

# Face Liveness Detection using OpenCV and Python

Meenu Shukla\*, Shashank Tyagi\*\*, Jayant Tomar\*\*, Pradeep Yadav\*\*

Information Technology, Abdul Kalam Technical University Lucknow (U.P.)

## ABSTRACT

In this paper, we have used Open CV and Python, for identifying and detecting human faces. This study outlines the ways that open CV which is a crucial component of the computer science field can be used to identify faces utilizing a variety of libraries including Dlib, Open CV and Python. This paper includes advocated methodology that will improve in real time image retrieval. This solution issuitable for a variety of hardware platforms including Console devices, and software programmers.

**Keywords:** Face Detection, Liveness Detection, Open CV, etc.

## I. INTRODUCTION

Face recognition technique examines a user's distinct face to determine actual uniqueness. Such kind of system is suited to static photos, images, and moment devices. Our aim in writing this paper is to offer a basic and straight forward methodology rooted in computer technology. Using certain technology, it is indeed possible to swiftly learn features with gesture signals provided by the system which resemble a user's external look. First most successful way for recognizing a person's face is one that uses Python and Open CV programming languages are used with this work. This method is useful in many areas along with the defence, safety, education, aviation, finance, web-based apps, and sports. It employs a powerful Python tool to make liveness detection of face and identification in a prominent way [1] [2].

### 1.1 INSPIRATION:

The biometric authentication procedure makes work easier is the most practical area in which face recognition is crucial. Biometric system's is among the frequently utilized technique which ensure effective and efficient results. It includes collecting of documents supplied from the database from a variety of domains including educational, hospitality and other various institutions punctuality system.

It could aid in the capture of criminals or any other ill intentions person along with the safety of ordinary individuals and critical safety zones around the globe. Face recognition technology can be used by the government to defend against internet scams, find lost person's, count or conduct censuses, and validate voter lists also. E-commerce is widely employed in pharmaceutical and healthcare industries. This necessitates the development of an actual system for facial identification that the general people and the admin governments may utilize for much usage. Many jobs will be simplified along these improved and emerging technologies.

### 1.2 PROBLEM STATEMENT:

A popular direction of computer vision research, biometric recognition is widely used in security systems due to its safety and convenience. Nowadays some common biometric recognition methods include face recognition, fingerprint recognition, iris recognition, voice recognition, etc. are used for authenticating a person's identity. Among these methods, face recognition is supposed to be the most convenient compared with others. The main purpose is to implement this technology is to identify a person's liveness while utilize device webcam. Python, deep learning programming language an Open Face tool is used for this purpose [3] [4].

## II. LITERATURE REVIEW

Kortli Yassin, Maher Jridi, Ayman Al Falou, and Mohamed Atri. "Face recognition systems:	2020	The techniques are used to detect specific geometric features, according to geometric information of the face surface	It determine the creation of 3D face of a person and detection of different landmarks.
Adjabi, I., Ouahabi, A., Benzaoui, A. and Taleb-Ahmed, A., 2020. Past, present, and future of face recognition.	2020	They proposed the levels of development in field of face recognition system and its history and development with modern technology.	Paper gives the brief analysis of the different phases and methods for the detection of face liveness detection developed..
Abudarham Naphtali, Lior Shkiller, and Galit Yovel. "Critical features for face recognition"	2019	Proposes the modern framework's that is similar perceptual representation of the faces and integrates, cognition and perception to account for human enhanced recognition of familiar faces.	Paper provides a brief information on the contrast to current views that are founded as subset of feature's used for matching unfamiliar faces, are also used for matching and recognition of familiar faces
Lacey Best Rowden , Anik Jain	2017	Proposed a longitudinal study of face detection system.	.Paper focus on uniqueness and permanence and its properties, It also calculates specific variability, and the influence of age, sex, race, and face image quality on the bases, and Longitudinal analysis shows decrease in the trend
Saptarshi Chakraborty , Drubajyoti das	2014	Categorization based on different type techniques used for liveness detection.	A secure system which works on face liveness detection must prevent against spoofing attacks , as they are vulnerable to fake face identification and future development must focus on solution for spoofing.

**2. 1 LITERATURE READING:**

The face recognition is prominent methods for recognizing faces, also called as "basis functions" in mathematical. The elements are organized to reflect different levels of face variance.

Chord fitting is different way for face images. Chord comparison may be utilized to develop for entity & feature extraction by refining a finding solution. [5],[6],[7]

Random analysis of non - stationarity tensor temporal show depended on the HMM model is used to the recognitions of user's faces by subdividing it into many features including the eye, nose, ears, and so on, with Hidden Markov Models. Faces recognition and suitable fitting are 87% reliable because it continually offers prominent and right choice of faces detection utilizing saved info. Instead, the applicable model reveals the identification of the faces.

Spatial image acquisition is a method that relies on the angular forms of the facial. The geometry facial design yields a large adequate sample for a facial expression detection and identification systems. These approaches are used for face detection and identification. This system looks to respond faster and it's good

Among the ways is structural adjustment, whereby the trial picture is stored as a double arrays of numbers that are checked by Distance function with a perfectly smooth showing the entire face.

To depict an approach which alternatively employ many face templates via a variety of perspectives.

**III. METHODS**

Gary Brad ski suggested the concept of OpenCV, which could function on several levels. OpenCV has several notable things and benefits those are instantly obvious. OpenCV aids in the identification of a user's anterior profile and creates Xml data for numerous locations like anatomical structures.

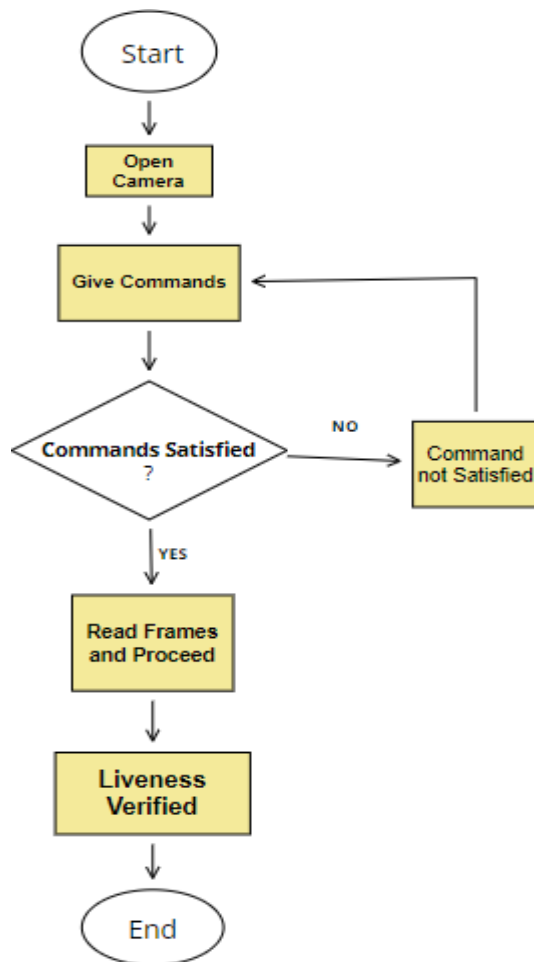
Machine learning has just emerged in the field of gesture recognition. As a result, facial detection and machine learning serve as high measure teaching methods. In summary, machine learning in face identification will essentially operate on two aspects, one of which is taking the surety input data as well as any applicable photo and the next of which is generating the best results again for image of the photo. We would arrange the face assessment using the Dlib face detection architecture. The two major components in the system are Dlib and Liveness

Detection.[8]

Python has shown to be the most effective in verification and warning systems. Python is a strong software language that is widely used across the globe. Facial detection is surprisingly simple and accurate thanks to the Python language with OpenCV.

**3.1 REQUIREMENT OF AUTOMATION IN TECH:**

In light of rapid growth for tech that can help in fields such as safety and spying, this sort of person identity it could no more by accomplished fundamental handmade methods. As a result, is an increasing demand for automation capable of handling real recognition's software and swiftly correcting mistake's. If job gets accomplished by technology, it may be done successfully in a small time- frame and all person mistake is eliminated. A actual Visual interface detection system, able to be implemented in a range of method. In fig: 3.1 the flowchart of this model is proposed.



**Fig 3.1: Flowchart**

### 3.2 GUI:

A GUI is just a platform supports manual input and some sort of computer interlinkage (GUI). GUIs are used in portable apps, mp3 & variety of different items. Users may code in human-to-human communication and create optical display, periodic activity of the GUI in any piece of Software's. The development and testing-phases will have a significant impact on the site's GUI, enabling for picture gathering and mentoring.

Python, is the basic minimum requirements again for system comprise the required info. Gadget might require higher chipset, as well as a multiple CPU threads core. the operating like win 10, as well as 8GB of ram. A desktop with a live internet access & scanner's, are necessary foroperator.

### IV. DEFINED ORDER FOR DESIGNING SYSTEM

For creating the system, we should first collect the facts. So that the picture pixels are high definition the face detection would do numerous procedures. All jobs are completed with the Python commands. In entry the information to beacquired in will be utilized. Its method will give perfect layout when appearance is concerned.

Identifying faces separately. Next doc identify as Python files will include necessary approaches for identifying a guy's face from database photo. The python commands will run the specified file & editing like cropping the image to acquire a close enough match to the intended outcome. Current model, in conjunction with Python libraries, will improve the outcomes of the face liveness detection system. Fig 4.1 depicts the block diagram of the model.

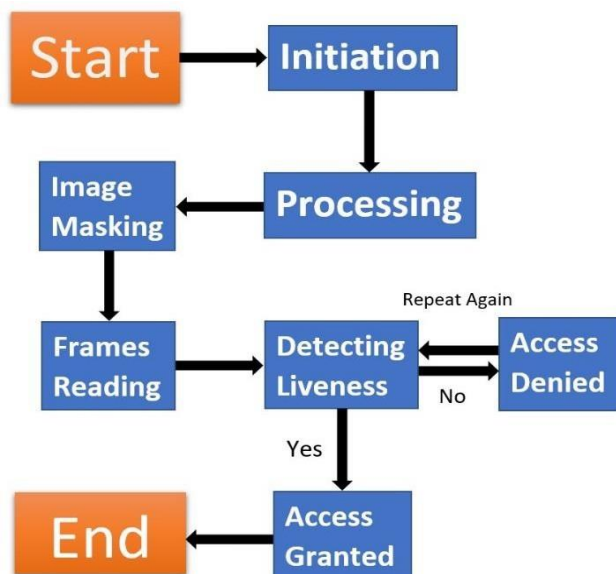


Fig 4.1: Liveness detection system design

### V. ADVANTAGES AND DISADVANTAGES

Face liveness detection system features include rapid response, identity automating, intrusion of privacy, large data store, better results, heightened security, actual face liveness detection of students in school's & college's, workers in main offices & more.

Several disadvantages include the lack of financing, the requirement for really high-end sensors, or the possibility of data quality restrictions. Huge chunk of information are required for the particular system to successfully operate as, since small photographs made detecting faces more difficult. Profile angles might also affect face liveness detection accuracy.[8]

### VI. CONCLUSION

The work of facial recognition is made easier by the fact that recognition systems are currently connected to numerous leading technology enterprises and industries. It will give faster & useful tool machine which is constructed based on requirement of user using Python language and its libraries as d-lib and open-cv. As its client and cost-effective, the proposed solution in just this work would assist a large number of individuals. So, a face liveness detection may be built with Python and open-cv for a range of applications.

### REFERENCES

- [1]. Margarita N. Favorskaya, "Face presentation attack detection: Research opportunities and perspectives", Intelligent Decision Technologies, vol.17, no.1, pp.159, 2023.
- [2]. Derek Apgar, Muhammad R. Abid, "Survey of Face Liveness Detection for Unsupervised Locations", 2021 IEEE 12th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON), pp.0162-0168, 2021.
- [3]. Wang M, Deng W. Deep face recognition: A survey. Neurocomputing. 2021 Mar 14;429:215-44.
- [4]. Kortli, Yassin, Maher Jridi, Ayman Al Falou, and Mohamed Atri. "Face recognition systems: A survey." Sensors 20, no. 2 (2020): 342.
- [5]. Adjabi, I., Ouahabi, A., Benzaoui, A. and Taleb-Ahmed, A., 2020. Past, present, and future of face recognition: A review. Electronics, 9(8), p.1188.
- [6]. Abudarham, Naphtali, Lior Shkiller, and Galit Yovel. "Critical features for face recognition." Cognition 182 (2019): 73-83.

- [7]. Deeba, Farah, et al. "LBPH-based enhanced real-time face recognition." *International Journal of Advanced Computer Science and Applications* 10.5 (2019).
- [8]. X Song, X Zhao, L Fang et al., "Discriminative representation combinations for accurate face spoofing detection[J]", *Pattern Recognition*, vol. 85, pp. 220-231, 2019.
- [9]. P Zhang, F Zou, Z Wu et al., "FeatherNets Convolutional Neural Networks as Light as Feather for Face Anti-spoofing[C]", *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*, pp. 0-0, 2019.
- [10]. S Zhang, X Wang, A Liu et al., "A Dataset and Benchmark for Large-scale Multi-modal Face Anti-spoofing[C]", *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pp. 919-928, 2019.
- [11]. X Yang, W Luo, L Bao, Y Gao, D Gong, S Zheng, et al., "Face anti-spoofing Model Matters So Does Data[C]", *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pp. 3507-3516, 2019.
- [12]. Masi, Iacopo, Yue Wu, Tal Hassner, and Prem Natarajan. "Deep face recognition: A survey." In 2018 31st SIBGRAPI conference on graphics, patterns and images (SIBGRAPI), pp. 471-478. IEEE, 2018.
- [13]. Phillips, P. Jonathon, et al. "Face recognition accuracy of forensic examiners, super recognizers, and face recognition algorithms." *Proceedings of the National Academy of Sciences* 115.24 (2018): 6171-6176.
- [14]. GBD Souza, Paulo Papa João and A N Marana, "On the Learning of Deep Local Features for Robust Face Spoofing Detection[C]", *2018 31st SIBGRAPI Conference on Graphics Patterns and Images (SIBGRAPI) IEEE*, pp. 258-265, 2018.
- [15]. Y Atoum, Y Liu, A Jourabloo et al., "Face anti-spoofing using patch and depth-based CNNs[C]", *IEEE International Joint Conference on Biometrics IEEE*, 2018
- [16]. Y Liu, A Jourabloo and X Liu, "Learning deep models for face anti-spoofing Binary or auxiliary supervision[C]", *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pp. 389-398, 2018.
- [17]. A Jourabloo, Y Liu and X Liu, "Face de-spoofing Anti-spoofing via noise modeling[C]", *Proceedings of the European Conference on Computer Vision (ECCV)*, pp. 290-306, 2018.
- [18]. Liu, Weiyang, et al. "Sphere face: Deep hypersphere embedding for face recognition." *Proceedings of the IEEE conference on computer vision and pattern recognition*. 2017.
- [19]. Best-Rowden, L. and Jain, A.K., 2017. Longitudinal study of automatic face recognition. *IEEE transactions on pattern analysis and machine intelligence*, 40(1), pp.148-162.
- [20]. Nech, Aaron, and Ira Kemelmacher-Shlizerman. "Level playing field for million scale face recognition." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*. 2017.