Face Match Detection using AI and ML

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Abstract: *Artificial intelligence and machine learning are the part of computer science that are correlated with each other. Application of AI & ML is increasing rapidly. Face detection has over time proven to be the least intrusive and fastest form of biometric verification. Facial Detection is a category of biometric software that maps an individual's facial features and stores the data as a face print. The software uses deep learning algorithms to compare a live captured image to the stored face print to verify one's identity.*

Keywords: Python, OpenCV, TensorFlow, Face detection, Feature extraction, Face recognition

I. INTRODUCTION

Face detection has been a challenging research field since its emergence in the 1990s. Before 2000, despite many studies, the practical performance of facial recognition was far from satisfactory until the milestone work proposed by Viola and Jones. Artificial Intelligence and Machine Learning (AI & ML) represents a great research opportunity in creating new fields in engineering, and Computing. AI is everywhere, from gaming stations to maintaining complex information at work. Computer Engineers and Scientists are working hard to impart intelligent behavior in the machines making them think and respond to real- time situations.

AI is transiting from just a research topic to the early stages of enterprise adoption. AI becoming popular nowadays and enter quickly in this emerging market. Artificial Intelligence and Machine Learning are much trending and also confused terms nowadays. Machine Learning (ML) is a subset of Artificial Intelligence. ML is a science of designing and applying algorithms that are able to learn things from past cases. If some behavior exists in past, then you may predict if or it can happen again. Means if there are no past cases then there is no prediction.

II. OBJECTIVE

The main objective of this project is to implement a low cost, reliable and faster face match detection system that can be used to live captured image to the stored face print to verify one's identity. In recent years face recognition has received substantial attention from researchers in biometrics, pattern recognition, and computer vision communities. There is a large number of commercial, securities, and forensic applications requiring the use of face recognition technologies. As you can see, face recognition system is very important in our daily life. It is possessing a really great advantage.

III. LITERATURE REVIEW

Face detection is a computer technology that determines the location and size of human face in arbitrary (digital) image. The facial features are detected and any other objects like trees, buildings and bodies etc. are ignored from the digital image. It can be regarded as a specific 'case of object-class detection, where the task is finding the location and sizes of all objects in an image that belong to a given class. Face detection, can be regarded as a more general 'case of face localization. In face localization, the task is to find the locations and sizes of a known number of faces (usually one). Basically, there are two types of approaches to detect facial part in the given image i.e., feature base and image base approach. Feature base approach tries to extract features of the image and match it against the knowledge of the face features. While image base approach tries to get best match between training and testing images.
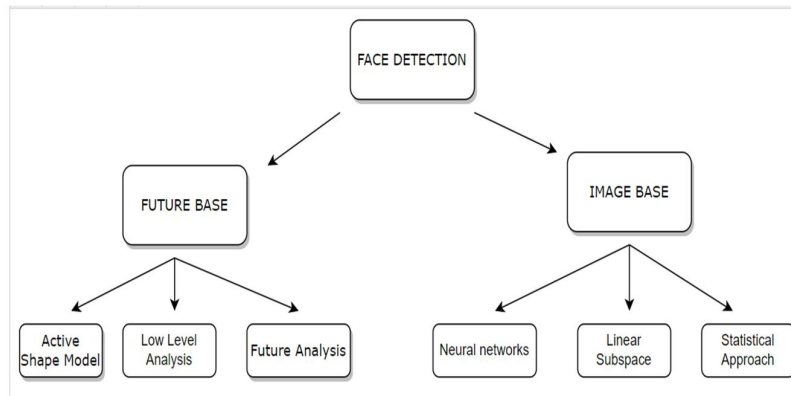
3.1 Siamese Model:
A. Algorithm
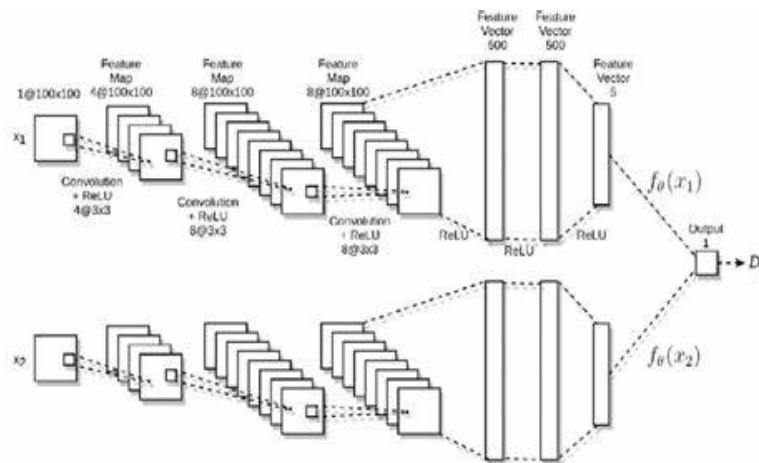
B. KIVY

Kivy - Open-source Python library for rapid development of applications that make use of innovative user interfaces, such as multi-touch apps.

C. Cross Platform

Kivy runs on Linux, Windows, OS X, Android, iOS, and Raspberry Pi. You can run the same code on all supported platforms. It can natively use most inputs, protocols and devices including WM Touch, WM Pen, Mac OS X Track pad and Magic Mouse, Mtdev, Linux Kernel HID, TUIO. A multi-touch mouse simulator is included.

D. Business Friendly

Kivy is 100% free to use, under an MIT license (starting from 1.7.2) and LGPL 3 for the previous versions. The toolkit is professionally developed, backed and used. You can use it in a commercial product. The framework is stable and has a well-documented API, plus a programming guide to help you get started.

E. GPU Accelerated

The graphics engine is built over OpenGL ES 2, using a modern and fast graphics pipeline. The toolkit comes with more than 20 widgets, all highly extensible. Many parts are written in C using Cython, and tested with regression tests.

IV. CONCLUSION

The computational models, which were implemented in this project, were chosen after extensive research, and the successful testing results confirm that the choices made by the researcher were reliable. The system with manual face detection and automatic face recognition did not have a recognition accuracy over 90%, due to the limited number of eigen faces that were used for the PCA transform. This system was tested under very robust conditions in this experimental study and it is envisaged that real-world performance will be far more accurate. The fully automated frontal view face detection system displayed virtually perfect accuracy and in the researcher's opinion further work need not be conducted in this area.

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