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Library Attendance System Using Yolov5 Faces Recognition in Deep Learning

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KEYWORDS

Yolov5, attendance monitoring, API service, dataset, facial recognition, library

ABSTRACT:

The manual technique of managing attendance takes a lot of time and effort to keep up. Hence, the procedure for managing students' attendance in schools and universities ought to be computerized. Attendance may be tracked using a variety of biometric techniques. Facial recognition technology is widely employed. Without human intervention, attendance will be recorded alongside the suggested work. This approach fixes the camera within the classroom. From the collected image, faces are located and then identified using a trained model. The class teacher then verifies and marks the attendance. The absences are noted in the attendance and reported to the parents.When identifying many faces at once, algorithmic and computational hurdles occur. Because there are so many interrelated subsystems in a library, It is incredibly difficult to combine a facial recognition system and an existing automation system. A library attendance system prototype is being developed to aid library management with the facial identification of library visitors. The YOLOv5 algorithm is used in this work to focus on face identification in pictures. The library attendance system integrates the visitor identification system, YOLOv5 face recognition and API service. The findings show that the library attendance system can run quickly, read the API service, and provide results data.

1. Problem Statement

Numerous studies have been conducted around image processing, particularly those that focus on facial identification and detection. The study's findings can be applied to solve library issues. Most librarians are employed by libraries, where automated systems help them. The detection of a user's presence is one of the most challenging visual jobs. The presence of visitors may be detected by employing RFID and bar-code cards at the library entrances. Using the card raises security concerns since other individuals could misuse it. Computer algorithms and approaches that can recognize a wide range of objects must be used to respond to these inquiries.

2. Introduction

There have been several experiments done to find items using YOLO. YOLO has the advantage of being useful for item monitoring. In the study, the YOLO system detected objects in the form of traffic signs with 74% accuracy. Furthermore, detecting spherical elements in a human-robot soccer ball was 60% accurate. The YOLO (You Only Look Once) algorithm was created for real-time object tracking. Repurposed classifiers or locators are used in tracking systems. There are now several variants of YOLO, ranging from the original through YOLOv2, YOLOv3, and finally YOLOv5. However, there hasn't been much work done to apply the YOLOv5 algorithm to the library attendance system. Therefore, this is a crucial issue. The YOLOv5 algorithm will be used in the prototype library attendance system created for this project since it is thought to be superior to earlier iterations. With the use of this technology, Not only can the system recognize a person by face, but it can also record information about that user in a database. This will make it easier for librarians to process information about the attendance of permitted and unauthorized guests.

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3. Algorithm

YOLO v5 stands for You Only Look Once v5 is the version of the accessible system. Facial recognition plays an important function in a day-to-day upgrading system of automation, where the majority of the system transfers to image processing. The programme we will be using is YOLO v5. Biometric is a technology that may be found in today's latest smartphone models. Biometric is a technique that is typically used to grant access to the principal user of a system; we may install it on any suitable device.

In the world of Information technology, Biometric is used to store and offer access to individuals with the use of fingerprints, facial recognition, eye retina, and other similar human features. Through the study of face recognition, we will discover how it will operate with that characteristic and how we may integrate it in today's automated environment.

The study's main influence is the development of it with the Artificial Intelligence System. We plan to enhance it by sending notifications to frequent library users on activities such as the amount of books they have, congratulating them on their accomplishments, and improving security.

4. Proposed Methodology

The library attendance system is being built in three phases, each based on one of its three subsystems: API Service, YOLOv5 Facial Recognition, and Visitor Identification System. The developmental phases are as follows:

- The creation and develop of a library attendance API service
- Making facial recognition software using YOLOv5.
- Developing a visitor identification system
- Thorough system testing

The general software development life cycle is used in phases 1 and 3 to construct the Visitor Identification System and API Service. Stage 2 of facial recognition development using YOLOv5 calls for more and more careful attention. yolo (You Only Look Once) is a very accurate origin object identification system. YOLO (You Only Look Once) is a real-time item detection system that is extremely accurate. For object identification, the YOLO method makes use of a convolution neural network. To find items in a picture, YOLO employs an artificial neural network (ANN) method. The picture is divided into various parts by this network, which also predicts each boundary city. YOLO excels in both picture prediction and classification.

Backbone Model:

To extract important features, the backbone model is employed.

from an input photo, YOLOV5 makes advantage of the CSP (Cross Stage Partial) Network as its framework for extracting significant characteristics from the input picture.

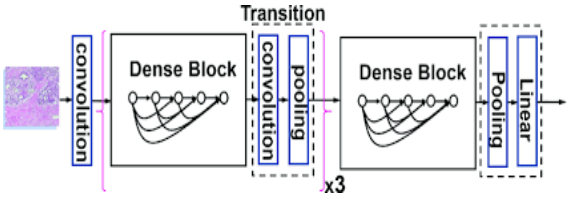

Fig-1 Densenet CSP

Neck Model:

YOLOv5 neck style employing the feature pyramids network (FPN)-based PANet. The PANet model is utilised and facilitate the model's good object scales generalisation. When recognizing the same thing at various sizes and scales, is incredibly helpful. An example of a neck-related PANet picture used for feature categorization is shown in the below figure.

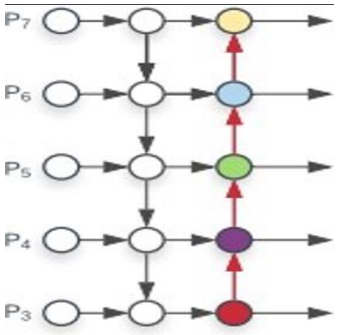

Fig-2 PANET structure

Head Model:

The final detection is performed by the head model, which applies anchoring boxes to features and generates

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a final output vector comprising bounding boxes, objectivity scores, and class probabilities. YOLOv5's activation functions are Leaky ReLU and Sigmoid. The Leaky ReLU activation function is used in the intermediate or buried layers, whereas Sigmoid is used in the final detection layer.

An artificial neural network's activation function specifies how many input weights and biases are required Neurons are activated and deactivated. The loss value is calculated by YOLOV5 using Scores for objectivity, class probability, and bounding box regression. The following are the approaches for developing facial recognition software with YOLOv5:

Building a Dataset:

Before commencing training, the first step is to construct a dataset. A JPG/image collection of images is required to create the dataset, and each photo is subsequently tagged or annotated using labeling software. The annotation's output comes in the form of an XML file. For picture pre-processing, The XML files in the datasets are then concatenated.

Training Dataset:

In the second approach, which employs a proprietary For detection, the YOLOV5-s model, the training phase outputs, or the Yolov5s weight model are employed. The dataset is read, and a class is created to serve as the basis for Yolov5's unique detection model. The dataset is then trained using this file. When the training is finished, pictures and videos may be used to test the training's data.

Object Detection Model Testing:

The final step is to detect objects using a trained model. Using images and videos, the testing step is represented in the above picture. For testing, images or videos can be used as input to begin the detection phase, the built-in model is loaded, Following that, classification and prediction are carried out utilizing bounding boxes and confidence ratings.

The outcomes are prediction boxes, confidence values, and object classes. The fourth stage is thorough system testing. By combining the three-part sub-system to represent the comprehensive system testing phase, comprehensive system testing is used to evaluate the integrated sub-system.

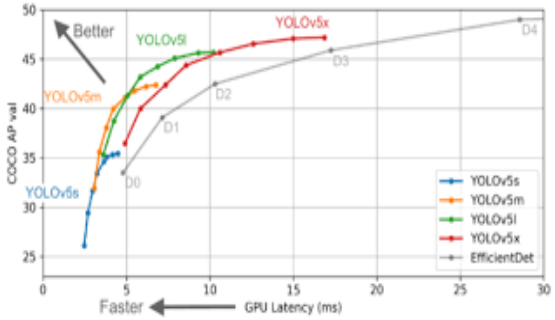

Fig-3 YOLOv5 Performance graph

The input begins with a camera-captured image of a face. Following that, the detecting procedure will load the built-in model and utilize bounding boxes and confidence scores to do classification and prediction. The outcomes are prediction boxes, confidence values, and object classes. The detection findings will be saved as an object class (class) in the report database, and the data from the report database will be shown on the report page. In the report page, the data is shown as a number.

HARDWARES & SOFTWARES USED

H/W System Configuration: -

• Pentium IV Processor

• RAM: 4 GB (minimum)

• Hard Disk: 20 GB

S/W System Configuration:-

- Windows 10 as the operating system
- Tools: python, Jupiter notebook,
- anaconda tool.

4. Result

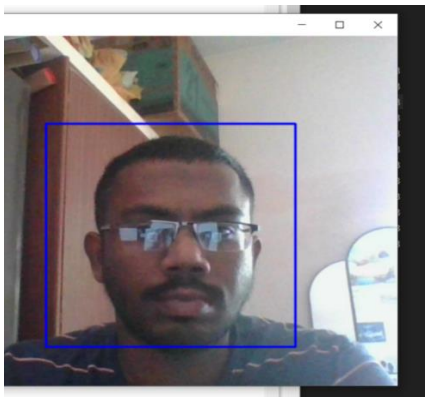

Fig-4 Face detection

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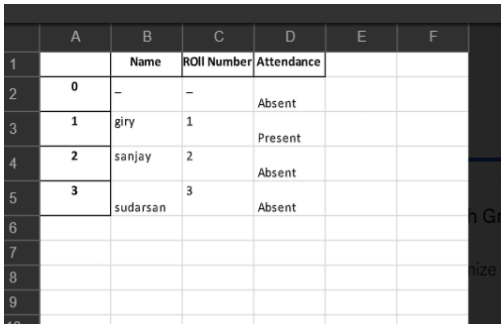

	A	B	C	D	E	F
1		Name	ROll Number	Attendance		
2	0	–	–	Absent		
3	1	giry	1	Present		
4	2	sanjay	2	Absent		
5	3	sudarsan	3	Absent		
6						
7						
8						
9						

Fig-5 Attendance sheet

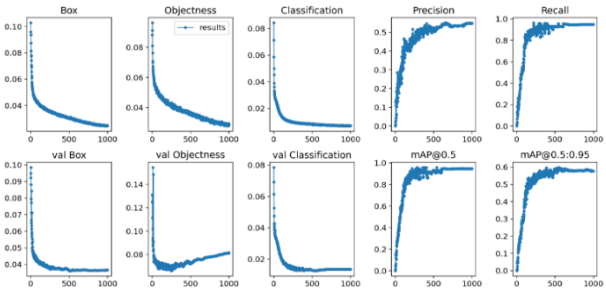

Fig-6 The results of the Face recognition sub-system dataset training

5. Conclusion

The Automatic Attendance System was designed to address the shortcomings of the conventional (manual) approach. This attendance system illustrates how image processing methods might be used in the classroom. The suggested automated attendance system with facial recognition is an outstanding example of a reader attendance tracking system in a library.This technique also aids in the prevention of proxies and fraudulent attendance. In today's society, several biometric technologies are available. Facial recognition, on the other hand, appears to be a viable choice due to its high accuracy and lack of human interaction. This technique is intended to give an extremely high level of security. This technique can not only aid with attendance, but it can also boost an institution's reputation.

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