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1 Introduction

The main idea of the project is to develop a system for an educational institution or for an organization, where there is a need for surveillance of dress code. The idea of the dress code surveillance is to check whether the students/employees wear the proper uniform. Due to humans being used for checking whether the students wore proper uniforms or not, it is a very time consuming activity and also requires manpower. The system has reduced time consumption and human power. The system is majorly focused on the human objects present in camera and what type of dress are worn by humans. By using YOLO object detection algorithm, the system is able to detect human objects present in an image. This system is also able to differentiate between male object and female object from the images with the help of YOLO object detection algorithm, because the dressing style of males and females are quite different. One of the significance in the proposed methodology mainly concerns image processing techniques to detect human objects rather than using AI techniques. The system will be able to reduce the time required to check the uniform of every student, whether they are wearing proper uniform or not.
For getting the accuracy for Dress code surveillance for school and colleges system, the first system has to perform some operations on the dataset. First system does the step "Data Preprocessing". Data preprocessing is a data mining technique which is used to transform the raw data in a useful and efficient format. Data cleaning is the process of fixing or removing incorrect, corrupted, incorrectly formatted, duplicate, or incomplete data within a dataset. After this step the system dataset is fully prepared for applying the various machine learning algorithms. Second step is the "Training and Testing dataset". The Train/Test method is used for measuring the accuracy of applied machine learning models. It is called train and test, because the system splits the dataset in two parts: training set and testing set. After this step, choose a suitable deep learning model. The system uses Mask-RCNN(Regions with Convolutional Neural Network) for segmentation of particular shape.
The system use following technology:

1. Deep learning:
   Mask R-CNN is a Convolutional Neural Network (CNN) and state-of-the-art in terms of image segmentation. This variant of a Deep Neural Network detects objects in an image and generates a high-quality segmentation mask for each instance. One of the most important operations in Computer Vision is Segmentation. Image segmentation is the task of clustering parts of an image together that belong to the same object class. This process is also called pixel-level classification. In other words, it involves partitioning images (or video frames) into multiple segments or objects. Deep learning-based Image segmentation has been successfully applied to segment the images or frames coming from video feed. In this, different types of clothes are segmented using Deep Learning based Mask R-CNN deep neural network.

2. YOLO Algorithm:
   The system uses the YOLO(You Only Look Once) algorithm for real time object detection.The YOLO algorithm divides the image into N grids, each

having an equal dimension of SxS. Each of these N grids is responsible for the detection of the object it contains. The YOLO algorithm helps the system to enhance the speed and accuracy of the object detection. By using the YOLO algorithm it is easy to detect human objects present in an image or video stream. System collects the data of human objects by using the YOLO algorithm and sends them to the next module for further processing. The YOLO algorithm helps the system to detect the proper objects with high accuracy.

3. OpenCV:
   OpenCV focuses on image processing, video capture and analysis including features like face detection and object detection. The system is using OpenCV for processing images and to collect the data present in the image. This system uses OpenCV for detecting the human objects present in image/video streams. OpenCV collects the data of human objects present in the image and stores that data for further processing. System uses OpenCV because of its speed to process image data. OpenCV helps the system to enhance the accuracy of output.

1.1 Problem definition

This project is able to show whether the students are wearing proper uniforms or not by studying the relationship between gender and dress type. For identifying human objects and their gender based on facial feature information, The system uses the camera to capture the user's static frontal photos, and then perform a series of related operations such as face recognition on the detected faces. This system aims to study and explore dress code detection for different genders and features by utilizing methods and techniques.

1.2 Aim and objective of the project

The aim of the current system is:

1. Detects human objects present in image.
2. Collect object data and process on that data.
3. Detect the gender of humans with the help of collected data.
4. Study relation between gender and dress type.
5. It mainly concerns image processing techniques rather than using other AI techniques.
6. To propose a dress code detection system so the organization can get an exact look over the dress code of each student.

The main objectives of current system are:

1. To develop a system for school, college and organization for proper dress code detection to save human efforts.
2. . To detect proper dress-code based on the requirements through real time video surveillance for students and employees.

3. To create the model for Person detection, Gender detection, Dress Color detection and Dress Code Type detection.

1.3 Scope and limitation of the project

Scope of the current system is:

1. Providing automated dress code detection systems for colleges and companies.
2. Providing video feed to the system in which a human is walking or entering in the video feed.
3. Converting video feed into machine readable format and detecting a person with its gender, dress type and color.
4. Matching with the given dress code and providing output whether the person is in proper dress code or not.

Limitation of the system:

1. 1. The detection of objects in our system is slow.
2. Our System requires more inbuilt hardware.
3. Our system used in only specific region i.e. Only for specific schools or colleges or industries

1.4 Timeline of the project

The system has used the classic life cycle paradigm also called the "WaterFall Model". For software engineering which is a sequential approach to software development that begins at the system level and progresses through analysis, design, coding, testing and maintenance. To develop the system had completed software requirement analysis by the mid of October 2021 which encompasses both system and software requirement gathering. By the end of November 2021, completed project planning and design.
On the basis of design prepared in the previous stage by the end of March 2022 completed the coding stage. After completion of the coding stage the important part in the software development is the testing phase carried out in the mid - April 2022. Various criteria of testing were taken into account which includes unit testing, integration testing, validation testing and system testing. Each and every module of the project was tested under the unit testing. After the unit testing, integration testing was carried out by integrating all modules tested in unit testing. After unit testing each module was cross checked with the design.

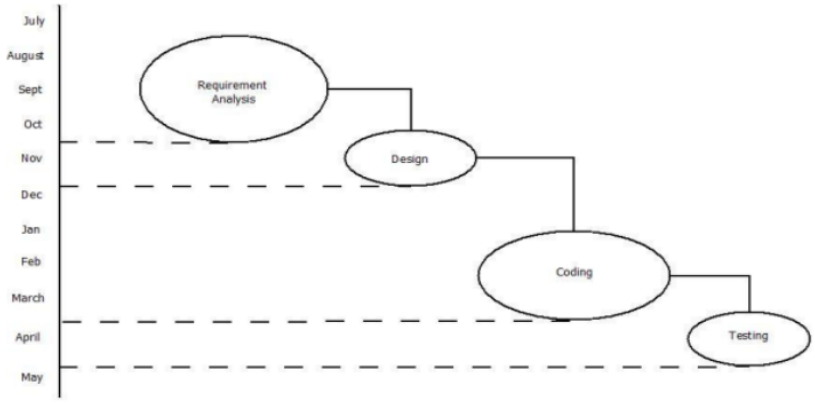


Figure 1 Timeline of the project.

1.5 Project Management Plan

Task	Duration	Start Date	End Date	Assigned to	Priority
Domain Selection	7 days	02-07-2021	08-07-2021	All Team members	High
Domain Finalization	7 days	09-07-2021	15-07-2021	All Team members	High
Selection of Problem Statement	14 days	16-07-2021	29-07-2021	All Team members	Medium
Finalization of Problem	7 days	30-07-2021	05-08-2021	All Team members	High

Statement					
Study on Research Paper	14 days	06-08-2021	19-08-2021	All Team members	Medium
Documentation of Synopsis	14 days	20-08-2021	02-09-2021	Yogiraj , Sahil and Yugdarshan	High
Requirement Analysis	7 days	03-09-2021	09-09-2021	Akash ans Shailesh	High
System Requirement	7 days	10-09-2021	16-09-2021	Yogiraj	High
Module Identification and study	7 days	17-09-2021	22-09-2021	Sahil and Yugdarshan	Medium
SRS Documentation and presentation	7 days	24-09-2021	01-10-2021	All Team members	Medium
Coding 30%. Data Collection.	14 days	02-12-2021	15-12-2021	Akash and Shailesh	High
Implementation 30%.	7 days	16-12-2021	22-12-2021	Akash and Shailesh	High
Data Collection. Coding 70%	14 days	23-12-2021	05-01-2022	All Team members	High
Implementation 70%.	14 days	06-01-2022	24-01-2022	All Team members	High
Testing and Improvements.	14 days	25-01-2022	07-02-2022	Sahil	High
Code updation.	7 days	08-02-2022	14-02-2022	All Team members	High
Coding 80%	59 days	16-02-2022	15-04-2022	Akash and Shailesh	High
Testing Implementation 100%	15 days	16-04-2022	1-05-2022	All Team members	High

1.6 Project Cost

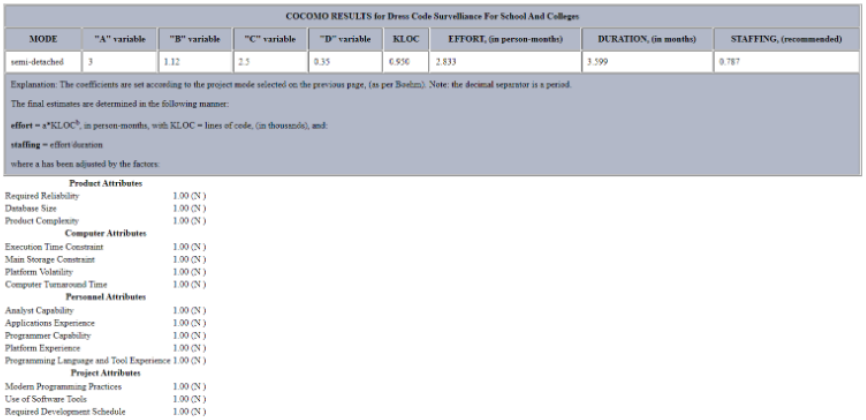
The software is built using open-source software and no any extra hardware is used other than those present in the system. Hence the cost of the project

includes only the cost of the machine. COCOMO Model In this project, the Cost Estimation based on COCOMO (Constructive Cost Model) the formula for this Model is follows:
Effort = Constant × (Size) scale factor× Effort Multiplier

– Effort in terms of person-months – Constant: 3 in 1998 based on semi-detached Mode – Size: Estimated Size in KLOC – Scale Factor: combined process factors – Effort Multiplier (EM): combined effort factors Functional Point Table The function point range in between 1-10 Conversion of Functional point to Lines of Code (LOC) Total function points = 6

Estimated Size –950 LOC The basic COCOMO equations take the form Effort Applied (E) = ab (KLOC) bb [man-months] Development Time (D) = cb (Effort Applied) db [months] People required (P) = Effort Applied / Development Time [count]

Where, KLOC is the estimated number of delivered lines (expressed in thousands) of code for a project. The coefficients ab, bb, cb and db are given in the following table.



COCOMO RESULTS for Dress Code Surveillance For School And Colleges

MODE	"A" variable	"B" variable	"C" variable	"D" variable	KLOC	EFFORT, (in person-months)	DURATION, (in months)	STAFFING, (recommended)
semi-detached	3	1.12	2.5	0.35	0.950	2.833	3.599	0.787

Explanation: The coefficients are set according to the project mode selected on the previous page, (as per Boehm). Note: the decimal separator is a period.

The final estimates are determined in the following manner:

effort = a*KLOC^b, in person-months, with KLOC = lines of code, (in thousands), and:

staffing = effort/duration

where a has been adjusted by the factors:

Product Attributes	
Required Reliability	1.00 (N)
Database Size	1.00 (N)
Product Complexity	1.00 (N)
Computer Attributes	
Execution Time Constraint	1.00 (N)
Main Storage Constraint	1.00 (N)
Platform Volatility	1.00 (N)
Computer Turnaround Time	1.00 (N)
Personnel Attributes	
Analyst Capability	1.00 (N)
Applications Experience	1.00 (N)
Programmer Capability	1.00 (N)
Platform Experience	1.00 (N)
Programming Language and Tool Experience	1.00 (N)
Project Attributes	
Modern Programming Practices	1.00 (N)
Use of Software Tools	1.00 (N)
Required Development Schedule	1.00 (N)

Other Factors:

Hardware/Software	**Cost (Approximately) in Rs.**
Computer System with i7 7th generation or above	80000
Python IDE(Jupyter Notebook Environment) to run machine learning models	0
NVIDIA 1050 TI or moderate level GPU	10000
16GB or above RAM and graphics card	6000
Electricity	560
Internet	2400

2 Background study and literature overview

2.1 Literature overview

Joseph Redmon, Santosh Divvala, Ross Girshick, Ali Farhadi[1]. You Only Look Once: Unified, Real-Time Object Detection [2019] stated that YOLO is a new approach for object detection. It frames objects using bounding boxes and associated class probabilities. The base YOLO model that is used in paper processes images in real-time, which reframe object detection as a single regression problem, straight from image pixels to bounding box coordinates and class probabilities. Using, you only look once (YOLO) at an image to predict what objects are present and where they are. Processing images with YOLO is simple and straightforward. The system, First resizes the input image to 448 × 448, then runs a single convolutional network on the image, and at last threshold the resulting detections by the model's confidence.

Joseph Redmon and Ali Farhadi[2]. YOLOv3: An Incremental Improvement [2015] stated how bounding boxes are predicted. For that the system predicts bounding boxes using dimension clusters as anchor boxes. The network predicts 4 coordinates for each bounding box, tx, ty, tw, th. If the cell is offset from the top left corner of the image by (cx, cy) and the bounding box prior has width and height pw, ph. Muddam Akshay Roy[3]. Clothing Recognition Using Deep Learning Techniques [2018] stated an idea about Image dataset collection and how to make Annotated images on the image dataset for training and testing the models. The data is collected from DeepFashion dataset, which is a publicly available dataset with various clothing images. The classes taken from this dataset are Dress, Tee, Shorts, Jeans. For the remaining classes of Shirts, Caps and Spectacles data is collected from various sources on the Internet like the ecommerce-website Myntra. The Annotating Images are required for the detection purpose. The objects in images should be labeled with appropriate classes. There are a total of five classes- Dress, Tee-shirt, Short, Pant, Shirt. An open-source software called 'Labelme' is used for labeling images or annotating images. Labelme is a user-friendly software so that labels can be created easily and saved in YOLO format. The label file contains information about the class and coordinates of the bounding boxes in the image. In YOLO format, the values stored in the text file are given in the order of class, x, y, w and h

Shervin Minaee, Yuri Boykov, Fatih Porikli, Antonio Plaza, Nasser Kehtarnavaz, and Demetri Terzopoulos[4]. Image Segmentation Using Deep Learning: A Survey [2016] stated about how the image segmentation is actually happening using one of the deep Learning techniques called Mask-R CNN (Mask-Regional Convolutional Network). This new version of the RCNN is called Mask R CNN for faster Image segmentation and for more accuracy of bounding boxes. The Mask R-CNN is actually a Faster RCNN with 3 output branches, It first computes the bounding box coordinates, The second computes the associated classes, And the third computes the binary mask to segment the object. The Mask R-CNN loss function combines the losses of the bounding box coordinates, the predicted class, and the segmentation mask, and trains all of them jointly.

Gil Levi and Tal Hassner[5]. Age and Gender Classification using Convolutional Neural Networks [2015] stated about how gender classification using CNN network is done. In Gender classification using CNN, the network contains three convolutional layers, each followed by a rectified linear operation

and pooling layer. The first two layers also follow normalization using local response normalization. The first Convolutional Layer contains 96 filters of 7×7 pixels, The second Convolutional Layer contains 256 filters of 5×5 pixels, The third and final Convolutional Layer contains 384 filters of 3 × 3 pixels. Finally, two fully-connected layers are added, each containing 512 neurons. We used the Gender Face Dataset which has total 1173 of Men face images and a total 1134 of women face images for the training and test on our Gender detection model Rebekah J, D. C. Joy Winnie Wise, Bhavani D, Agatha Regina P, N. Muthukumaran[6]. Dress code Surveillance Using Deep Learning [2013] stated that an objective is to develop a system for an organization or for an educational institution, where there is a need for surveillance of dress code. The idea of the dress-code surveillance is to check whether the student or staff wear the proper dress or not.

2.2 Critical appraisal of other people's work

The approach used for object detection by Joseph Redmon, Santosh Divvala, Ross Girshick, And Ali Farhadi [1] represents work for Unified and real-time object detection using YOLO. Compared to the approach taken by the object detection algorithms before YOLO which repurpose classifiers to perform detection, YOLO proposes the use of an end-to-end neural network that makes predictions of bounding boxes and class probabilities all at once. The first version of YOLO has 26 layers in total with 24 Convolutional Layers followed by 2 Fully Connected Layers. The major problem with YOLOv1 is its inability to detect very small objects. In Comparison to YOLOv1, YOLOv3 has 106 neural network layers and detection on 3 scales for detecting objects of small to very large size. The MultiClass problem turned into a MultiLabel problem. The approach used for image segmentation and instance segmentation by Shervin Minaee, Yuri Boykov, Fatih Porikli, Antonio Plaza, Nasser Kehtarnavaz, and Demetri Terzopoulos [4] represents work for instance segmentation using Mask-RCNN. It is an extension of Fast RCNN and Faster RCNN. In Fast RCNN Deep ConvNets were used to identify the objects. It has a few drawbacks as training is expensive in space, object detection is slow at time of inference. Faster RCNN is a combination of RCNN and Fast RCNN technique. A new component is introduced called the region proposal network(RPN).

2.3 Investigation of current project and related work

A real time robust human detection and tracking system for video surveillance which can be used in varying environments. This system consists of human detection, human tracking and false object detection. The human detection utilizes the background subtraction to segment the blob and use codebook to classify human beings from other objects.

A gender and age estimation system from face images uses an algorithm which estimates gender and age with classifiers using support vector machine(SVM) classifiers and voting based on features, such as geometric arrangement, texture and luminosity patterns extracted from facial images. The algorithm has been tested with 300 persons of softpia japan HOIP facial image database. As a result, hitting ratios were 97.3

The main idea of the project is to develop a system for an educational institution or for an organization, where there is a need for surveillance of dress code. The idea of the dress code surveillance is to check whether the students/employees wear the proper uniform. Due to humans being used for checking whether the students wear proper uniforms or not, it is a very time consuming activity and also requires man power.To reduce time consumption and human power we have developed this system. To build this system first we have to detect persons present in the video feed or images. For detecting persons we have used the YOLOv3 algorithm. Our base YOLO model that we have used in our project processes images in real-time, which reframe object detection as a single regression problem, straight from image pixels to bounding box coordinates and class probabilities. Using, you only look once (YOLO) at an image or frames to predict where persons are present. After detecting persons in an image or frames our system will send this data to our next model for identifying the gender of the person. We built a CNN network which contains three convolutional layers, each followed by a rectified linear operation and pooling layer. The first two layers also follow normalization using local response normalization. The first Convolutional Layer contains 96 filters of 7×7 pixels, The second Convolutional Layer contains 256 filters of 5×5 pixels, The third and final Convolutional Layer contains 384 filters of 3 × 3 pixels. Finally, two fully-connected layers are added, each containing 512 neurons. After identifying gender, the system will identify dress type for this. We have used this new version of the RCNN called Mask R CNN for faster Image segmentation and for more accuracy of bounding boxes. Mask R-CNN is actually a Faster RCNN with 3 output branches, It first computes the bounding box coordinates, The second computes the associated classes, and the third computes the binary mask to segment the object.

3 Requirement analysis

3.1 Requirement Gathering

1. As an organization, we need to check students wear proper uniform.
2. As an organization, to check manually students wearing proper uniform is a time consuming activity.
3. For that, the organization required a software system to check whether students wear proper uniform.

User Stories:

1. An admin can access the video feed.
2. An admin can see a person detected in the video feed.
3. An admin can see a gender detected in the video feed.
4. An admin can see a dress type detected in the video feed.
5. An admin can see a dress color identified in the video feed.
6. An admin can see whether a person wears proper uniform or not.

3.2 Requirement Specification

No	Requirement	Essential/ Desirable	Description of Requirement
RS1	This system should have facility to add new image	Essential	After clicking on 'add image' button, system should ask for select the image from device
RS2	This system should have the facility to start a live video stream by starting a webcam.	Essential	After clicking on the 'start webcam' button, the system should start the webcam.
RS3	This system should have facility to detect human objects present in image/video stream	Essential	After adding new image or starting webcam system will start directly to detect human object present in that image/video stream
RS4	This system should have facility to detect gender of humans present in image/video stream	Essential	After detection of human object present in image/video stream, system should start faces of human objects
RS5	This system should have facility to detect gender of humans present in image/video stream	Essential	After faces detection of human object present in image/video stream, system should start detecting gender
RS6	This system should have facility to detect dress type wear by humans present in image/video stream	Essential	After gender detection of the human object present in image/video stream, the system should start to dress the type human's wear.
RS7	This system should have facility to detect color of dress worn by humans present in image/video stream	Essential	After dress type detection of the human object present in image/video stream, the system should start to dress color humans wear.
RS8	This system should generate alert messages for whether the student is wearing proper dress or not.	Essential	For given image/video stream system will display result, whether the student is wearing proper dress or not

3.3 Use case Diagram

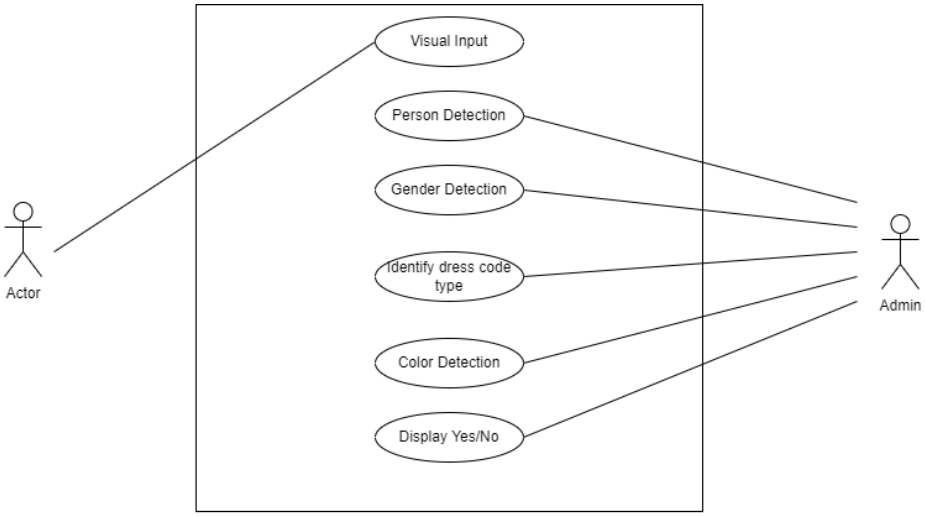


Figure 3.1 Use Case Diagram

Use case diagram consists:

1. Visual input - Getting video feed from the user using a web camera. The video is of the entrance of school or company where students/ employee is entering in the building.
2. Image data processed- Converting video feed into the matrix structure analysis the data and separating frames from the video feed.
3. Human detection- Detecting human from the processed data. Matching the human patterns using trained model to detect human.
4. Gender detection- Finding whether it is a male or female, by using face structure and body structure.
5. Identify type and pattern- Identifying type like shirt, pant on shirt.
6. Color detection- Detecting different colors of the dress and matching with the given dress code color.
7. Match to dress code- Matching to dress code color and type weather is acceptable or not?

4 System design

4.1 Architectural Design

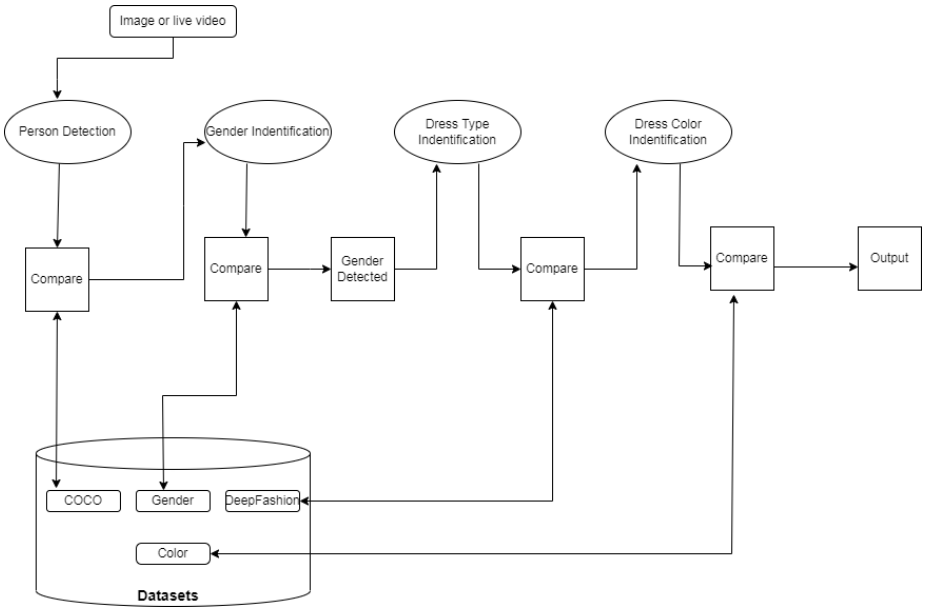


Figure 4.1 Architecture Design

In our project architecture we use following component and datasets:

1. Person Detection
   This component processes the frames or images for detecting a person object. It uses YOLO v3 algorithm and pre-trained YOLO weights to identify a person in video feed or images.

2. Gender Identification
   This component collects the frames from the person detection function and it loads trained models. And by applying a deep learning method to detect the gender of a person present in the image or frame. By comparing these face images with images already available in the dataset on the basis of this comparison it classifies whether the person is men or women.

3. Dress Type Identification
   This component collects the data from gender identification function and it loads trained mask RCNN models. It detects and extracts the shape of dress from the image or video frame. Then the extracted shape is compared with the data present in the dataset and classifies dress type according to it. Also it color segments the area of dress identified in image or frame.

4. Dress color Identification
   This component collects the data from dress type detection function and converts captured image or frame into binary format. After generation of image into binary format then it uses the extracted shape of the dress from it detect the pixel and on the basis of pixel detect the color of dress.

5. Datasets:
   (a) Coco: This dataset is used for person detection.
   (b) Gender: This dataset is used for gender detection of a person.
   (c) DeepFashion: This dataset is used for dress type identification.
   (d) Color: This dataset is used for color detection.

4.2 User Interface Design

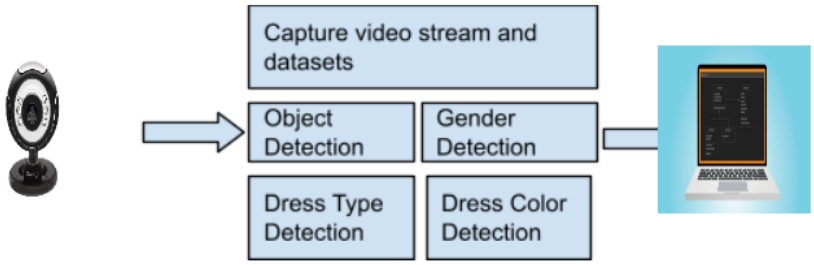


Figure 4.2 User Interface Design

The above figure is user interface design. It shows the interaction between the system and web camera.

4.3 Algorithmic description of each module

1. Module: Person Detection
   (a) Start
   (b) Detect Image or live video Stream
   (c) Recognize from images or frames
   (d) Apply deep learning methodology Yolo v4 algorithm
   (e) Person Object Detected
   (f) End
2. Module: Gender Identification
   (a) Start
   (b) Recognize images
   (c) Compare images with datasets
   (d) Classify gender
   (e) End
3. Module: Dress Type Detection
   (a) Start
   (b) Image or live video stream
   (c) Shape Extraction

(d) Match Shape in dataset

(e) Identify dress type

(f) End

4. Module: Dress Color Detection

(a) Start

(b) Image or live video stream

(c) Convert images into binary format

(d) Pixel detection

(e) Identify Color

(f) End

4.3.1 Dataflow Diagram

1. Data Flow Diagram Level 0

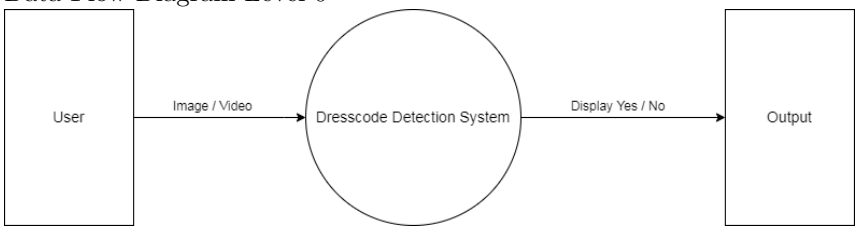


Figure 4.3 Data Flow Diagram Level 0

The above figure is data flow diagram level 0 of the system. It is a basic overview of the system.

2. Data Flow Diagram Level 1

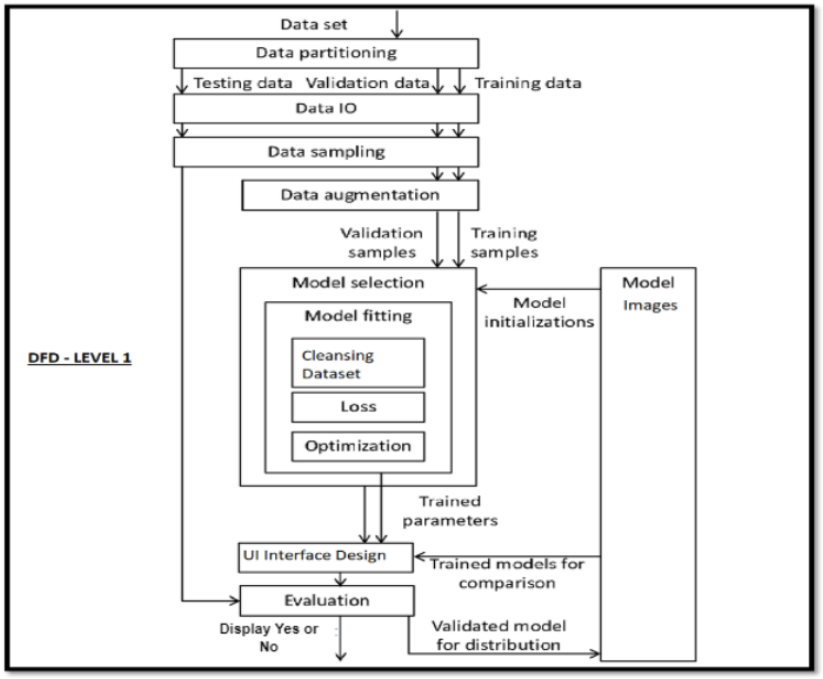


Figure 4.4 Data Flow Diagram Level 1

The above figure shows the data flow diagram level 1 of the system. It shows a more detailed process of the system.

4.3.2 Sequence Diagram

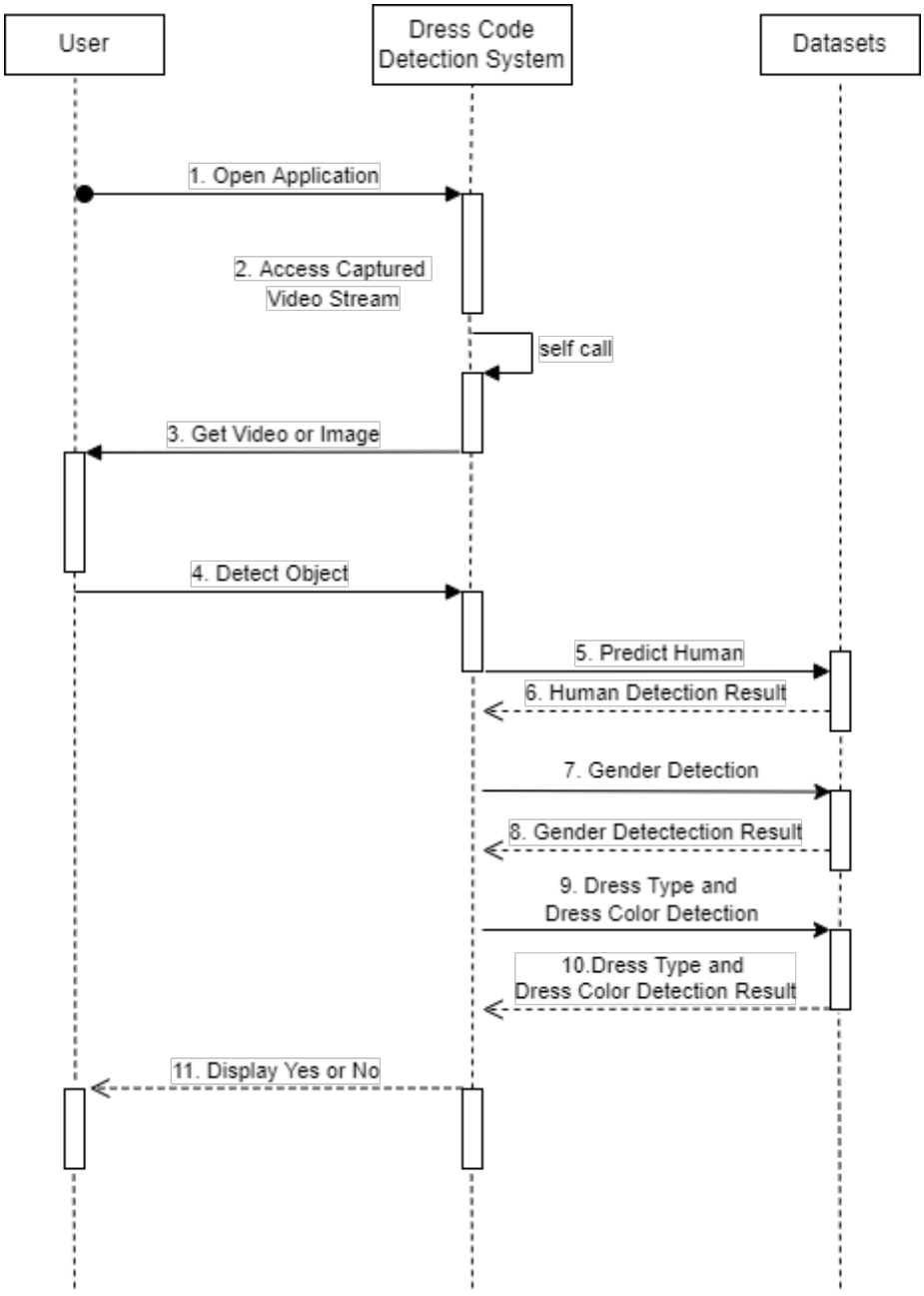


Figure 4.5 Sequence Diagram

The above figure shows the sequence diagram of the system. It is used to show the interactions between different objects of the system.

4.3.3 Activity Diagram

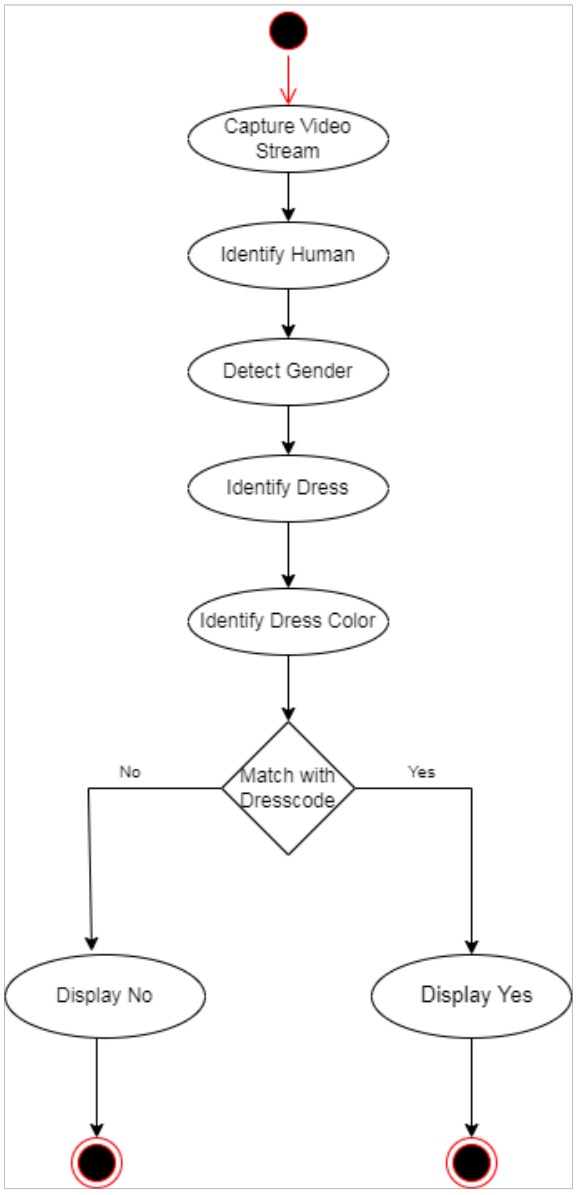


Figure 4.6 Activity Diagram

The above figure shows an activity diagram of the system. It shows a behavioral flow of the system.

4.3.4 Component Diagram

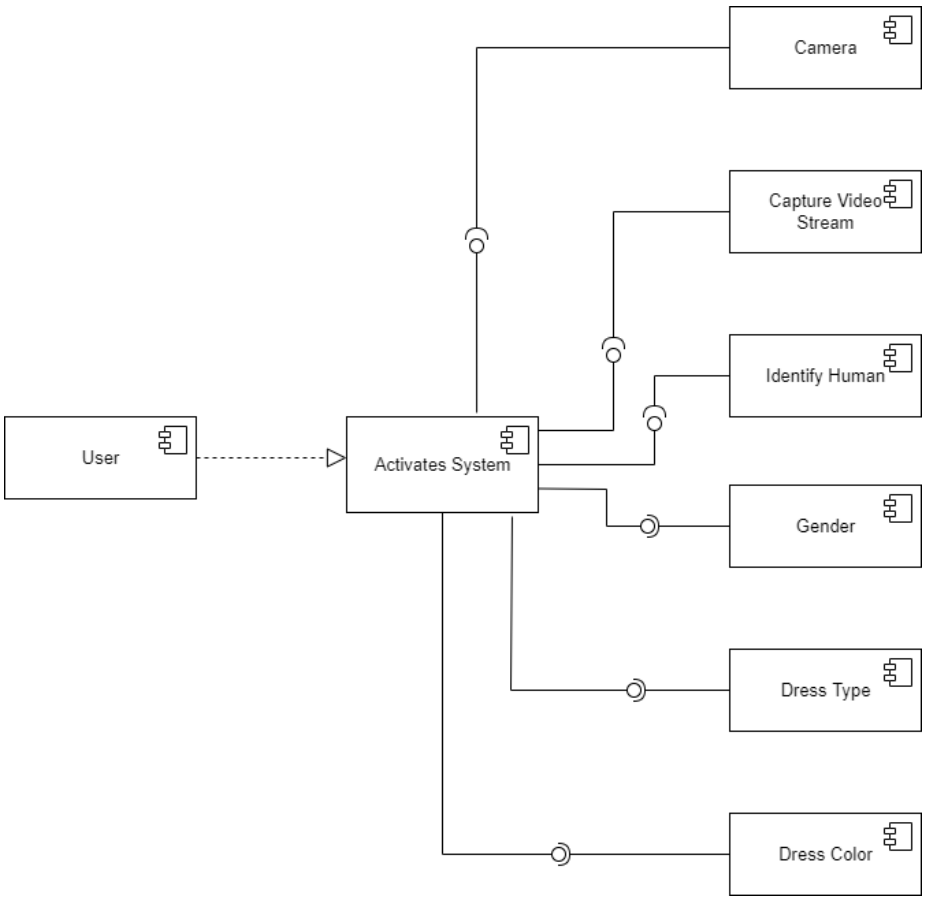


Figure 4.7 Component Diagram

The above diagram shows the component diagram of the system. It shows the organization of the physical diagram of the system.

4.3.5 Deployment Diagram

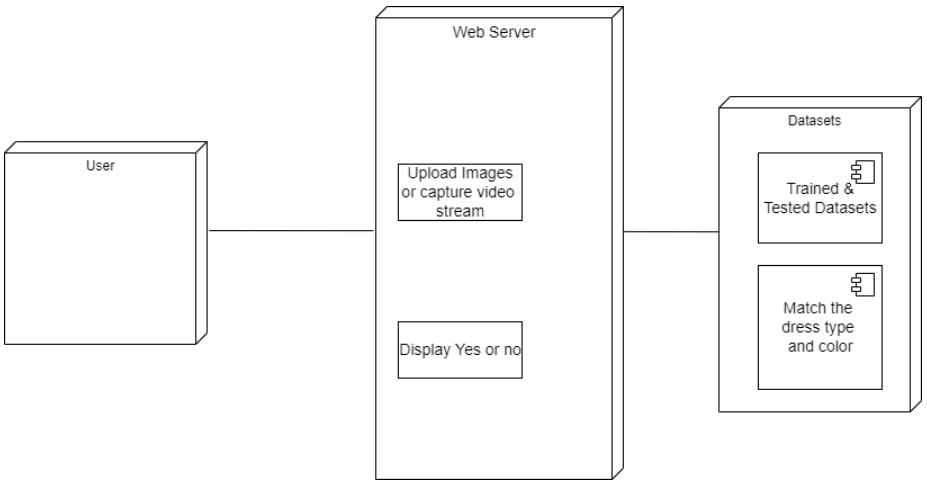


Figure 4.8 Deployment Diagram

The above figure shows the deployment diagram of the system. It shows the execution of the system.

5 Implementation

5.1 Environmental Setting for Running the Project

Software required to run the system:
1. Software

Ubuntu	Version 21.10
Cuda	Version 11.2
Cudnn	Version 8.1
Python	Tensorflow,GPU,Keras

Hardware required to run the system:
2. Hardware

Desktop/Laptop	1
RAM	24GB (Minimum)
Graphics Card	16GB (Minimum)
WebCam	1

5.2 Detailed Description of Methods

1. Person Detection:
   This function processes the frames or images for detecting person object. It uses YOLO v3 algorithm and pre-trained YOLO weights to identify person in video of feed or images.

2. Gender Identification
   This function collects the frames from person detection function and it loads trained model. And by applying deep learning method to detect the gender of person present in the image or frame. By comparing these face images with images already available in the dataset on the basis of this comparison it classifies whether the person is men or women.

3. Dress Type Detection
   This function collects the data from gender identification function and it loads trained mask RCNN model. It detects and extract shape of dress from the image or video frame. Then extracted shape is compared with the data present in the dataset and classifies dress type according to it. Also it color segment the area of dress identified in image or frame.

4. Identify Dress Color
   This function collects the data from dress type detection function and converts captured image or frame into binary format. After generation of image into binary format then it uses the extracted shape of the dress from it detect the pixel and on the basis of pixel detect the color of dress.

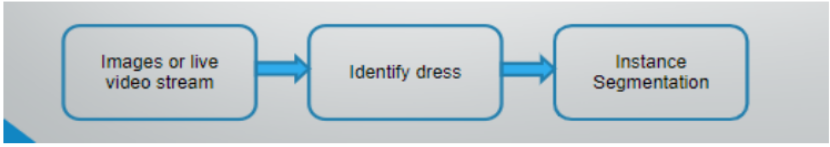
5. Start WebCam
   In this, live data is collected continuously and dynamically through enabling the camera. And using this feed for processing. This process takes place until system is shut down.

6. Get Image File
   In this, image data is collected by allowing user to give image as input to the system. For classifying whether the person wear proper dress or not by calling above functions.

5.3 Implementation Details

1. Video capturing: cap = cv2.VideoCapture(0)
   Opens a camera for video capturing. Set up an infinite while loop and use the read() method to read the frames using the above created object.

2. Person Detection



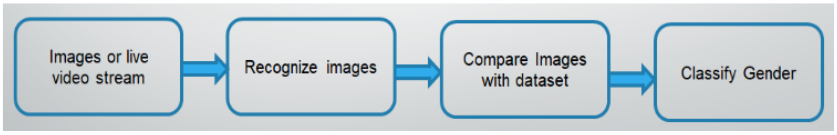
   blob = cv2.dnn.blobFromImage(img, 1/255.0, (416, 416), swapRB=True, crop=False)
   OpenCV's new deep neural network (dnn)used for preprocessing images and preparing them for classification via pre-trained deep learning models. cv2.dnn.blobFromImage function returns a blob which is our input image after mean subtraction, normalizing, and channel swapping.

   output_layers_names = getOutputsNames(net)
   Get the names of the output layers, i.e. the layers with unconnected out-

puts

cv2.rectangle(img, (x, y), (x + w, y + h), color, 2) method is used to draw a rectangle on any image

3. Gender Detection



face, confidence = cv.detect_face(img)
It will return the bounding box corners and corresponding confidence for all the faces detected.

conf = model.predict(face_crop)[0]
Apply gender detection on face. model.predict return a 2D matrix, ex: [[9.9993384e-01 7.4850512e-05]]

cv2.putText(img, label, (startX, Y), cv2.FONT_HERSHEY_SIMPLEX,0.7, (0, 255, 0), 2)
Write label and confidence above face rectangle.

4. Dress Type Detection

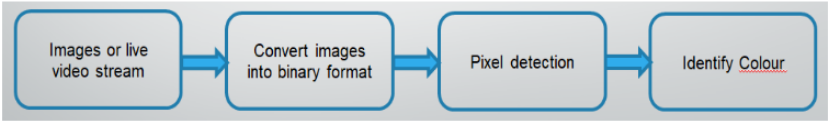
input_tensor = tf.convert_to_tensor(image_np)
The input needs to be a tensor, convert it using 'tf.convert_to_tensor'.

real_num_detection = tf.cast(detections['num_detections'][0], tf.int32)
Reframe is required to translate the mask from box coordinates to image coordinates and fit the image size.

viz_utils.visualize_boxes_and_labels_on_image_array(
image_np_with_detections,
detections['detection_boxes'],
detections['detection_classes'],
detections['detection_scores'],
category_index,
instance_masks=detections.get('detection_masks'),
use_normalized_coordinates=True,
max_boxes_to_draw=200,
min_score_thresh=.30)

Overlay labeled boxes on an image with formatted scores and label names. This function groups boxes that correspond to the same location and creates a display string for each detection and overlays these on the image. Note that this function modifies the image in place, and returns that same image.

5. Dress Color Detection



B,G,R = img[int(xmax/2),int(ymax/2)]
Extracts a pixel from selected region of dress which contains Red, Green and Blue value.

getColorName(R,G,B, csv)
Function to calculate minimum distance from all colors and get the most matching color.

6 Integration and Testing

6.1 Description of the Integration Modules

MODULES

1. Module Name: Person Detection:
   Module Input: Images captured from video stream.
   Description:
   This module processes the frames or images for detecting a person object. It uses YOLO v3 algorithm and pre-trained YOLO weights to identify person in video of feed or images

   Output: Person Objects detected from image.

2. Module Name: Gender Identification
   Module Input: Person edge detected image and images from dataset.
   Description:
   This function collects the frames from the person detection function and it loads trained models. And by applying a deep learning method to detect the gender of a person present in the image or frame. By comparing these face images with images already available in the dataset on the basis of this comparison it classifies whether the person is men or women.

   Output: Classify whether the person is male or female.

3. Module Name: Dress Type Detection
   Module Input: Images captured from video stream and image dataset which contains different types of dress images.
   Description:
   This module collects the data from gender identification function and it loads trained mask RCNN models. It detects and extracts the shape of dress from the image or video frame. Then the extracted shape is compared with the data present in the dataset and classifies dress type according to it. Also it color segments the area of dress identified in image or frame.

4. Module Name: Dress Color Detection
   Module Input: Person gender detected image or live video and images from dataset.

Description:
This module collects the data from dress type detection function and converts captured image or frame into binary format. After generation of image into binary format then it uses the extracted shape of the dress from it detect the pixel and on the basis of pixel detect the color of dress.

Output: Color of dress code worn by person.

6.2 Testing

Unit Testing

1. Person Identification

Test Case No.	Test Case	Input	Expected Output	Actual Output	Status
1	Check whether the person is present in image or not	Object detection dataset i.e. Person	Yes, Person is found in an image	Yes, Person is found in an image	Pass
2	Check whether the module can detect multiple persons are present in image or not	Object detection dataset i.e. Person	Yes, Multiple persons are found in an image	Yes, Multiple persons are found in an image	Pass
3	Check whether the module can detect only person objects	Object detection dataset i.e. Person	Yes, Module only detect person object present in an image	Yes, Module only detect person object present in an image	Pass

2. Gender Detection

Test Case No.	Test Case	Input	Expected Output	Actual Output	Status
1	Detect face	Face detection dataset	Face detected	Face detected	Pass
2	Classify person on the basis of face detection	Face detection dataset	Person classify in two classes i.e. 1. Male 2. Female	Person classify in two classes i.e. 1. Male 2. Female	Pass

3. Dress Code Type

Test Case No.	Test Case	Input	Expected Output	Actual Output	Status
1	Check whether the person wearing dress is dress type	Dress code type as per rules	Person is wearing accurate type of dress as per rules i.e. formal	Person is wearing accurate type of dress as per rules i.e. formal	Pass
2	Check whether the person wearing dress is dress type	Dress code type as per rules	Person is not wearing accurate type of dress as per rules i.e. casual	Person is not wearing accurate type of dress as per rules i.e. casual	Pass

4. Dress Color Detect

Test Case No.	Test Case	Input	Expected Output	Actual Output	Status
1	Check whether the color identified	Dress code color as per the rules	Person is wearing the proper color dress code	Person is wearing the proper color dress code	Pass
2	Check whether the color of dress wear by person is matching to rules	Dress code color as per the rules	Person is not wearing the proper color dress code	Person is wearing the proper color dress code	Fail

System Testing

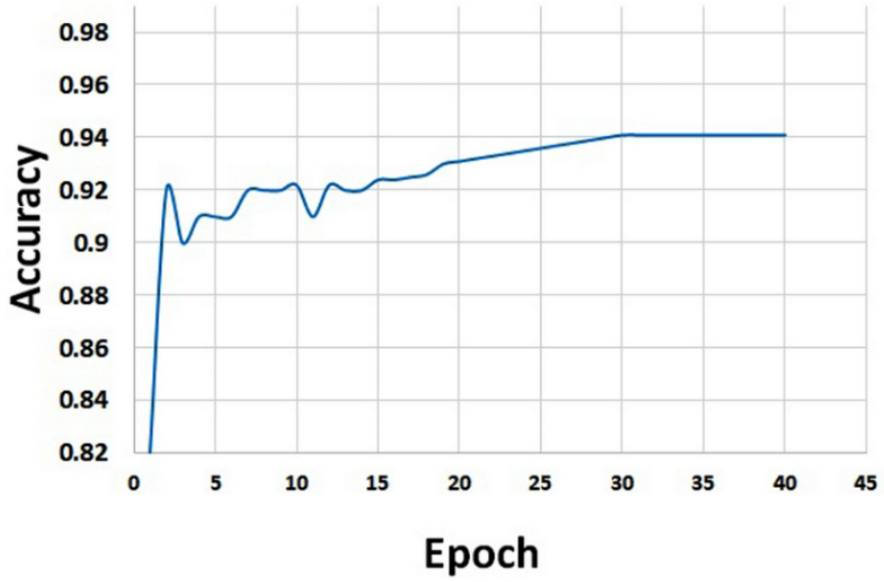
Test Case No.	Test Case	Input	Expected Output	Actual Output	Status
1	Check whether objects is detected in frame or not	Object detection dataset	Objects are detected	Objects are detected	Pass
2	Check whether person is detected in frame or not	Person detection dataset	Person is detected	Person is detected	Pass
3	Check Accuracy of person whether the person is male or female	Gender classification dataset	Detected the person is male or female	Detected the person is male or female	Pass
4	Check the person wearing proper color dress code	Color detection dataset	Proper color of dress is detected	Proper color of dress is detected	Pass
5	Check which type	Dress code type dataset	Proper dress code type is detected	Proper dress code type is detected	Pass

	of dress is wear by person				
6	Check accuracy of person wearing proper dress code	Person wearing dress code properly	Accuracy between 95 to 100%	Accuracy between 95 to 100%	Pass
7	Check whether the system is able to detect for single person wearing proper dress code	Single person wearing dress code properly	Single person wearing proper dress code	Single person wearing proper dress code	Pass
8	Check whether the system is able to detect for more than one people wearing proper dress code	More than one people wearing proper dress code	More than one people wearing proper dress code	Only single person is detected wearing proper dress code	Fail
9	Check whether the system is able to detect for more than one people not wearing proper dress code	More than one people not wearing proper dress code	More than one people not wearing proper dress code	Only single person is detected not wearing proper dress code	Fail

7 Performance Analysis

In this project, We have used different kinds of object detection models for different set of purposes. Below the graph, I've discussed the reasons why we choose this model and its reasons.

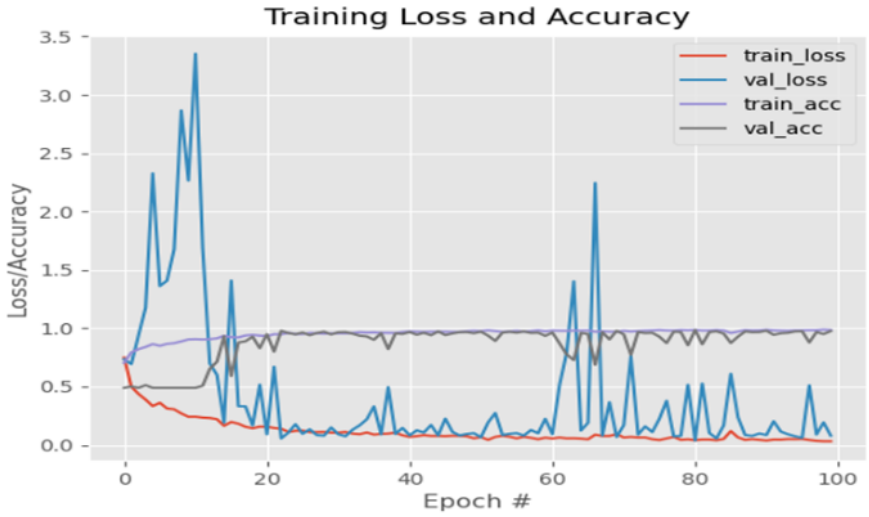
Yolo V3 for Object Detection-



The main advantage of yolov3 is detection speed and accuracy. YOLOv3 has a large number of backbone network parameters and requires high hardware performance, which is not conducive to the popularization of applications.

For our person detection model the accuracy of the model is between 94-98%. The loss value is very low up to 0.04%.

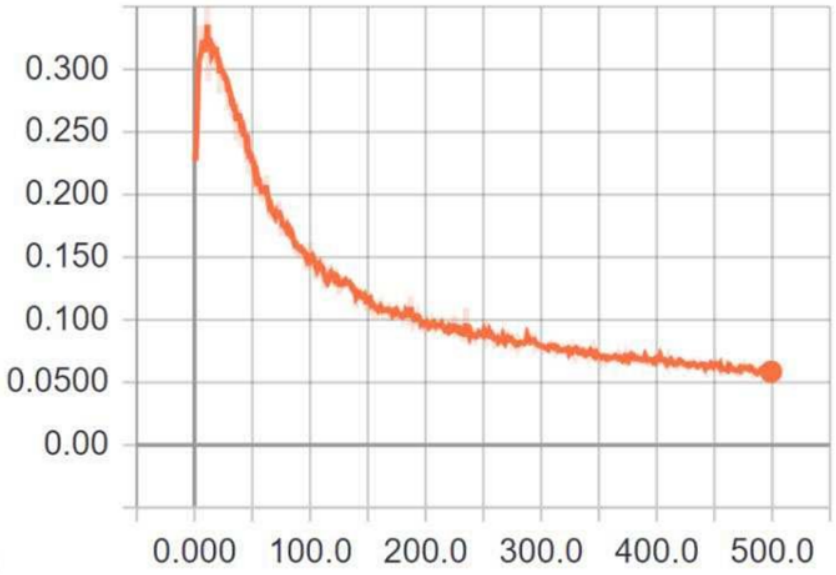
Gender detection –



Gender detection model is based on tensorflow object detection. It allows for the recognition, localization, and detection of multiple objects within an image which provides us with a much better understanding of an image as a whole.

In the gender detection model the accuracy of training and testing is near to 1, and loss is as low as 0.012

Mask-RCNN for Dress detection-



Mask RCNN has high accuracy of detection, while using different kinds of detection models, like resent , R-CNN gives low precision value, so we used mask-r CNN for dress detection.

The accuracy of the dress detection model which is developed using Mask RCNN varies as the changes appear in the dataset and the number of epochs are done to train the model. The above graph shows the loss of 5000 epochs which is nearly up to 0.0500.

8 Future Scope

The system will be extended in future by adding following features:

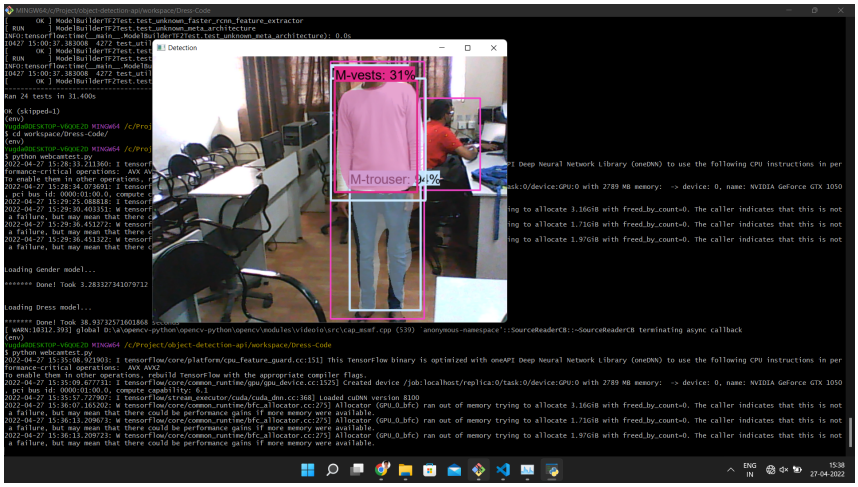
1. In future to enhance performance of our system requires high level inbuilt hardware.
2. Our system can be extended to use face recognition for the attendance system.
3. By using the attendance system we can extend the system to create a summary of how many days students wear proper uniforms.
4. It also can be extended for student security purposes.

9 Applications

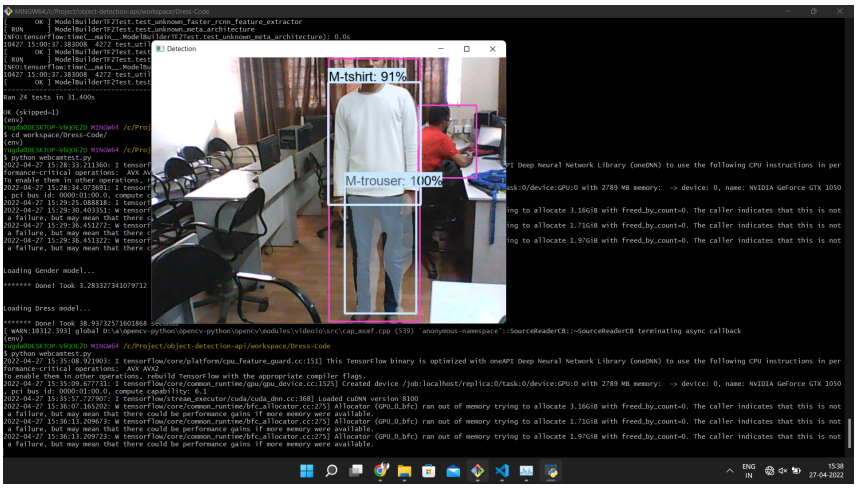
1. Ability to identify the proper dress code with the proper color saves human time.
2. Suitable for schools, Colleges, Company and at different industries.

10 Installation Guide and User Manual

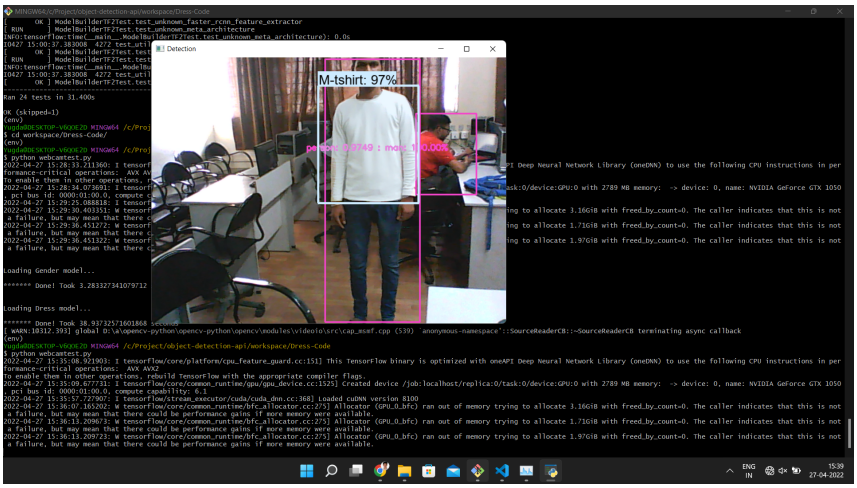
1. Installation
   (a) Install Python's latest version
   (b) Install Anaconda Navigator or Visual Studio Code or use Google Colab.
   (c) Then install the Libraries. Libraries to be installed pip :
   numpy==1.22.3
   pandas==1.4.1
   matplotlib==3.5.1
   Tensorflow==2.7.0
   Keras==2.3.0
   (d) Download Cuda 11.2 from https://developer.nvidia.com/
   (e) Download Cudnn for cuda 11.2 from https://developer.nvidia.com/
   (f) To run the system type command python main.py in command prompt.
2. User Manual



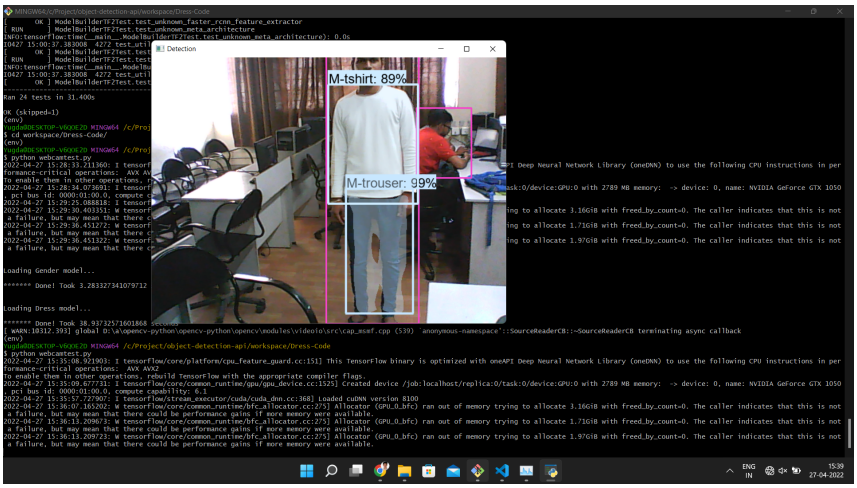
The above snap shows the system detect male trouser 94%.

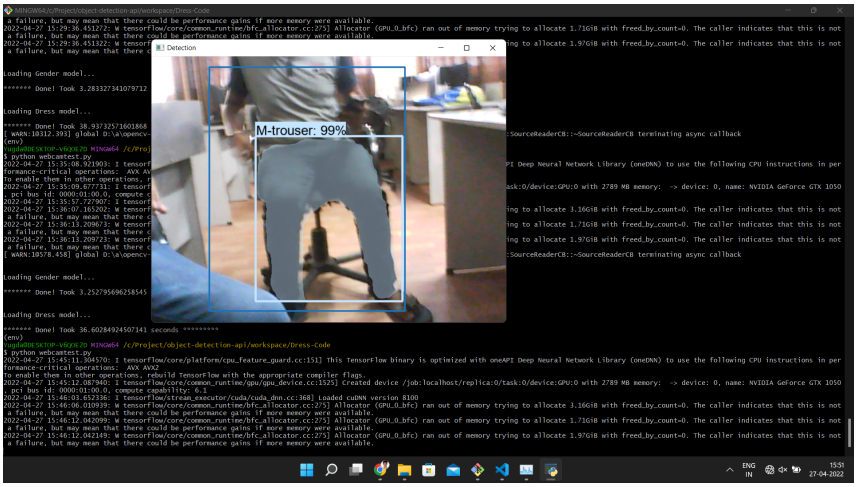


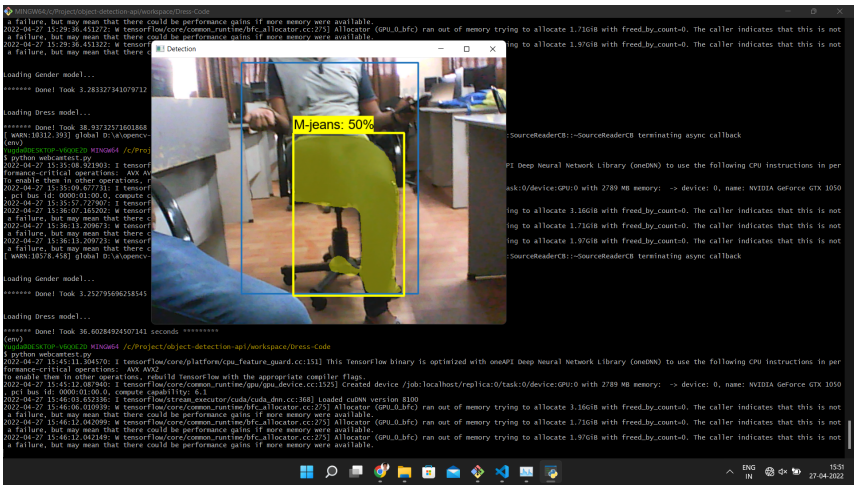
The above snap shows the system detect male tshirt and male trouser 91% and 100% respectively.

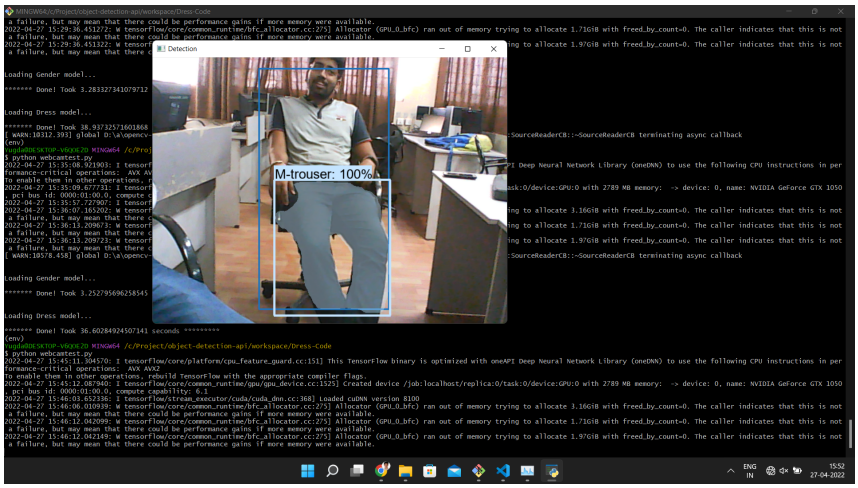


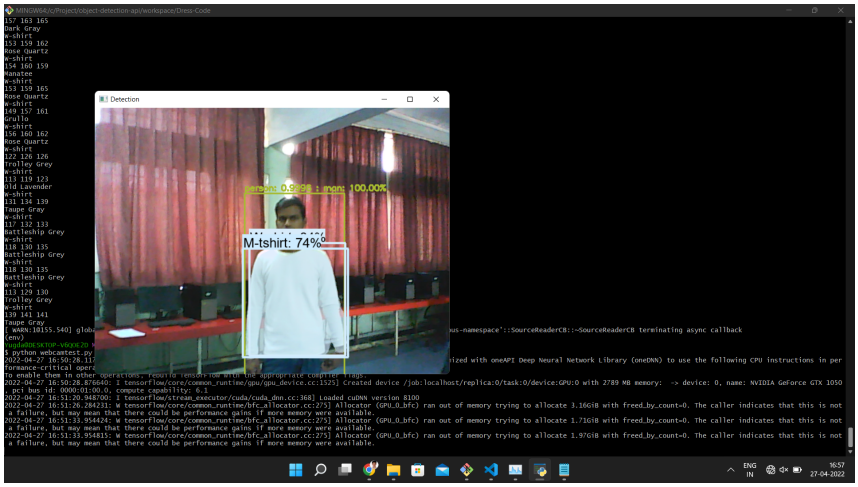
The above snap shows the system detect the show person is man 100% and detect male tshirt 97%.

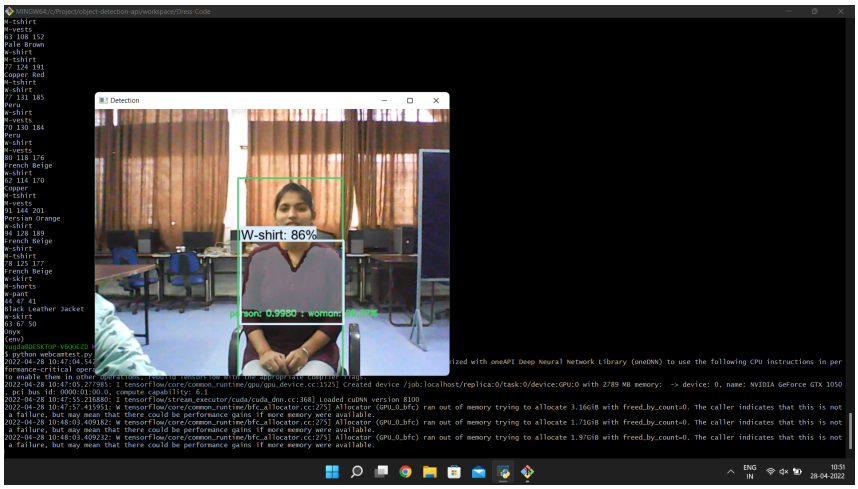

Detection
M-tshirt: 89%
M-trouser: 99%


Detection
M-trouser: 99%

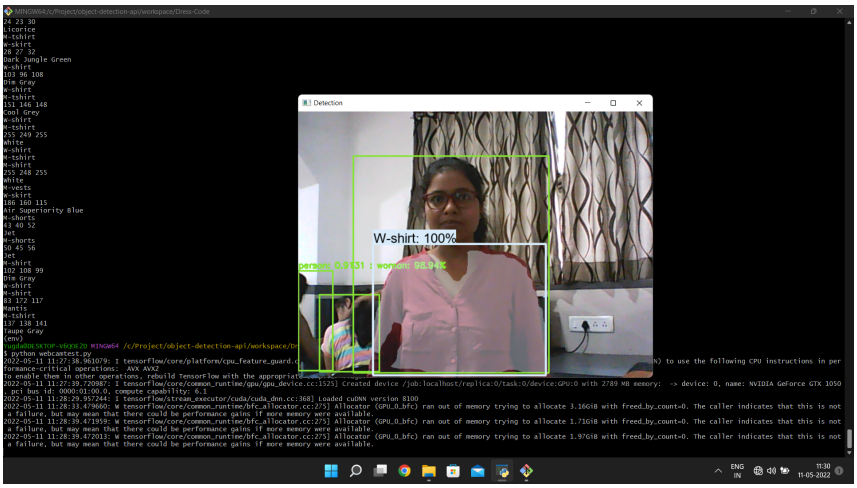

Detection
M-jeans: 50%





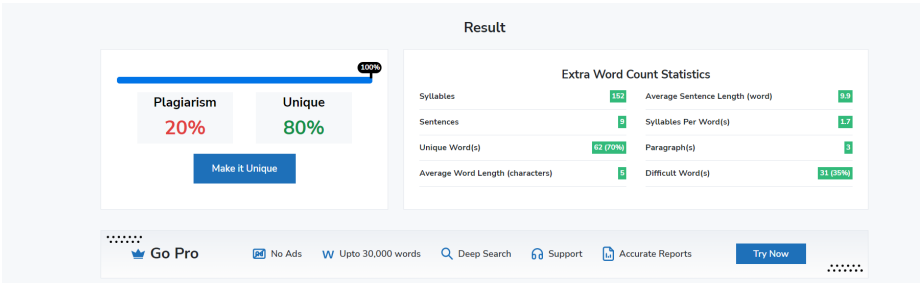


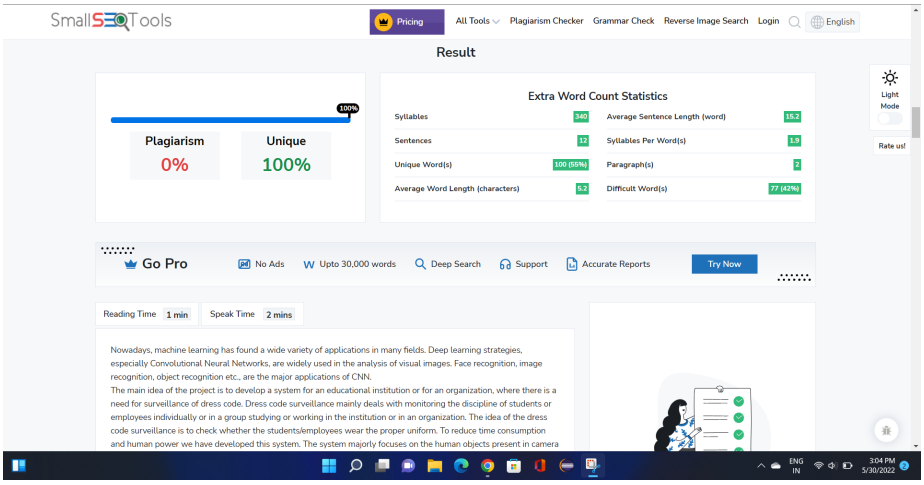
The above snap shows the system detect the women and women shirt 89.37% and 86% respectively.

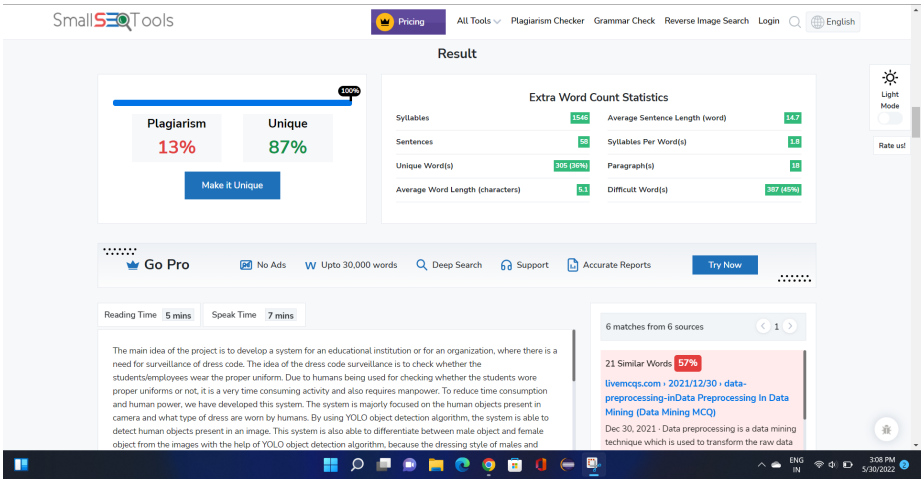


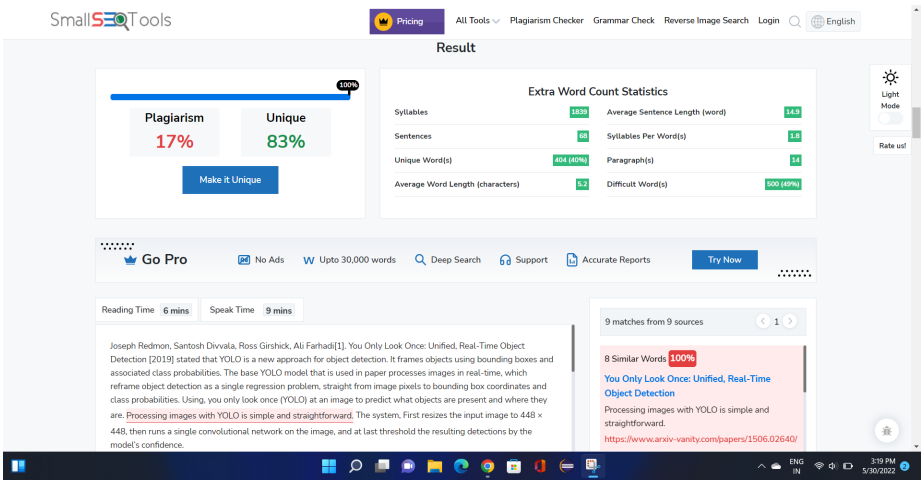
The above snap shows the system detect the women and women shirt 98.94% and 100% respectively.

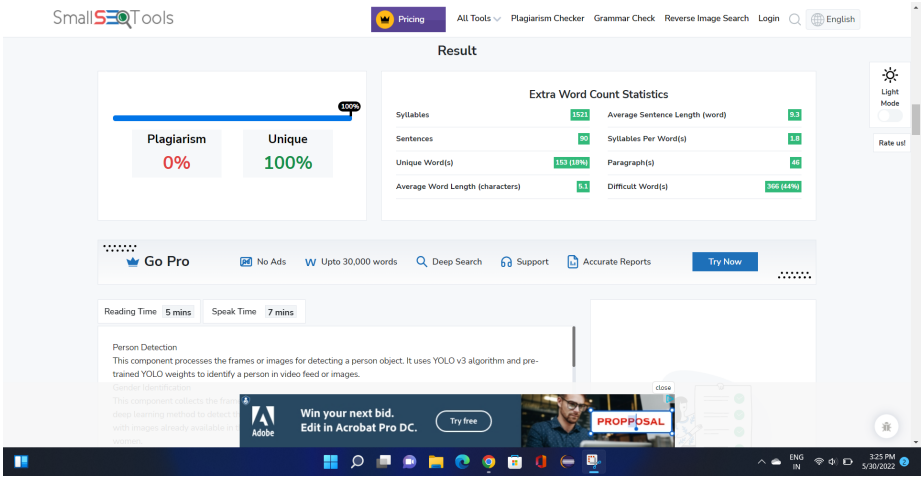
11 Plagiarism Report

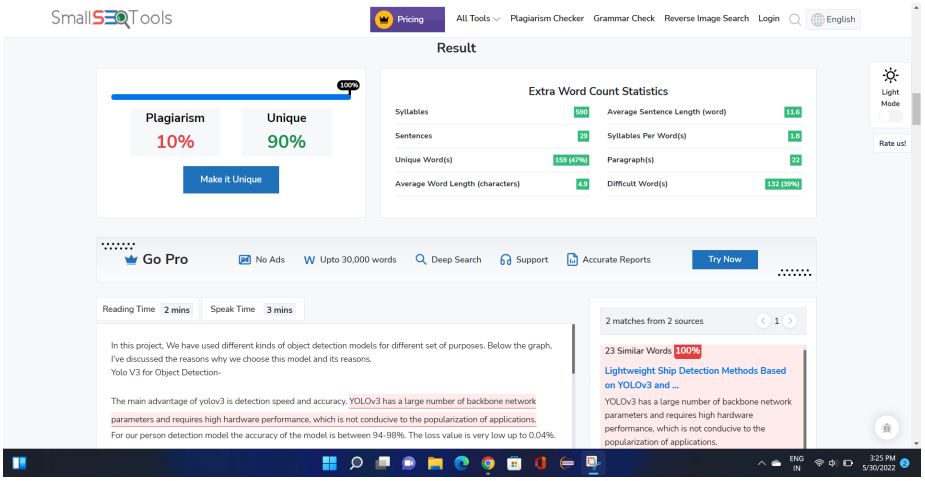





SmallSEOTools
Pricing
All Tools
Plagiarism Checker
Grammar Check
Reverse Image Search
Login
English
Result
Plagiarism
13%
Unique
87%
Make it Unique
Extra Word Count Statistics
Syllables 1546
Average Sentence Length (word) 14.7
Sentences 58
Syllables Per Word(s) 1.8
Unique Word(s) 305 (36%)
Paragraph(s) 18
Average Word Length (characters) 5.1
Difficult Word(s) 387 (45%)
Light Mode
Rate us!
Go Pro
No Ads
Upto 30,000 words
Deep Search
Support
Accurate Reports
Try Now
Reading Time 5 mins
Speak Time 7 mins
The main idea of the project is to develop a system for an educational institution or for an organization, where there is a need for surveillance of dress code. The idea of the dress code surveillance is to check whether the students/employees wear the proper uniform. Due to humans being used for checking whether the students wore proper uniforms or not, it is a very time consuming activity and also requires manpower. To reduce time consumption and human power, we have developed this system. The system is majorly focused on the human objects present in camera and what type of dress are worn by humans. By using YOLO object detection algorithm, the system is able to detect human objects present in an image. This system is also able to differentiate between male object and female object from the images with the help of YOLO object detection algorithm, because the dressing style of males and
6 matches from 6 sources
21 Similar Words 57%
livemcqs.com › 2021/12/30 › data-preprocessing-inData Preprocessing In Data Mining (Data Mining MCQ)
Dec 30, 2021 · Data preprocessing is a data mining technique which is used to transform the raw data


SmallSEOTools
Pricing
All Tools
Plagiarism Checker
Grammar Check
Reverse Image Search
Login
English
Result
Plagiarism
17%
Unique
83%
Make it Unique
Extra Word Count Statistics
Syllables 1839
Average Sentence Length (word) 14.9
Sentences 68
Syllables Per Word(s) 1.8
Unique Word(s) 404 (40%)
Paragraph(s) 14
Average Word Length (characters) 5.2
Difficult Word(s) 500 (49%)
Light Mode
Rate us!
Go Pro
No Ads
Upto 30,000 words
Deep Search
Support
Accurate Reports
Try Now
Reading Time 6 mins
Speak Time 9 mins
Joseph Redmon, Santosh Divvala, Ross Girshick, Ali Farhadi[1]. You Only Look Once: Unified, Real-Time Object Detection [2019] stated that YOLO is a new approach for object detection. It frames objects using bounding boxes and associated class probabilities. The base YOLO model that is used in paper processes images in real-time, which reframe object detection as a single regression problem, straight from image pixels to bounding box coordinates and class probabilities. Using, you only look once (YOLO) at an image to predict what objects are present and where they are. Processing images with YOLO is simple and straightforward. The system, First resizes the input image to 448 × 448, then runs a single convolutional network on the image, and at last threshold the resulting detections by the model's confidence.
9 matches from 9 sources
8 Similar Words 100%
You Only Look Once: Unified, Real-Time Object Detection
Processing images with YOLO is simple and straightforward.
https://www.arxiv-vanity.com/papers/1506.02640/


SmallSEOTools
Pricing
All Tools
Plagiarism Checker
Grammar Check
Reverse Image Search
Login
English
Result
Plagiarism
0%
Unique
100%
Extra Word Count Statistics
Syllables 1521
Average Sentence Length (word) 9.3
Sentences 50
Syllables Per Word(s) 1.8
Unique Word(s) 153 (18%)
Paragraph(s) 46
Average Word Length (characters) 5.1
Difficult Word(s) 366 (44%)
Light Mode
Rate us!
Go Pro
No Ads
Upto 30,000 words
Deep Search
Support
Accurate Reports
Try Now
Reading Time 5 mins
Speak Time 7 mins
Person Detection
This component processes the frames or images for detecting a person object. It uses YOLO v3 algorithm and pre-trained YOLO weights to identify a person in video feed or images.
Win your next bid.
Edit in Acrobat Pro DC.
Try free
PROPPOSAL

e 

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5. https://pjreddie.com/darknet/yolo/

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