detection, specialists train specific neural networks to detect human face landmarks and separate faces from other objects in an image. As landmarks, they use universal human facial features. For example, eyes, mouth, nose, etc. Convolutional Neural Network(CNN) is one of the breakthroughs of artificial neural networks(ANN) and AI development. It is one of the most popular algorithms. CNN work by breaking an image down into smaller groups of pixels called a filter. Each filter is a matrix of pixels. In the OpenCV method, first, the image acquisition section is completed. After that, they train the computer. Finally, face detection is first performed to determine the location of the face in the picture. This part is important for performing the face detection function.

HOW FACIAL RECOGNITION IS HELPFUL?

(1)Customer Tracking and People Counting
Counting devices placed throughout a retail store. They collect data about where and how long customers spend their time. Machine learning processes aid in this process. As a result, customer analytics can help retailers better understand customer interactions. Thus, they can optimize store layouts.
Data examples train computer vision algorithms. It also helps them to detect and count humans when seen. Stores can use people counting technology to collect data about their success. It can also be used in situations like COVID-19, where only a certain number of people can gather at a time.

(2)Waiting Time Analytics and Productivity Analytics
Retailers are implementing queue detection technology to avoid impatient customers and long lines. Cameras used in queue detection track and counted the number of people in a line. Moreover, the system sounds like an alert to open new checkouts once a certain number of customers has reached.

Productivity analytics monitors the effects of workplace changes, such as how employees spend their time and resources, the use of various tools. This type of information helps with time management, workplace collaboration, and employee productivity.

(3)Ensuring Safety, Theft Detection, and Managing Quality
Companies use distance detectors to ensure adherence to safety precautions. A camera monitors the movement of employees or customers. It also uses depth sensors to determine the distance between them. The system then draws a red or green circle around the person, depending on their position.
Quality management systems ensure that an organization meets the needs of its customers. It does so by addressing policies, procedures, instructions, and internal processes. This also ensures a high level of consumer satisfaction.
It is using computer vision algorithms that analyze the scene. Retailers can detect suspicious behavior like loitering or accessing off-limits areas.

OUTPUT:
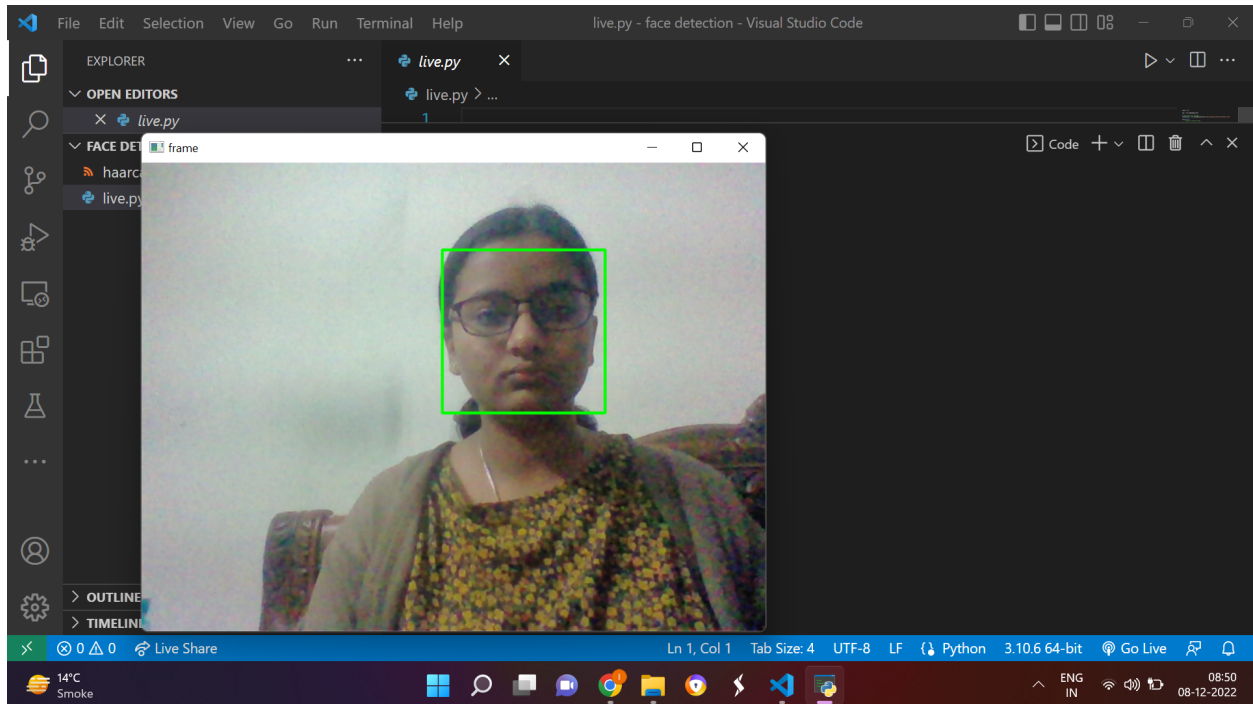
CONCLUSION

Hence, Face Recognition helps in detecting faces.In this whole project, we use Python OpenCV library, as a tool that speeds up the identification of Face, in an agile and efficient way.