

FACE RECOGNITION ATTENDANCE SYSTEM

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ABSTRACT

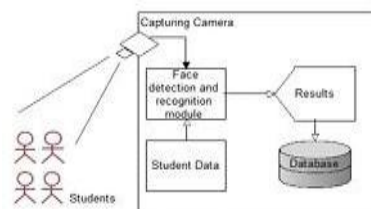
In this era of information technology, authentication is a significant problem. Nowadays the attendance taken in class is by oral mean and all that attendance is managed by teacher but face recognition system will be in use for the authentication and to manage all the data of attendance in this system. This paper proposes one of the solution for attendance of student in the class by using face recognition technique. Here, technique of neural networks is used to classify facial objects.

INTRODUCTION

In the day to day life of college and universities the attendance is recorded manually time to time. On regular basis the staff has to maintain the record valid and correct of attendance with proper mechanism. There are two types of student attendance system, i.e. manual attendance system and automated attendance system. Manual attendance includes recording of large number of students in classroom and that requires more time to record and calculate of average attendance and this project may lessen the burden of staff.

Face recognition attendance system involves the process of extracting key features of face image of the student when student enters the classroom or when everybody is in their seats. A facial recognition system technology is capable for identification, verifying persons face from digital image or video frame of video source. After detection of faces from image system will calculate face features and will compare to already stored database to record the attendance.

Fig 1 : Block diagram

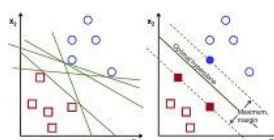


ALGORITHMS

A. SVM

The objective of the support vector machine algorithm is to find a hyper-plane in an Multi-dimensional space that distinctly classifies the data points.

Fig 2: Hyper-plane



To separate the two different classes of data points, there are many possible hyper-planes that could be chosen. Our objective is to find a plane that has the maximum margin, i.e. the maximum distance between data points of two different classes.

Maximizing the margin distance provides some reinforcement so that future data points can be classified with more efficiency. Support vector machine is another algorithm like linear regression and logistic regression that every machine learning student should have in his arsenal. Support vector machine is highly preferred by many as it produces much better accuracy with less computation power. Support Vector Machine can be used for both regression and classification tasks. But, it is widely used in classification objectives.

B. Neural Networks

In a simple word, Neural networks are a set of algorithms, modeled loosely after the human brain, that are designed to recognize patterns. They interpret data through a kind of machine perception, labeling or clustering raw input.

The patterns they recognize are numerical contained in vectors, into which all real-world data, whether it is images, sound, text or time series but must be translated. Neural networks help us cluster and classify. , Neural networks help to group unlabeled data according to similarities among the example that are provided as input , and then classify the data when they have a labeled dataset to train on. In our model, the neural network is applied on the face feature by marking the node points on all over the face.

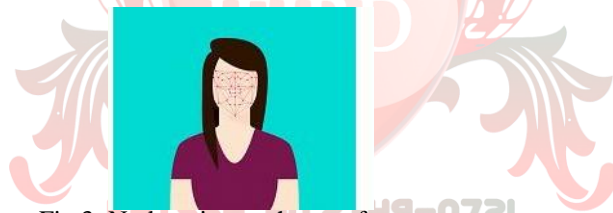


Fig 3: Node points on human face

TECHNOLOGIES USED

A. PYTHON:

Python is an interpreted, high-level, general-purpose programming language. To implement your machine learning (ML) model, you should use a programming language that is stable, flexible, and has tools available. Python offers all of this, which is why we see lots of Python ML projects today. From development to deployment and maintenance,

Python helps students to be productive and confident about the model they're building. Benefits that make Python the best fit for machine learning model include simplicity and consistency, access to great libraries and frameworks for ML, flexibility, platform independence, and a wide community. These add to the overall popularity of the language. Python is platform independent.

Python is supported by many platforms including Linux, Windows, and macOS etc. Python code can be used to create standalone executable programs for most popular platforms present today, which means that Python software can be easily distributed and used on those operating systems without a Python interpreter.

B. PyCharm IDE

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is totally free and open-source. We prefer PyCharm because it is much more user-friendly, powerful and configurable as compared to other IDEs and it also provides support for various handy plugins, and a lot of useful keyboard shortcuts.

C. *OpenCV*

The OpenCV (Open Source Computer Vision) is a high performance library of python programming functions mainly aimed at real-time computer vision. In simple language it is library used for digital Image Processing. It is used to manipulate pixel based graphics.

It helps us to load a model from storage and then pre-process an input image and to finally pass the image through the network and obtain the output classifications. The architecture of Neural Network is highly compatible with OpenCV.

D. *Dlib*

The Dlib is a general purpose cross-platform software library. It is open source library. The library is originally written in C++, it has good python interfacing. We have majorly used dlib for face detection.

The CNN (Convolutional Neural Network) based face detector is already available in dlib. The CNN based detector is capable of detecting faces in various angles. Dlib along with OpenCV can handle poor lighting conditions and various facial positions such as tilted or rotated faces with affine transformation.

D. *Numpy*

The NumPy is a library for the Python programming language used for scientific calculations, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions. NumPy uses much less memory to store data.

Convolutional Neural Networks (CNN) involves lot of Multiplication and this multiplication becomes easy with knowledge of Matrix multiplication from Matrix Algebra. For all these mathematical calculations, Numpy comes very handy tool to use. It is a very important library on which almost every machine learning Python packages are available such as Scikit-learn.

E. *Scikit-learn*

In Python, scikit-learn is a widely used library for implementing various ML/AI algorithms. SVM is also available in the scikit-learn library.

Scikit-learn features various classification, regression, and clustering algorithms, including support vector machines (SVM) and is designed to work with the Python numerical and scientific libraries like NumPy

F. *Anaconda*

Anaconda is a distribution of Python with simplified package management. Using anaconda, it is easier to have multiple python environments with different configurations and to switch between them as per the system. The anaconda package manager makes it easier to resolve conflicts between multiple versions of a package required by different packages.

Anaconda is just convenient and fast. The significant advantage is ease of installation. But without Anaconda, installing packages and libraries are far more complicated using default python. Anaconda comes preinstalled with loads of packages, libraries and tools that would be most useful in machine learning like Numpy.

G. Openface

It is an open source face recognition implementation, written in Python and based on deep learning and neural networks. As such, it relies on a number of components that work together as pipelines, each one basing its input on the previous component's output.

These are dlib and OpenCV, used for the face detection, alignment and transformation; the machine learning library for implementing deep learning; and the neural network model itself. We have loaded a set of images to dlib, which would then detect the enclosed faces, placing bounding boxes around them and subsequently cropping them to a (n x n) pixels wide area

Fig 4: Face recognition



CONCLUSION

It can be concluded that face recognition attendance system in classroom using neural networks technique works quite well. The attendance process become easier, robust and fair since there is less chance for proxy attendance.

The overall time required to take attendance is also reduced. The success rate of our system in recognizing facial images of the students is about 90%

FUTURE SCOPE

As we have successfully achieved 90 % accuracy in overall model but in the future 100 % accuracy can be achieved even in odd and different condition and environment.

This model of Facial recognition can be used in many businesses. Some of uses of face recognition system will be in to unlock phones, smart advertisement, tagging people on social media platforms, diagnose diseases, payment verification etc.

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