AUTOMATED EXAM INVIGILATOR USING DEEP LEARNING

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This Thesis report has been submitted in fulfillment of the requirements

for the Degree of Bachelor of Science in Software Engineering

Fall-2022

APPROVAL

This thesis titled on "**Automated Exam Invigilator Using Deep Learning**", submitted by **Mahiya Rahman Rafa (ID: 191-35-2706)** to the Department of Software Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Software Engineering and approval as to its style and contents.

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This statement states that MAHIYA RAHMAN RAFA completed the thesis titled "**Automated Exam Invigilator Using Deep Learning**" under the guidance of **Mr. Md. Shohel Arman**, Assistant Professor, Department of Software Engineering, Daffodil International University. Additionally, it declares that neither this paper nor any component of it has been transferred to another institution for the conferment of a degree.

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ACKNOWLEDGEMENT

I want to start by expressing my gratitude to Almighty God for bestowing His divine favor and allowing me to complete my undergraduate thesis.

I would like to express my gratitude and deep amount of respect to my supervisor, **Md. Shohel Arman**, **Assistant Professor** in the “Department of Software Engineering” at “Daffodil International University” in Dhaka. His profound knowledge and guidance in the segment on “Deep Learning” help me a lot to complete this entire thesis work. It has been made possible by his never-ending empathy, academic leadership, continuous motivation, regular and vigorous monitoring, constructive criticism, helpful counsel, reviewing numerous subpar manuscripts, and fixing them at every level.

I wish to extend my sincere appreciation to **Dr. Imran Mahmud, Head of the “Software Engineering” Department**, Faculty of Science and Information Technology, as well as to the other professors, faculties, and personnel of the SWE Department of “Daffodil International University” for their considerate assistance in accomplishing my work.

Last but not least, I must respectfully thank my parents for their unwavering love and patience.

Table of Contents

List of Figures

List of Tables

List of Nomenclatures

YOLOv7 - "You Only Look Once version 7(Real-time Object detector)".

FLASK - "Python micro web framework".

CNN - "Convolutional Neural Network".

KNN - "K- Nearest Neighbour".

SVM - "Support Vector Machine".

MTCNN - "Multi-Task Cascaded Convolutional Neural Networks".

RPN - "Region Proposal Network".

RNN - "Recurrent Neural Network".

Faster RCNN - "Faster Region-Based Convolutional Neural Network".

LSTM - "Long Short-Term Memory".

mAP - "Mean Average Precision".

ABSTRACT

From the different physical gestures in the examination room, the examinees' suspicious conduct can be observable. Traditional invigilation methods cannot perform effective monitoring. Due to the physical constraints of human invigilators, many illegal acts go unnoticed. The fundamental principle of this research is to prevent unethical approaches from the examinees by differentiating the correct and suspicious posture of the candidate. An object detection model was developed by YOLOv7(You Only Look Once) to identify the movement of the candidates. At present YOLOv7 has greater accuracy in object detection. During the training, the model has 97.1% mAP(Mean Average Precision). That indicates the high accuracy of the model. After that, we deployed that YOLOv7-trained model into the web with the help of FLASK(Micro Web Framework). With this proposed system, the capability of a large number of students' invigilation will be increased. Suspicious behavior can be detected in real-time with the help of CCTV footage. The system is completely effective in identifying and keeping track of further than 100 participants in a single frame during assessments. To assess the effectiveness of the Automatic Invigilation System, many authentic examples are taken into account. Any kind of institution can apply this model to examine any kind of candidate. To identify and maintain a close eye on questionable student behavior universities, colleges, and schools might use the suggested invigilation approach. It will reduce academic dishonesty and cheating among students. However, by putting the suggested invigilation mechanism into place, maybe cheating can be stopped and find a remedy for the problem.

CHAPTER 1

1. INTRODUCTION:

At present, examination procedures are being questioned for unethical behavior of examinees in various important examination halls. Effective monitoring cannot be done using conventional auditing techniques. Many illicit activities go undiscovered because human examiners are physically limited. To mitigate this problem we worked on this sector using “Deep Learning” algorithms. In the suggested methodology, the sole need for identifying questionable student conduct is CCTV video of the test room. As a “Deep Learning approach” we used object detection algorithms to detect the body movements- such as head, and neck and pass notes to others.

There are a lot of invigilation systems that have been developed around the world. Rutuja Sanjay Kulkarni in his “Real Time Automated Invigilator in Classroom Monitoring using Computer Vision” which was published in 2019 focused on the examinee’s body movement using a motion detection sensor. For implementing that model, every exam hall needs to install a physical sensor for noticing inappropriate activities. “Md Adil, Rajbala Simon, and Sunil Kumar Khatri” published their paper in 2020 named “Automated Invigilation System for Detection of Suspicious Activities during Examination ”. They used OpenCV and face recognition algorithms for identifying head, hand, and facial movements. In 2021 Manit Malhotra and Indu Chhabra in their “Automatic Invigilation Using Computer Vision” paper mentioned the YOLOv3-based object detection model to identify the head and neck movements of the students. “A One-Decade Survey of Detection Methods of Student Cheating in Exams (Features and Solutions)”- proposed by “Tariq Mostaf Radwan, Saif Al

Abachy & Ahmed Sabah Al-Araji" used 'CNN and YOLOv4' to notice suspicious activity or emotions among students during a test. Fatima Mahmood and her team in 2022, proposed a model in their research paper- "Implementation of an Intelligent Exam Supervision System Using Deep Learning Algorithms" which uses 'RCNN, MTCNN, RPN, and CNN' for recognizing head movements and the face of the students having 99.5% accuracy throughout training and 98% accuracy during testing. We are searching for a method that can be budget-friendly for every institution. Nowadays, 'YOLOv7' is attracting the attention of developers for its higher accuracy in object detection. 'YOLOv7' is a real-time object detector that is now transforming computer vision object detection more advanced than before. Rather than the use of Faster RCNN, with the help of the 'YOLOv7 model', we found more accuracy through its amazing characteristics in the detection of head and neck movements.

1.1. BACKGROUND:

Any evaluation at academic institutions is one of the best methods for assessing and determining student competence, intelligence, intellect, expertise, and knowledge. Coursework, formative assessments, presentations, exercises, and verbal assessments are just a few of the ways that students' talents might be estimated. Students get question papers for a typical, formal test on which they must react with answers in a set amount of time. The proctors' responsibility is to prohibit any form of communication, including hand signals, and gestures, as well as to restrain students who are engaging in deception and forbid the use of notes or other forms of cheating technology. Each room requires a chief assessor to oversee students throughout examinations. This person will guarantee that the assessments are administered fairly and will address any issues that may arise. A monitoring board is also set up to oversee and vigilance all exam rooms at various times. There must be a different examiner present for every 30 students taking the test. We developed a system based on “Deep Learning-Computer Vision” algorithms that can notify and distinguish people engaging in any unusual behavior, such as neck movements during the evaluations, to address the issue of offline exams monitoring and lighten the volume of work of invigilation on supervisory panel members.

Artificial intelligence(AI)'s computer vision allows computers and programs to extract relevant information from digital photos, recordings, and other visual inputs and to conduct decisions or suggest alternatives in accordance with that knowledge. For a 3rd world country like ours, it’s very difficult to install sensors in every exam hall because of their high expense. Without using the sensor, some algorithm can be used for solving that issue. But it also demands high maintenance with efficient manpower. Some of the models are too slow that can not be helpful for the increased number of examinees in any single frame. That's why we were searching for a model that can be implemented with faster computation time, has fewer complexities to implement, and is also budget oriented. That’s why we proposed a system that used ‘YOLOv7(You Only Look Once-version 7)’ to detect and distinguish the correct and wrong postures of the candidates. With the help of our deployment service, we can closely monitor all kinds of activities during the exam. We considered the movement of the head and neck. And also by our proposed model, we can also identify passing scripts between the students.

We distinguish the movements as follows-

Table 1.1: Classification of Student's Posture

POSTURE TYPE	DETAILS	LABELS NAME
Correct Posture	Watching Scripts.	correctPosture
Wrong Posture	Moving Head to the left.	leftSideMove
	Moving Head to the right.	rightSideMove
	Moving Head to the back.	backSideMove
	Passing Notes.	passingNotes

1.2. MOTIVATION OF THE RESEARCH:

Cheating in the examination hall becomes a common practice during the exam. Students conduct various ways to cut off a better result even if they need to do inappropriate things. The examiner cannot oversee everyone at a time. That's why effective and true exams cannot be conducted in these circumstances. The primary motivation of this research work is to demolish illegal practices from every evaluation event by creating an automated invigilation system. With the help of CCTV, we automated the entire invigilation system. Many researchers proposed an automated invigilations system. Some of them used physical devices such as motion sensors, and face detection sensors or cameras for their model. It becomes hugely expensive to install on a large scale. Some of them used some early algorithms which were time-consuming and sometimes would have less accuracy. For solving all of the issues we proposed an object detection latest algorithm having faster, more accurate computational processes and is budget-friendly.

1.3. PROBLEM STATEMENT:

Around 68% of college students confess to cheating on exams or in written assignments, according to “Dr. Donald McCabe” and the International Center for Academic Integrity survey and research, which has researched patterns in academic misconduct for more than a decade. Many students are disqualified from exams across the southeast each year for cheating. It's a difficult and laborious effort to supervise an examination room. Manual examination hall monitoring may be a blunder, necessitates a significant amount of effort, and is expensive. It can be problematic to discern between standard and deviant conduct in a testing environment since aberrant behavior can take many different forms, including passing the paper, looking through other people's papers, signaling to others, and more. Due to this reason, it is not possible to determine the exact quality of education of students. That’s why every year the ratio of unemployed, and unskilled graduates is increasing. The graduate is the greatest asset for any country. But due to that kind of unethical behavior, they are becoming burdened. Although many researchers are working on this issue, they didn’t provide any effective solution for our developing countries.

1.4. RESEARCH QUESTIONS:

The research questions were:

- Q1: Can we detect head, neck, and body movements with higher accuracy and faster computation time using the YOLOv7 deployed model?
- Q2: Can the model be used and launched without the need for high-priced hardware or sensors?

1.5. RESEARCH OBJECTIVE:

This paper's primary goal is to identify and keep tabs on a student's exam-related behaviors. Additionally, we aimed for a better outcome to increase the applicability of our concept. The main objectives are:

- To decrease students' educational misconduct and exam-related cheating.
- To more clearly and correctly track and record the frequency of academic misconduct among individuals in the area of higher education.
- To lighten the workload for the invigilation team.
- To create a way to observe every student's activities and distinguish right and wrong.

1.6. RESEARCH SCOPE:

While working on this research using "Deep Learning-Computer Vision" we focused on the following scopes-

- For this research work, we considered the head, neck, and whole body movement of the participants during the examination.
- Mainly we are focusing on the alternative ways of the physical invigilation system.
- For developing the model, we used 3h real-life CCTV footage. We also took those shoots from a different angle.
- Some data from the exam hall for around 1h were taken with a video camera for better accuracy in the training segments.

1.7. THESIS ORGANIZATION:

In the first chapter, a specific section on "Automated Invigilation System" and its application, the background context of the study, the particular problem statement of this research, certain Motivation of the Research, specific Research Questions on which it focuses, Research Objective and the Research Scope are covered. The remaining components of our investigation are as follows:

In the next chapter- The Literature Review, where we will discuss some researcher's studies that have already been done in the same area. We will examine their employed methodology and gaps, and on the basis of their work comparison between my work and their work, will be covered. We will then talk about our Research Methodology after that. The entire process of data collecting, data pre-processing, and work analysis will be mentioned in the methodology section. In chapter four, the final Results will be described. The final chapter- Conclusion includes a complete review of my efforts and a list of my shortcomings.

1.8. SUMMARY:

Every institution has academic malpractice. This model will include a strong activity detection method that monitors every student's classroom activities, including body movement.

CHAPTER 2

2. LITERATURE REVIEW:

2.1. INTRODUCTION:

As a researcher, we evaluated earlier work, research, conference papers, books, articles, etc. in the literature review segmentation. With it, we learned what research has previously been performed on the subject, gave a general overview of it, and identified any gaps in their work. After analysis, we focused on limits and found ways to get around them to improve results.

2.2. PREVIOUS LITERATURE:

The problem of dishonesty detection has been thoroughly studied by several scholars both locally and abroad. Methods for detecting cheating thus far include systems that rely on examinee activity in the testing environment, methods based on similarities in test papers, and so on. In this section, we've detailed a few studies that looked at ways to spot any inappropriate behavior in exam rooms based on how test-takers behaved.

Rutuja Sanjay Kulkarni et al [1] evaluate students' behavior using a motion selection procedure. After preprocessing image data, he used CNN(Convolutional Neural Network) and TensorFlow for detection and classification. CNN accuracy result is not up to the mark. It's a kind of backdated algorithm for detecting something.

Musa Dima Genemo et al [1] implemented CNN as a Deep Learning approach for an automated invigilation system. Then he classified correct and wrong postures with the help of two machine learning classification algorithms- ‘KNN(K-Nearest Neighbors) and SVM(Support Vector Machine)'. Between them, SVM shows better performance. This is the very early process of distinguishing differences. For their approach, they need a huge amount of processing and time. There are variously advanced procedures to detect the same thing with less processing time.

Md Adil et al [3] researched an automated invigilation system. In their research work, they focused on head position, hand placement, and facial expression with the help of Deep Learning and Computer Vision algorithms, Such as 'OpenCV, Gaussian Filter, Haar-Like feature, Viola Jones, and AdaBoost'. They used surveillance cameras for collecting data. But they have less accuracy(70%). They need to work on head orientation for increasing accuracy.

R.Meena et al [5] worked on complex human activities recognition. After preprocessing data they did feature extraction. They applied a histogram of oriented gradients (HOG), a skeleton model. 'CNN-LSTM and RNN' were employed as a Deep Learning approach. After that, KNN is used for classifying those actions. They used a complex architecture for solving those issues and their training dataset contains semi-temporal information. They can work on creating less complex architectures with real and accurate datasets.

R. Meena et al [5] designed a virtual invigilation and exam schedule module. They implemented SVM and Hog for solving their circumstances by classifying differences. This model can detect unexpected activities of the students and can arrange seating arrangements automatically. But that model also has some shortcomings. It was not tested or trained in any live-streaming exam events. So, it may cause a variety of accuracy as mentioned in the research paper. They need to apply this model in real-life situations.

Tao Xu et al [2] create a comparison between two algorithms- SSD(Single-Shot

Detector) and YOLO for monitoring the exam hall. It shows that SSD300 shows better results than YOLO. All of the thesis work was done in a predefined certain dataset. No real-life data were collected to examine this model. As real-life incidents may vary from time to time, researchers need to gather more real-life examples for their training. And they never implement this model in any kind of live scenario. So, they must calculate their model's efficiency after deploying it in the actual environment.

Tariq Mostafa et al [4] again proposed another model where they discussed the personal seating index of the student including cheating equipment, student activities, and test paper similarity. As applied algorithms, CNN and YOLO were chosen. They used physical tools for measuring the personal seating index. That might be very expensive for every institution for implementing this model in every invigilation hall for monitoring.

Manit Malhotra et al [2] proposed an object detection system created with YOLOv3 that can detect the neck and head movement of the examinee. By the ratio of MAP(Mean Squared Error), they calculated their model accuracy. There are various ways of cheating. With their model they can not count the body movements, whispering, or passing notes like unethical activities. So, if they can consider these segments, their model will be more effective.

Tariq Mostafa Radwan et al [3] detected cheating by object-oriented Deep learning approaches. Their model during an exam can observe any unusual behavior or feelings among the pupils. They used YOLOv4 and CNN as algorithms. As they are using object detection, it can measure bad outcomes in judging the feeling index of the students.

Fatima Mahmood et al [8] created an advanced system. To observe the movement of an entity, the researcher employed Faster RCNN. They especially employ Faster-RCNN to track head movement. Additionally, MTCNN has been utilized to find and identify any student's face. When there are more than 100 students in one exam room, their suggested model has 98.5% accuracy during testing and 99.5% accuracy throughout training. But it also has certain shortcomings. They simply took into account head motion and facial recognition. In the test room, there are several opportunities for cheating. They didn't take into account hand motion or any other exterior objects. Therefore, in this instance, they may make their suggested model more accurate by fixing these weaknesses in their current model.

2.3. SUMMARY:

From the above studies we can conclude that they used various ways or algorithms to identify exam candidate movement. They have done data processing and then applied their required algorithm on which they focus. In our research work, we tried to solve their shortcomings as much as we could.

CHAPTER 3

3. RESEARCH METHODOLOGY:

3.1. INTRODUCTION:

For Object detection, we used YOLOv7, and for the deployment, FLASK has been applied to our live exam hall dataset.

3.2. DATA COLLECTION:

As we didn't find any suitable and available dataset on the internet we had to collect data from the live scenario. Data was collected from CCTV footage of an exam hall. The footage has 3h duration. After that, we collected some pseudo-exam hall footage having a 1h duration for increasing the accuracy of our model.

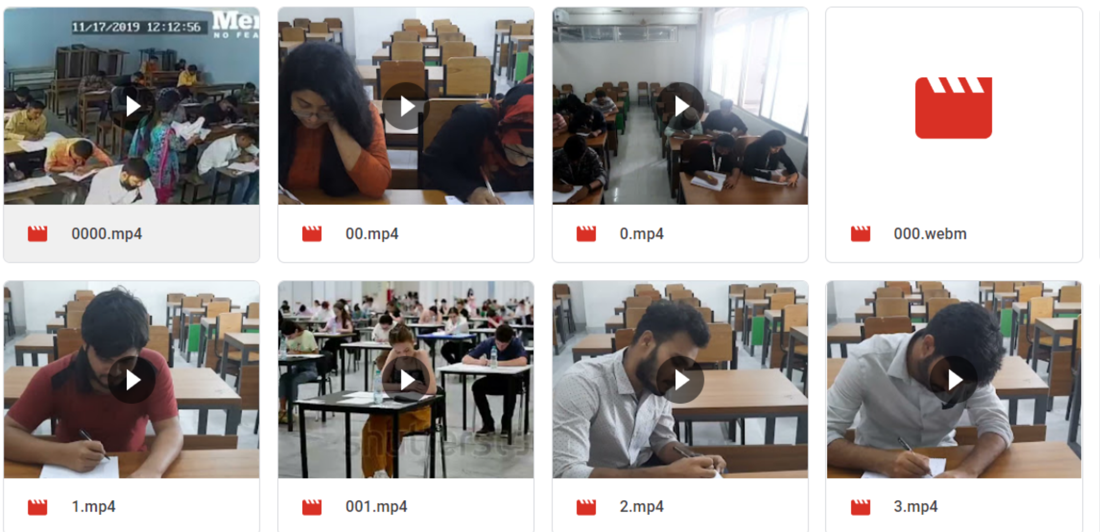

Figure 3.1: Raw Video Footage

3.3. DATA PREPROCESSING:

After collecting videos from the live scenarios, we used OpenCV to extract frames. After extraction, there were almost 8439 images or frames. We annotated those images with the labelMe application in YOLO format and 8439 annotation files were created. Annotation files were in text file format. The posture of the students was divided into 5 classes. Then we did some augmentation and resizing to mitigate the overfitting problems. After that, we divided those images and label files into different folders. We created two directories named- train and validation. 80% of images with their corresponding labels were placed in the train folder. And rest of the images with their relevant labels were placed in validation directories.

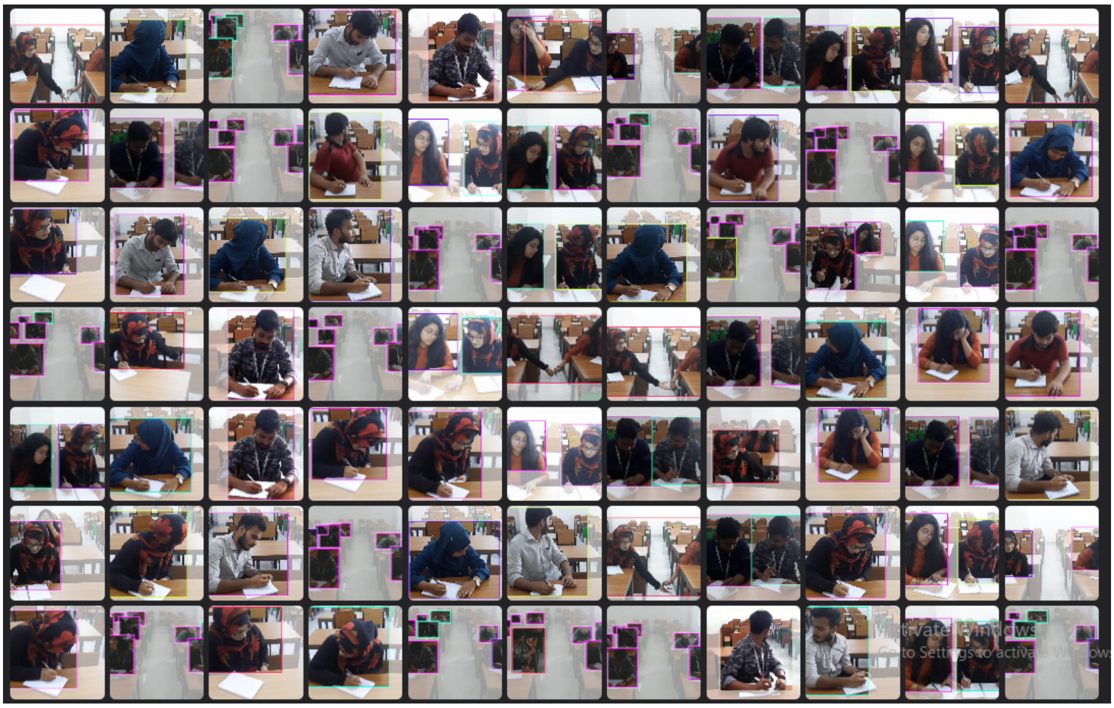

Figure 3.2: Annotated Image Data

3.4. YOLOv7:

Since its inception, YOLO has been one of the top object recognition systems for three key reasons: accuracy, affordability, and usability. Due to the combination of these characteristics, YOLO is without a doubt one of the most well-known DL models outside of the larger data science community. The most recent generation of the well-known algorithm, YOLOv7, has undergone several iterations of improvement and greatly outperforms its ancestors. In the range of “5 FPS to 160 FPS”, YOLOv7 outperforms all other known object-detectors in terms of “Speed and Accuracy”, and on GPU V100, it has the greatest accuracy of 56.8% AP of all real-time object detectors with 30 FPS or more. YOLOv7-E6 object-detector(56 FPS V100, 55.9% AP) outperforms both transformer-based-detector SWIN-L Cascade-Mask R-CNN(9.2 FPS A100, 53.9% AP) and convolutional-based-detector ConvNeXt-XL Cascade-Mask R-CNN(8.6 FPS A100, 55.2% AP) by 509% in speed and 2%. Additionally, we can train “YOLOv7” on the “COCO dataset” from scratch, utilizing no other datasets or pre-trained-weights.

YOLO initially divides the image into N grids before doing object recognition in a single step. These grids are of the same SxS size. It is utilized to find and locate any things that could be present in any of these areas. Bounding box dimensions, B, for any prospective objects are forecasted for each grid along with their item labels and a likelihood rating for their existence.

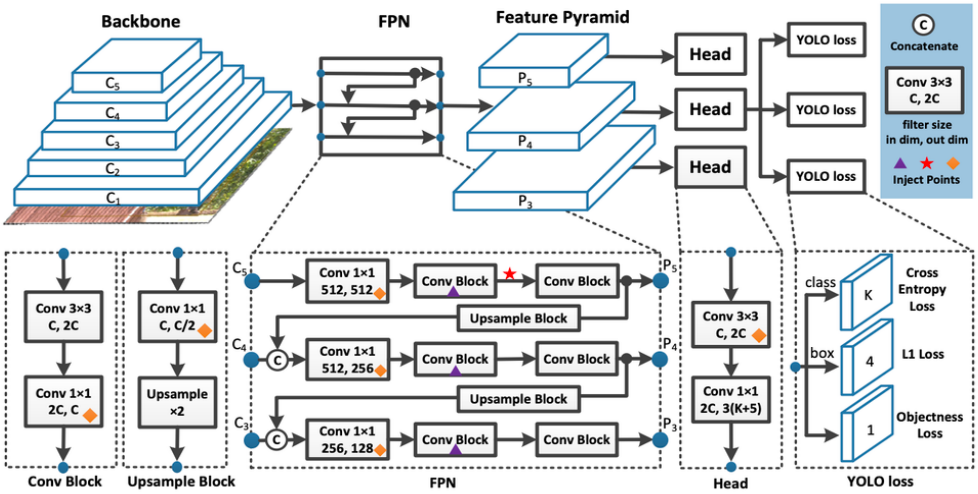

Figure 3.3: YOLOv7 Architecture

In this research work, we worked on GPU for faster calculation. The batch size was 8. We kept our image size default (640*640) as YOLOv7 accepts. After modifying the coco.yml and yolov7.yml file according to our classes, we performed 60 epochs for training.

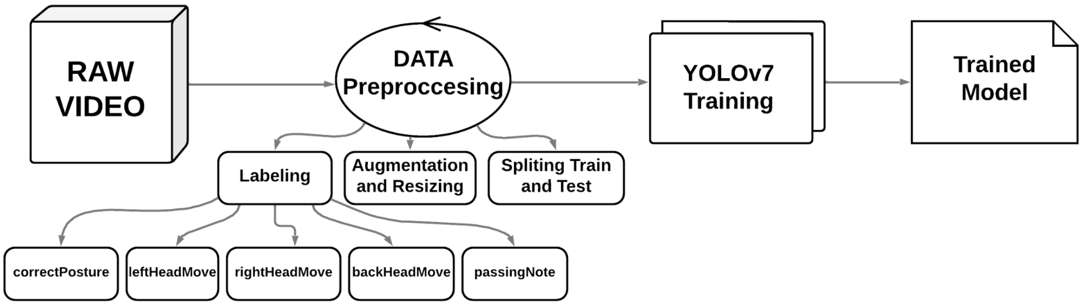

Figure 3.4: Custom Model Training Procedure

3.5. FLASK:

Python-based Flask is a microweb framework. It falls under the category of a micro-framework and doesn't involve any toolkits or modules. It excludes any elements like a database intermediary layer, custom post types, or other areas where third-party libraries currently offer similar functionality. With just one Python file, Flask offers useful features and tools to build a web service. It gives designers flexibility and provides a simple foundation for new developers.

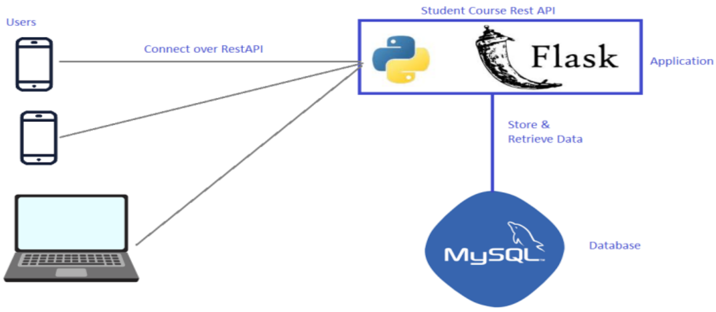

Figure 3.5: Flask Deployment Process

After the training session, we created an app.py file. Then after installation of the flask library, we loaded our custom-trained model(Weights file- “best.pt” or “last.pt”) into that file. Then with the help of the index.html file, we launched our model into the server.

3.6. TRANSFER LEARNING:

“Transfer learning” is the process of employing pre-trained-model parameters as a simplification. The neural network process utilizes the learned model from one issue to solve others. The general qualities of images can be recognized using transfer learning methods. It reached the highest level of performance while maintaining the system's effectiveness. The deep learning of vision models is the only methodology suggested in the paper. We have some .pt files in our YOLOv7-trained model that may be utilized for other uses.

3.7. EVALUATION METHODS:

For evaluating any kind of model, the “Confusion Matrix” can be easily understandable for everyone. For calculating that factor, we need to consider some of the parameters. Those are-

True-Positive(TP): “True Positive” is an actual value that was successfully anticipated.

True-Negative(TN): Resulting from the model accurately predicting the negative class is a real negative “True Negative”.

False-Positive(FP): “False-positive” occurs when it is assumed wrongly that the result is positive.

False-Negative(FN): “False-negative” is wrongly discarded.

3.7.1. Accuracy:

How correctly a machine can anticipate results depends on how good the model is. When every class has equal importance, something is significant. All classes are highly vital in our line of work. Therefore, accuracy is crucial in determining the model's correctness.

$$\text{Accuracy} = \frac{(TP+TN)}{(TP+FP+TN+FN)} \quad \ldots\ldots(3.1)$$

3.7.2. Precision:

It is a way of measuring how well a deep learning model performs. By dividing the genuine positive-value by a total positive-value, precision is determined.

$$\text{Precision} = \frac{TP}{TP+FP} \quad \ldots\ldots(3.2)$$

3.7.3. Recall:

Recall is the evaluation of the genuine positive that is precisely determined. Divide the genuine positive value by the total number of associated records that are currently in existence to get the recall.

$$\text{Recall} = \frac{TP}{TP+FN} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.3)$$

3.7.4. F1 Score:

The F1 score is an index of test accuracy. The F1 value is computed using recall and precision.

$$\text{F1 Score} = 2 * \frac{(Precision*Recall)}{(Precision+Recall)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.4)$$

We have displayed the mAP and model accuracy for our approach, the YOLOv7 technique. In model accuracy mAP, training correctness and accuracies are considered for determining accuracy. Additionally, the losses for the system are discovered in terms of training efficiency and test efficiency.

3.7.5. Mean Average Precision(mAP):

A statistic called “Mean Average Precision (mAP)” is used to assess object-detection models like “Fast R- CNN, YOLO, Mask R-CNN”, etc. Recall level-range is 0 to 1, the “average accuracy (AP)” frequencies (mean) are measured.

$$\text{mAP} = \frac{1}{n} \sum_{k=1}^{k=n} \text{AP}_k \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.5)$$

AP_k = The AP of the class k

n = Class Number

3.7.6. Confusion Matrix:

Basically "Confusion Matrix" relies on four indicators which are - "True-Positive(TP), True-Negative(TN), False-Positive(FP), False-Negative(FN)". And its visual representation as like as follows-

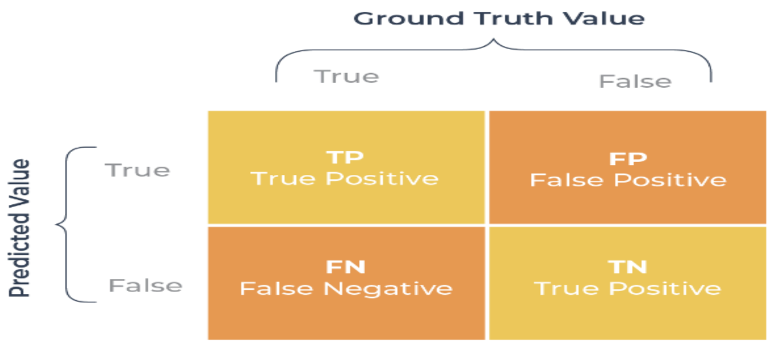

Figure 3.6: Confusion Matrix Visualization

3.8. SUMMARY:

After data preprocessing, we applied YOLOv7 to identify movement and FLASK to deploy the web services into our processed dataset. There is also an overview of the architecture of algorithms. We introduce some evaluation methods along with their formulae by which we can evaluate our model.

CHAPTER 4

4. RESULTS AND DISCUSSION:

4.1. INTRODUCTION:

Following the data-collection and preparation stage, we outlined the model implementation procedure. Here, we'll talk about the model's end result after training.

4.2. RESULT:

After 60 epochs, we received almost 97.1% accuracy. We have got some custom-trained .pt files. Then we performed some detection with the help of detection.py using both best.pt and last.pt files. During the detections, we set our confidence level at 0.5. And every time we got accurate results.

After training our model with YOLOv7 we got our final precision, recall, and mAP rates.

Class	Images	Labels	P	R	mAP@.5	mAP@.5:.95: 100%
all	123	328	0.969	0.915	0.971	0.808
correcPosture	123	215	0.963	0.981	0.987	0.791
leftSideMove	123	28	0.96	0.857	0.956	0.834
rightSideMove	123	46	0.944	0.736	0.922	0.749
backwardMove	123	32	0.997	1	0.996	0.898
passingNotes	123	7	0.982	1	0.995	0.768

Figure 4.1: Overall result after training

Some plotting graphs are also created which indicate the accuracy of the model. Those plots were done with the consideration of the train and validation values of the model.

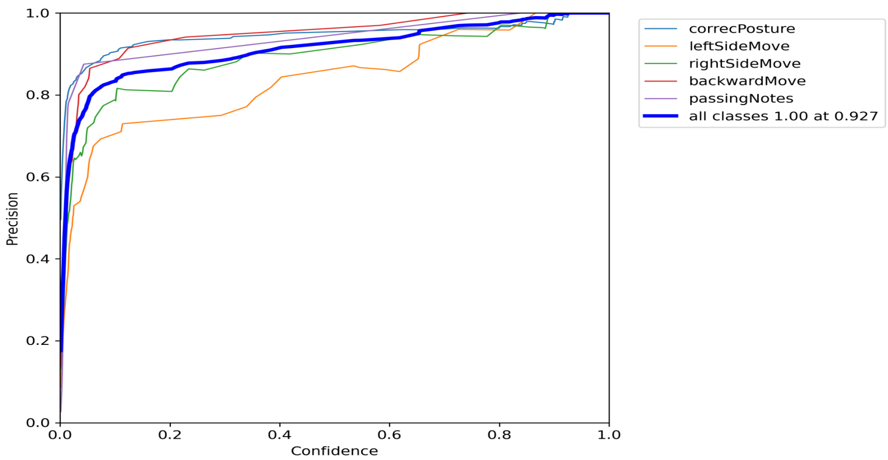

Figure 4.2: Precision Curve

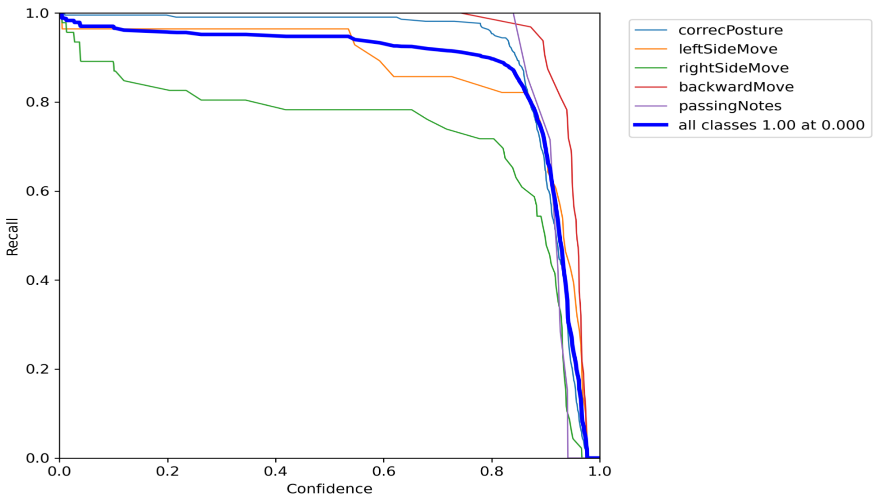

Figure 4.3: Recall Curve

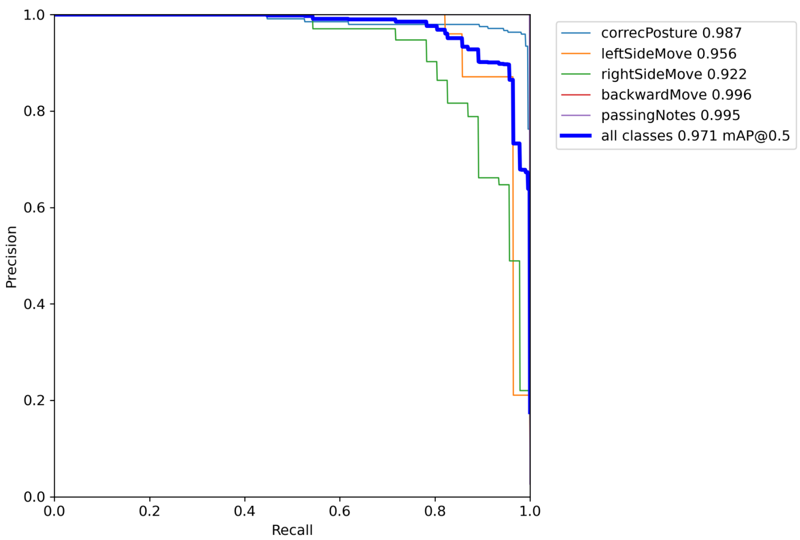

Figure 4.4: Precision-Recall Curve

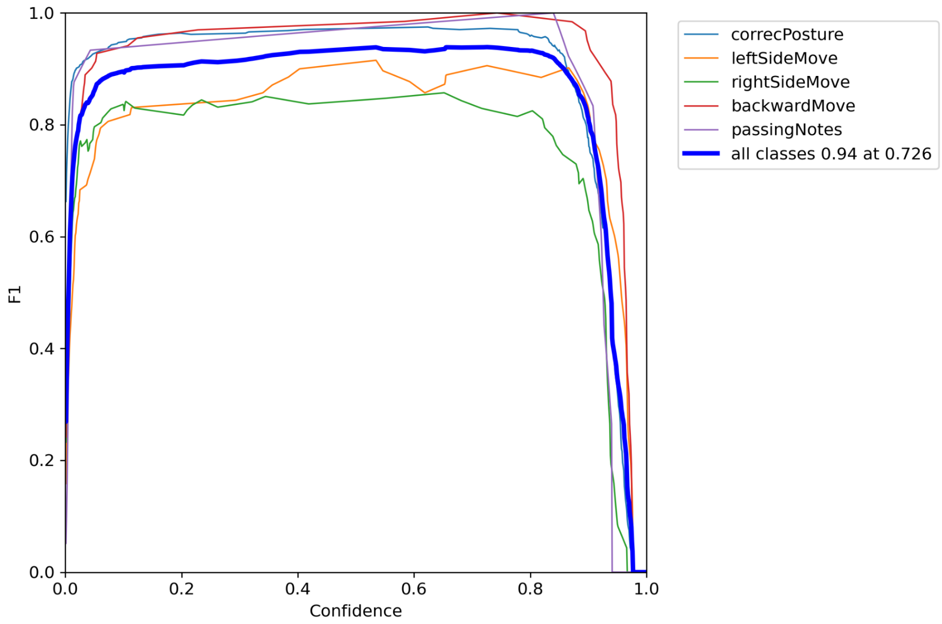

Figure 4.5: F1 Score

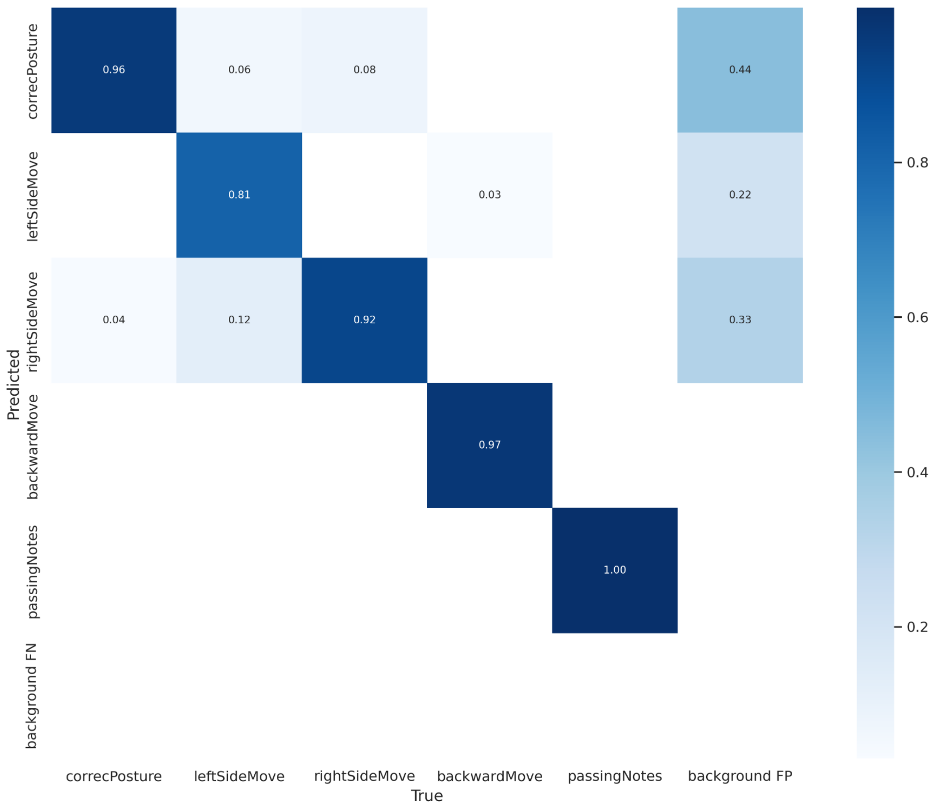

Figure 4.6: Confusion Matrix

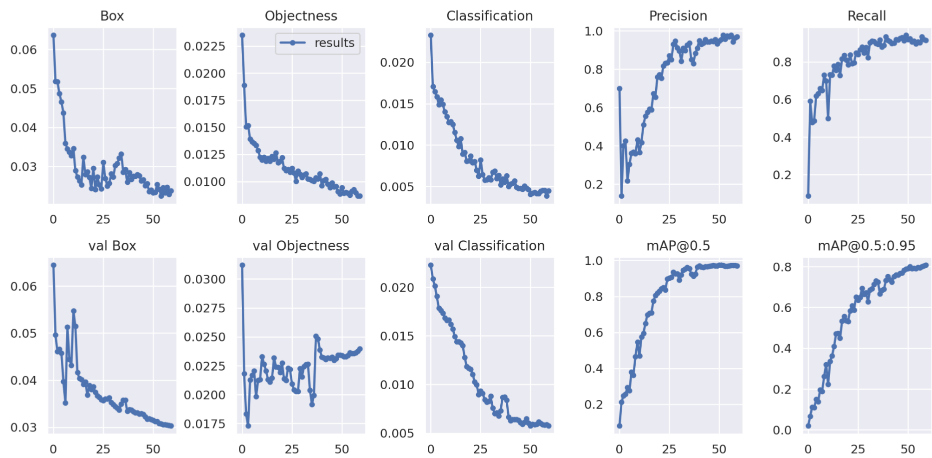

Figure 4.7: Overall Result

4.2.1. YOLOv7 OUTPUT:

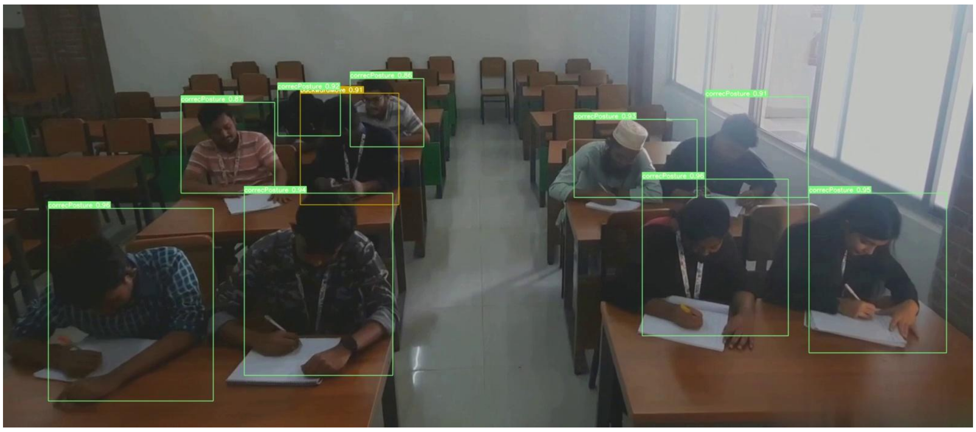

Figure 4.8: Detection Result of YOLOv7

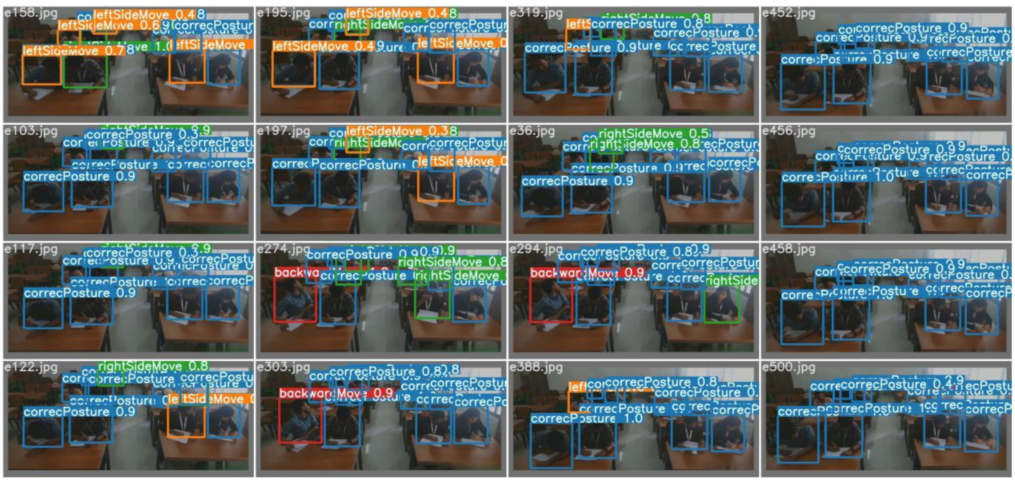

Figure 4.9: Batch output of YOLOv7

4.2.2. FLASK OUTPUT:

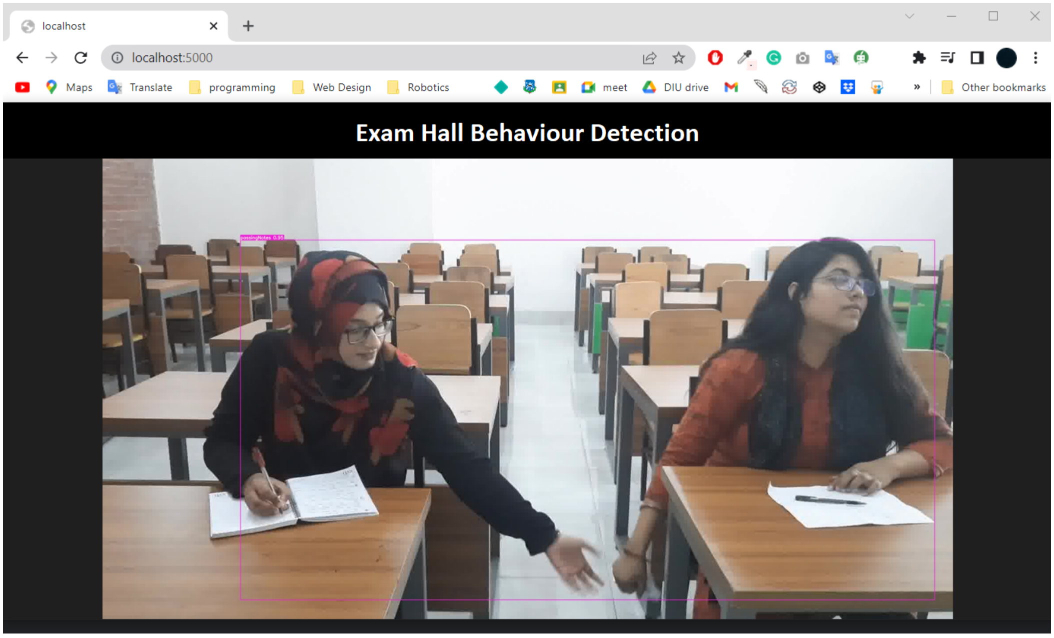

Figure 4.10: FLASK Deployment Output

4.3. DISCUSSION:

As we predicted, YOLOv7 is showing amazing results in the object-detection. Head-Neck movements and passing notes are taken into count in the entire research procedure. We took a lot of videos from different sources having the same posture. That's why it's showing that much accuracy. Comparatively, our YOLOv7 model is showing much more accuracy than our base paper. And we also deployed the model into the server using FLASK.

4.4. SUMMARY:

In this segment, we discussed the final results of our proposed model. YOLOv7 is used for the differentiation of posture and FLASK is used for deployment.

CHAPTER 5

5. CONCLUSION AND RECOMMENDATION:

YOLOv7 is a “Deep-Learning” approach used for “object-detection” and categorization. In comparison to other “object-detection” algorithms, it provides reliable findings and more precision for monitoring reasons. The proposed model uses YOLOv7 as a predictor to divide student behavior into the following five categories: “passingNotes, correctPosture, leftSideMove, rightSideMove, and backSideMove”. The no deceitful label (correctPosture) is applied to students who are working on their papers, while the fraudulent label (leftSideMove, rightSideMove, backSideMove, and passingNotes) is applied to students who are routinely looking to their left, right, or back while working on their papers, as well as students who are peeking into the papers of other students while doing so.

5.1. FINDINGS AND CONTRIBUTIONS:

An automated invigilation system is used in this suggested article to identify students engaging in unethical behavior during testing. A classifier using the YOLOv7 deep learning model is developed and tested on the Examination dataset. It is precise to 97.1%. The suggested model outperforms the current model since it can track over 100 participants at once and requires less computing time to achieve the required result than previous models.

5.2. RECOMMENDATIONS FOR FUTURE WORK:

By learning a YOLOv7 System to recognize any type of damaging or electric devices like calculators, smart watches, Bluetooth devices, and smartphones during the test, the suggested examination system may be made even better. To stop cheating in the test room, various Deep Learning techniques, such as Mask RCNN, can be employed to identify eye and mouth movements.

CHAPTER 6

6. REFERENCES:

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