Person Identification Using Machine Learning

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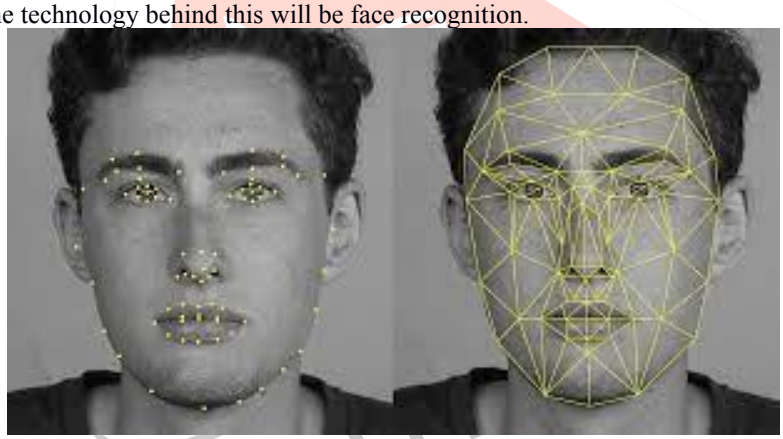
Abstract - **Nowadays taking attendance is mandatory everywhere. That can be school, college, office, etc... In school, the attendance is taken by a teacher orally, whereas in college it can be biometric, even in office the same. Rather than using these methods, we thought to have a standalone system, so that it will take the photos and mark the attendance automatically. we did this project by using a few machine learning algorithms. By using these algorithms the system can identify the person using the face marks, gradient points; with the help of these marks, points a person can be identified and attendance will be marked.**

keywords - **Attendance, Standalone system, Identification, Face recognition, Detection, Pixels, Gradients.**

I. Introduction

Our project is identifying a person using machine learning. Due to increased need for security and the rapid growth of mobile devices, face recognition has recently become a popular study area. Face recognition can be used in a variety of applications, including access control, identity verification, security systems, surveillance systems, and social media networks.

There are lots of attendance marking systems, but accuracy is one of the biggest issues being faced. The person behind this may be the attendance is not marked by the original person, proxy attendance. So, one of the ways is to use the face recognition technique and mark the attendance automatically without the involvement of faculty which also saves time and reduces false attendance. The technology behind this will be face recognition.



II. Algorithms

Haar Cascade XML

It is an Object Detection Algorithm that is used to recognise faces in images or real-time videos.

Face detection is a hot topic with a wide range of applications. Face detection software is embedded into today's smartphones and laptops, allowing the user's identification to be verified.

There are a slew of apps that can capture, detect, and process a face in real time, as well as determine the user's age and gender and apply some really amazing filters. Face detection has a wide range of applications in Surveillance, Security, and Biometrics, so the list isn't limited to mobile apps.

However, Viola and Jones proposed the first ever Object Detection Framework for Real Time Face Detection in Video Footage in 2001, which is when the company's Success stories began.

Conclusion

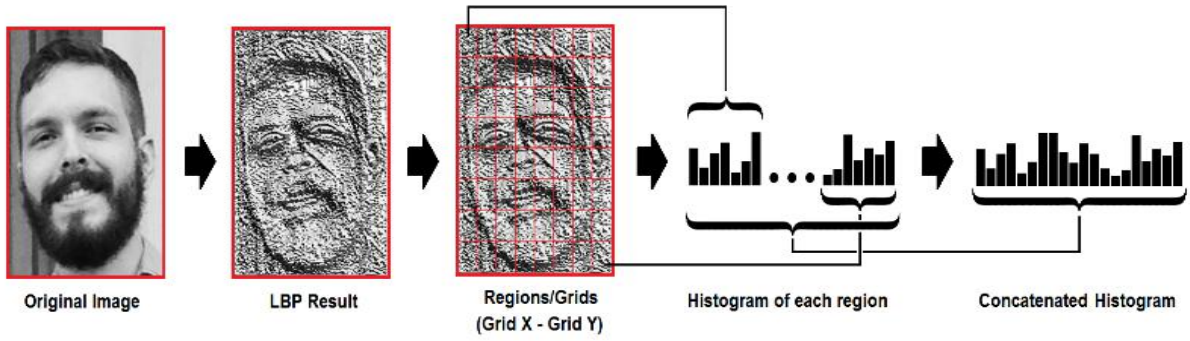
Haar Cascade Detection is a sophisticated face detection technology that has been around for a long time. It has existed for a long time, long before Deep Learning became popular. Haar Features were employed to recognise faces as well as eyes, lips, licence number plates, and other features.

LBPH(Local Binary Pattern Histogram)

It is a Face-Recognition algorithm that is used to identify a person's face.

The following is how LBPH works:

A data set is formed by capturing photographs with a camera or saving photographs, assigning a unique identity or name to the person in the photograph, and then storing the photographs in a database.



Local Binary Pattern (LBP) is a basic yet effective texture operator that labels pixels in an image by thresholding each pixel's neighbourhood and treating the result as a binary number.

It was first described in 1994 (LBP) and has since been discovered to be a useful texture categorization trait. On some datasets, it has also been discovered that combining LBP with the histograms of oriented gradients (HOG) descriptor boosts detection performance significantly.

We can represent the facial photos with a simple data vector using the LBP and histograms.

The core idea behind the histogram of directed gradients descriptor is that the distribution of intensity gradients or edge directions can be used to characterise the appearance and shape of local objects within an image. The image is divided into small connected sections called cells, and a histogram of gradient directions is created for the pixels within each cell. The concatenation of these histograms is the descriptor. Local histograms can be contrast-normalized for better accuracy by generating an intensity measure across a larger portion of the image, known as a block, and then using this value to normalise all cells within the block. Because of this normalisation, the invariance to changes in illumination and shadowing is improved.

Compared to other descriptors, the HOG descriptor has a few major advantages. Except for object orientation, it is invariant to geometric and photometric alterations because it operates on local cells. Such changes would only be visible in wider geographic areas. Furthermore, as Dalal and Triggs discovered, walkers' individual body movement may be ignored as long as they keep a roughly upright position, thanks to coarse spatial sampling, fine orientation sampling, and strong local photometric normalisation. As a result, the HOG descriptor is ideal for detecting humans in photos.

Conclusion

One of the simplest facial recognition algorithms is LBPH.

It can be used to represent localised features in photographs.

It is feasible to achieve excellent outcomes (mainly in a controlled environment).

It withstands monotonic grey scale alterations with ease.

The OpenCV library provides it (Open Source Computer Vision Library).

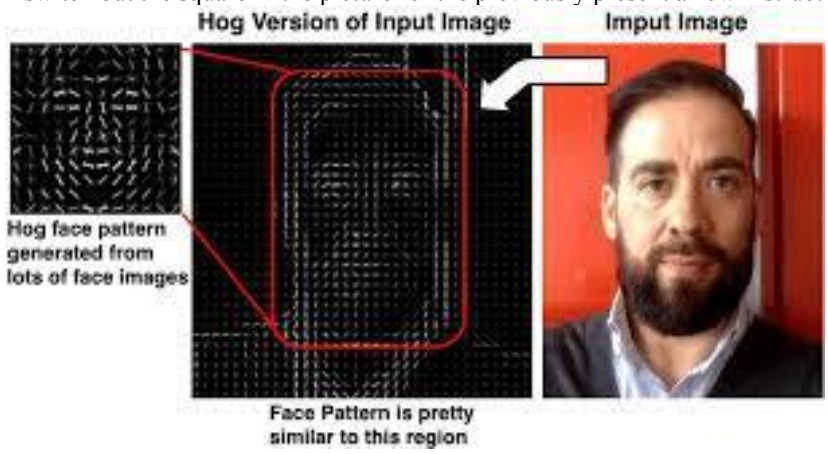
HOG(Histogram of Oriented Gradients)

The histogram of oriented gradients (HOG) is a feature descriptor for object detection in computer vision and image processing. The technique counts the number of times a gradient orientation appears in a certain area of an image. Edge orientation histograms, scale-invariant feature transform descriptors, and shape contexts are all comparable methods, but this one differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalisation for enhanced accuracy.

It's a sort of feature descriptor that's commonly used to extract data from images.

We'll look at every single pixel in our image one by one. We're interested in the pixels immediately surrounding each pixel.The aim is to figure out how dark the current pixel is in compared to the pixels around it. After that, we'll create an arrow to show which way the image is darkening.

We'll do this by dividing the picture into 16x16 pixel squares. In each grid, we'll count how many gradients point in each main direction. Then we'll switch out the square in the picture for the previously present arrow instructions.

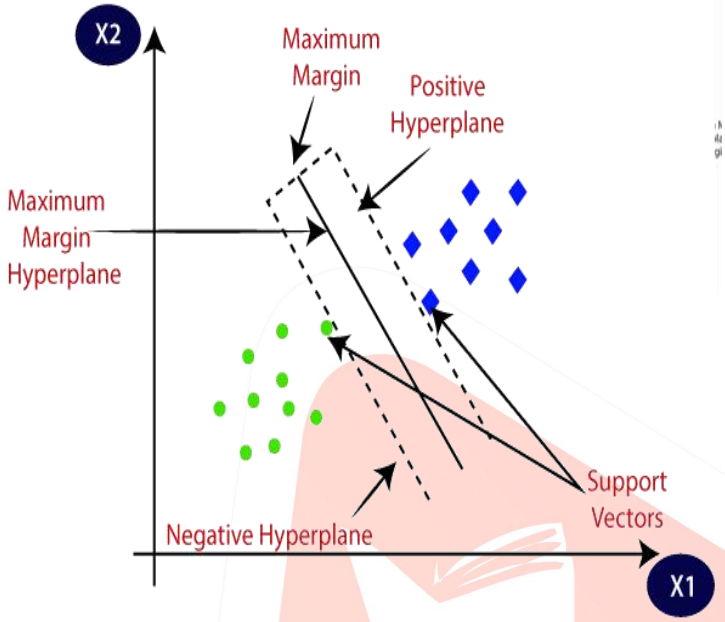


SVM(Support Vector Machine)

The Support Vector Machine, or SVM, is a popular Supervised Learning technique that may be used to solve both classification and regression issues. However, it is mostly utilised in Machine Learning for Classification difficulties.

The SVM algorithm's goal is to find the best line or decision boundary for categorising n-dimensional space into classes so that new data points can be easily placed in the correct category in the future. A hyperplane is the name for the optimal choice boundary.

The extreme points/vectors that assist create the hyperplane are chosen via SVM. Support vectors are the extreme instances, and the algorithm is called a Support Vector Machine.



It's a type of supervised machine learning that may be used for both classification and regression.
SVM stands for supervised machine learning, and it's a type of machine learning that may be used to address classification and regression issues. It alters your data using a method known as the kernel trick, and then uses these adjustments to establish an optimal border between the available outputs.

Appilications

SVMs can be used to tackle a variety of real-world issues, including:
In both the typical inductive and transductive situations, SVMs can considerably minimise the demand for labelled training instances, making them useful in text and hypertext categorization. Support vector machines are used in some shallow semantic parsing methods.
SVMs can also be used to conduct picture classification. After only three to four rounds of relevant feedback, SVMs provide much higher search accuracy than standard query refinement systems, according to experimental results. This is also true for image segmentation systems, even those that use a modified version of SVM that employs Vapnik's privileged method.
Satellite data, such as SAR data, is classified using supervised SVM.
SVM can be used to recognise handwritten characters.
In biology and other sciences, the SVM algorithm has been widely used. They've been used to classify proteins, with up to 90% of the molecules properly classified. SVM weights-based permutation tests have been proposed as a mechanism for SVM model interpretation. In the past, support-vector machine weights were also utilised to interpret SVM models. A relatively emerging area of research in the biological sciences is posthoc interpretation of support-vector machine models in order to uncover properties used by the model to make predictions.

Conclusion

SVM is a supervised learning technique that uses a hyperplane to split data into various classes. The hyperplane chosen has the largest margin between the hyperplane and all points, resulting in the best chance of accurate categorization.

III. PROCEDURE

Open the camera, then the machine detect the face and stores in database. Train the dataset, identify the persons using dataset and it automatically mark the roll numbers in excel.

IV. System Development

The process of defining, creating, testing, and implementing a new software application or programme is known as systems development. Internal development of bespoke systems, database system creation, or the procurement of third-party generated software are all possibilities. All information systems must be guided by written standards and procedures.

Functions of processing The management of the organisation must create and implement standards, as well as adopt an acceptable strategy.

The process of creating, acquiring, implementing, and maintaining a system is governed by the system development life cycle methodology.

Computerized information systems and related technologies must be maintained. We'd begun with a few implementations. Initially, we built this project in a single method, which was to use HOG for human face detection and then store the detected face encodings in a list.

When a person came to us for recognition, we used SVM to identify the faces, which compares the encodings that we had. Yet, at the time of execution, we attempted to identify many faces, and indeed, the algo stack that we used found almost ten faces and identified them, but I require a high-resolution camera with ample illumination.

We also constructed an algorithm utilising the LBPH method and discovered that it could only recognise two or three faces at a time, thus we concluded that it was difficult to locate more faces at a time with poor illumination.

Training the System

First the system should be trained with some images. so that the system will identify the person based on the trained images. Since we are using the Ml the system itself learns, predicts, improves.

Steps followed for training the system

collecting data

preparing data

choosing algorithm

training model

evaluating

prediction

V. Conclusion

To create a face recognition system using ml that provide easy attendance system in a standalone system. This will reduce the manual attendance system. It provides efficient attendance and importing of data made easy to the organization. And while referring for the things we also found that SAFR platform also gives the better results for the face recognition. We can also add that without good lighting and good resolution of camera more number of people can not be recognized. In future their may be other algorithms come to exist to recognize all the people at a time with good accuracy.

VI. Acknowledgment

The project was recognize the persons and mark attendance or note their presence. While doing this one we came up with many bloggers in the using of algorithms we have studied many papers and learned about many algorithms to do the things better. Research papers helped lot to us. We also watched the videos in youtube to get the inner meaning of some algorithms and their mathematical calculations. More over we have got help from our project guide and faculty. They helped us for selection of the algorithms provided the references for reading and many more things. At last we found to know that we can achieve more recognizes at a time when we have high resolution and good lighting more over with present algorithms we can find maximum of 10members with moderate conditions.

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