

# CROP PROTECTION USING FACIAL RECOGNITION ALGORITHM

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***Abstract:** Agricultural loss caused by thieves presents a huge blow to the farmers as well as the country's economy. Even though the farmers strive hard to protect their yield, somehow the yield is stolen. These happen to be a continuous problem in the society frequently. Currently farmers are staying at the fields day and night to protect. This may not be always possible to a farmer each and every second to protect the yield. The aim of the project is to build a device called "Harvest Guard" in which facial recognition algorithm is used to detect the thieves. The device allows the farmer to monitor his field all the time and protect the yield from being stolen by the thieves. When the thief tries to steal the crop, this device detects and immediately notifies to the farmer so that the farmer can take immediate actions. With this invention we aim to reduce loss which the farmers get by the thieves.*

***Keywords:** Agricultural loss, crop protection, face recognition system, OpenCV.*

## I. INTRODUCTION

Facial Reputation is a biometric software application that can uniquely identify or verify a person's identity by evaluating and analysing patterns based entirely on the facial features of a man or woman. Facial popularity is often used for security purposes, although there may be increased popularity in other areas. The facial popularity era has garnered a lot of

attention as it accommodates a wide range of applications related to law enforcement and other businesses [1].

Face recognition is a sophisticated technology that helps to recognize and identify human faces from a photo or video. A contracted device that implements facial recognition and uses biometrics to map facial capabilities from a photo or video. Compare this to our large

database of registered faces to find an accurate fit. The popular facial technology gained recognition in the early 1990s when the US Department of Defense sought an era that could detect criminals sneaking across borders. The Department of Defense has engaged leading university scholars and practitioners in facial popularity by offering them research funding. OpenCV is a library used to perform image manipulation using programming languages such as Python. This project uses the OpenCV library to do real-time face detection using your webcam as the first camera [2].

Face detection can appear as a specific case for detecting the beauty of an object. In detecting object magnificence, the task is to determine the locations and sizes of all devices in an image that belong to a particular class. Examples include upper torso spans, pedestrians, and engines.

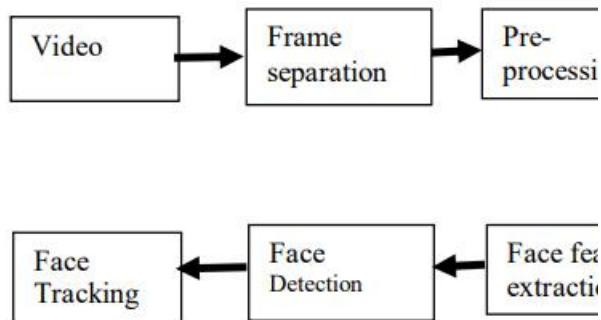
Knowledge of face detection algorithms in detecting frontal human faces. It is similar to photo discovery, where the person's photo is compared bit by bit. The image matches the image shops in the database. Any modification of facial features within the database will invalidate the matching system. A reliable approach for face detection is mainly based on a set of genetic rules and a subjective face approach[3].

First, potential regions are detected for the human eye by examining all valley regions in the image for gray level. A genetic algorithm is then used to generate all possible facial regions, including the eyebrows, iris, nostrils, and mouth corners.

Each possible candidate face is normalized to reduce the effect of lighting fixtures due to uneven lighting; and the wrinkling effect caused by head movement. The efficiency rating of each candidate is measured based on their face projection. After a series of iterations, all face candidates with a high fitness price are selected for a similar validation. At this level, facial symmetry is measured, and lifestyles with characteristic facial abilities are validated for each candidate's face.

### **Face Recognition System**

A typical Face Recognition system includes three stages. The first stage involves pre-processing. It includes image normalization, noise elimination, illumination, and normalization. The second stage is facial feature extraction from the processed image obtained in the first stage. Finally, third stage involves classification of facial images based on the results obtained in the previous stage. Figure 1 shows the typical face recognition system



**Fig.1** Typical Face Recognition System Architecture

## II. PROBLEM DEFINITION

Thieves are opportunistic. They seek out easy targets and choose items that can quickly be tossed in the trunk of a car or a truck bed. Farmers work hard throughout the year to grow crops and they protect the yield until it is marketed. Meanwhile the thieves may steal the crop which leads to a great loss to the farmers. Such incidents are frequently occurring throughout the country. We are developing a product called harvest guard in which facial recognition algorithm is used to recognize the thieves. It was stated in Chhattisgarh newspaper that some quintals of onions were theft in which caused a lot of loss to a farmer. Approximately 400 kilograms of garlic was stolen from a farm in some other area.

## III. LITERATURE SURVEY

C Rahmad and Muhiqqin [4] found around 5% more accuracy in Hog than haar cascade algorithm. And Haar cascade has

higher rate of false-positive detection in images. Face recognition method is mainly deal with images which contains large dimensions. This makes recognition very difficult. To overcome this problem dimension reduction was introduced. PCA is the most extensively used algorithm for dimension reduction and also for subspace projection. PCA is an unsupervised machine learning algorithm and it take the whole dataset consisting of d-dimensional samples and ignores all the class labels. It calculates the scatter matrix, covariance matrix and compute eigenvectors and corresponding eigenvalues.

Dadi HS and Pillutla [5] found more accuracy in HOG features based face recognition rather than holistic methods, such as PCA[2] or LDA.

Anila S, Devarajan N. [6] proposed a method of preprocessing by combining some preprocessing algorithms like histogram equalization, gabber filter.

Bora DJ, Gupta AK.[8] in 2016 proposed a new technique AERSCIEA for satellite color images. Which is a binary search based CLAHE and got far better result than CLAHE.

Guo G and Li SZ, Chan K. [9] represented the face recognition technique using linear support vector machines with the help of binary tree classification strategy. The

experimental results show that the SVMs are a better learning algorithm compare to the nearest centre approach for face recognition.

### **Artificial Intelligence**

Artificial Intelligence is an approach to make a computer, a robot, or a product to

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think how smart human think. AI is a study of how human brain think, learn, decide and work, when it tries to solve problems. And finally this study outputs intelligent software systems.

The aim of AI is to improve computer functions which are related to human knowledge, for example, reasoning, learning, and problem-solving. In computer science, **artificial intelligence (AI)**, sometimes called **machine intelligence**, is intelligence demonstrated by machines, in contrast to the **natural intelligence** displayed by humans. Colloquially, the term "artificial intelligence" is often used to describe machines (or computers) that mimic "cognitive" functions that humans associate with the human mind, such as "learning" and "problem solving".

Artificial intelligence can be classified into three different types of systems: analytical, human-inspired, and humanized artificial intelligence. Analytical AI has only

characteristics consistent with cognitive intelligence; generating a cognitive representation of the world and using learning based on past experience to inform future decisions. Human-inspired AI has elements from cognitive and emotional intelligence; understanding human emotions, in addition to cognitive elements, and considering them in their decision making. Humanized AI shows characteristics of all types of competencies (i.e., cognitive, emotional, and social intelligence), is able to be self-conscious and is self-aware in interactions. The traditional problems (or goals) of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects. General intelligence is among the field's long-term goals. Approaches include statistical methods, computational intelligence, and traditional symbolic AI. Many tools are used in AI, including versions of search and mathematical optimization, artificial neural networks, and methods based on statistics, probability and economics. The AI field draws upon computer science, information engineering, mathematics, psychology, linguistics, philosophy, and many other fields.

The field was founded on the claim that human intelligence "can be so precisely described that a machine can be made to simulate it". This raises philosophical arguments about the nature of the mind and the ethics of creating artificial beings endowed with human-like intelligence which are issues that have been explored by myth, fiction and philosophy since antiquity. Some people also consider AI to be a danger to humanity if it progresses unabated. Others believe that AI, unlike previous technological revolutions, will create a risk of mass unemployment.

#### IV. PROPOSED METHODOLOGY

The aim is to build a device called "HARVEST GUARD" in which facial recognition algorithm is used to detect the thieves. The device allows the farmer to monitor his field all the time and protect the yield from being stolen by the thieves. When the thief tries to steal the crop this device detects and immediately notifies to the farmer so that the farmer can take immediate actions. With this invention we aim to reduce loss which the farmers get by the thieves. This product main intention is to reduce the illegal activities by the thieves and give support to Farmers and business organizations to secure their properties.

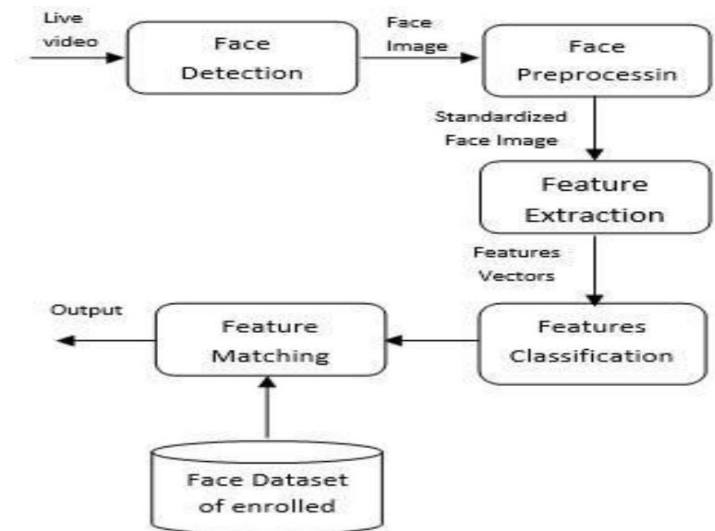


Fig. 2 Proposed work flow diagram

#### FACE RECOGNITION WITH OPEN CV

OpenCV was started at Intel in 1999 by **Gary Bradsky**, and the first release came out in 2000. **Vadim Pisarevsky** joined Gary Bradsky to manage Intel's Russian software OpenCV team. In 2005, OpenCV was used on Stanley, the vehicle that won the 2005 DARPA Grand Challenge. Later, its active development continued under the support of Willow Garage with Gary Bradsky and Vadim Pisarevsky leading the project. OpenCV now supports a multitude of algorithms related to Computer Vision and Machine Learning and is expanding day by day. OpenCV supports a wide variety of programming languages such as C++, Python, Java, etc., and is available on different platforms including Windows, Linux, OS X, Android, and iOS. Interfaces for high-speed GPU operations based on

CUDA and OpenCL are also under active development.

## **Applications**

### **a. Facial motion capture**

Facial motion capture is the process of electronically converting the movements of a person's face into a digital database using cameras or laser scanners. This database may then be used to produce CG (computer graphics) computer animation for movies, games, or real-time avatars. Because the motion of CG characters is derived from the movements of real people, it results in a more realistic and nuanced computer character animation than if the animation were created manual.

### **b. Facial recognition**

Face detection is used in biometrics, often as a part of (or together with) a facial recognition system. It is also used in video surveillance, human computer interface and image database management

### **c. Photography**

Some recent digital cameras use face detection for autofocus. Face detection is also useful for selecting regions of interest in photo slideshows that use a pan-and-scale Ken Burns effect. Modern appliances also use smile detection to take a photograph at an appropriate time.

### **d. Marketing**

Face detection is gaining the interest of marketers. A webcam can be integrated into a television and detect any face that walks by. The system then calculates the race, gender, and age range of the face. Once the information is collected, a series of advertisements can be played that is specific toward the detected race/gender/age. An example of such a system is Optim Eyes and is integrated into the Am screen digital signage system.

### **e. Emotional Inference**

Face detection can be used as part of a software implementation of emotional inference. Emotional inference can be used to help people with autism understand the feelings of people around them.

### **f. Lip Reading**

Face detection is essential for the process of language inference from visual queues. Lip reading has applications in help computers determine who is speaking which is needed when security is important

## **V. RESULTS**

In this implementation we are using python programming language to write the programme. It uses various libraries to implement the proposed approach.



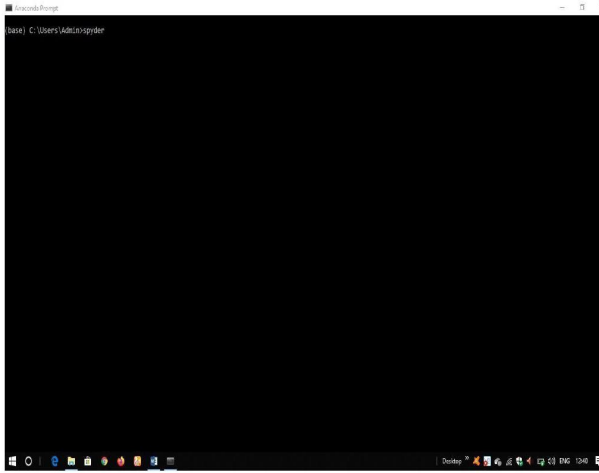


Fig.3 Command prompt opening

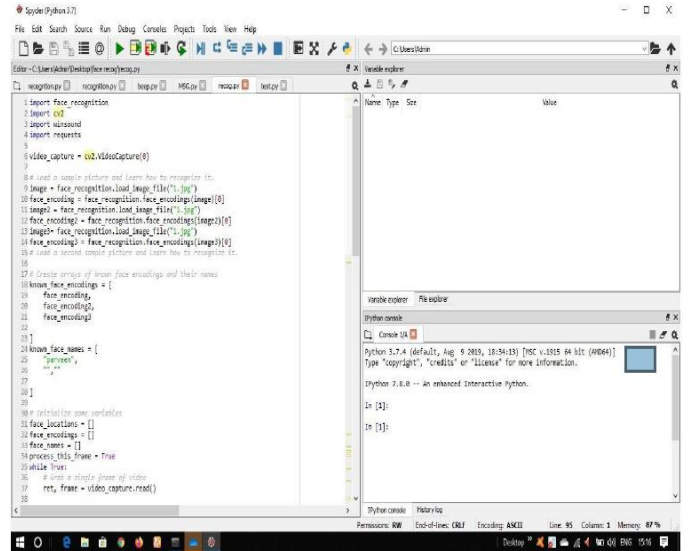


Fig.5 Running code

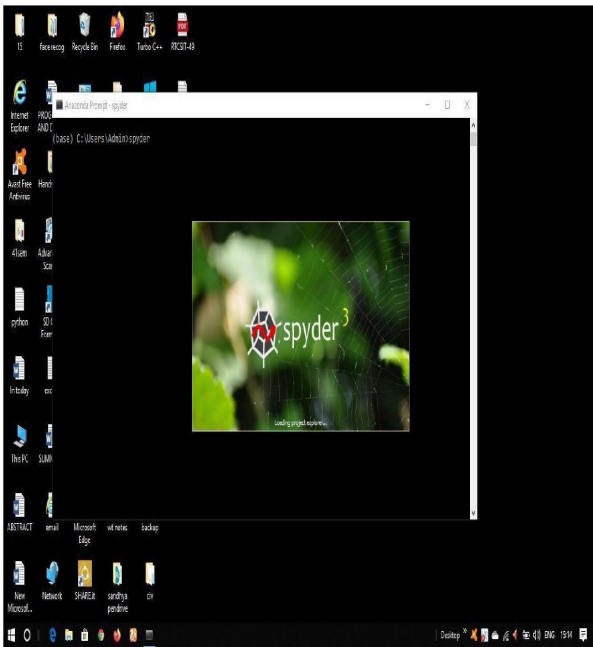


Fig. 4 Anaconda prompt

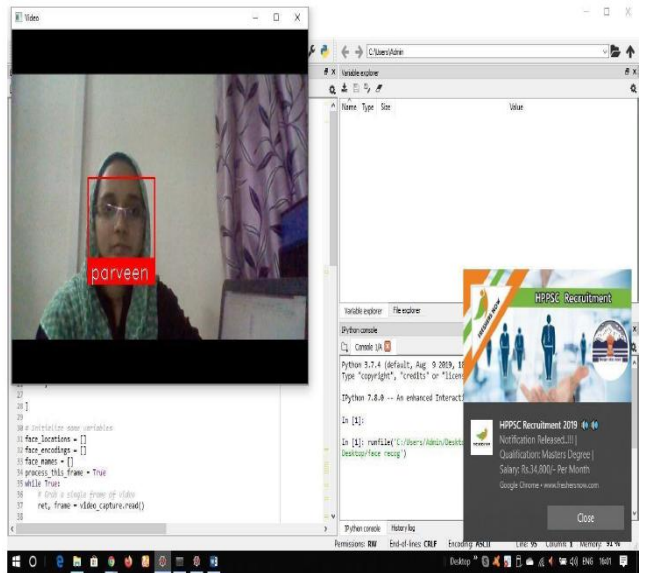
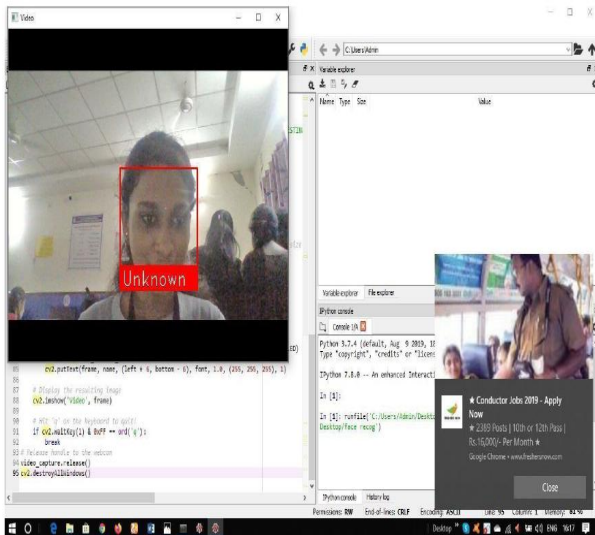
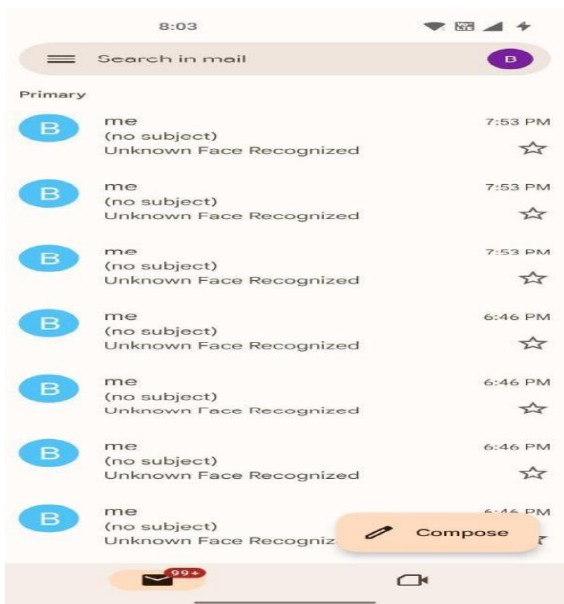


Fig.6 know face recognition



**Fig.7 Unknown face recognition**



**Fig.8 Mail alert while unknown face detected**

**VI. CONCLUSION**

In the present work, we propose an algorithm for face recognition under unconstrained settings, such as heterogeneous illumination and severe occlusions. By training models that only describe features of limited regions of the

face, we confer our algorithm a robustness to events where all other regions are occluded. In an attempt to replicate the global precedent hypothesis of the human brain's cognitive mechanisms of perception, we designed an innovative hierarchical recognition algorithm, where face recognition is performed locally only if a more global representation is not capable of achieving a decision with a high degree of certainty. Even though good performance was observed for a wide variety of non-ideal conditions, some ideas are worth noting for future research in the area.

**VII. FUTURE ENHANCEMENT**

This type of system can be used by concerned Government and Public organizations for continuous security purpose for our identification of thieves. Face recognition technology has come a long way in the last twenty years. Today, machines are able to automatically verify identity information for secure transactions, for surveillance and security tasks, and for access control to buildings etc. These applications usually work in controlled environments and recognition algorithms can take advantage of the environmental constraints to obtain high recognition accuracy. However, next generation face recognition systems are going to have widespread application in smart



environments -- where computers and machines are more like helpful assistants.

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