Low Level Design (LLD)

SDD (Social Distancing Detection)

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Document Version	0.2
Last Date of Revision	07/03/2022

Document Version Control

Date	Version	Author	Description
01-02-2022	0.1	Meenakshi Rao	Literature survey done
05-03-2022	0.2	Meenakshi Rao	Introduction & architecture defined
06-03-2022	0.3	Meenakshi Rao	Unit test cases defined and appended

Reviews

Version	Date	Reviewer	comments
0.2			

Approval Status

Version	Review Date	Reviewed By	Approved By	comments
0.2				

Contents

1 Introduction

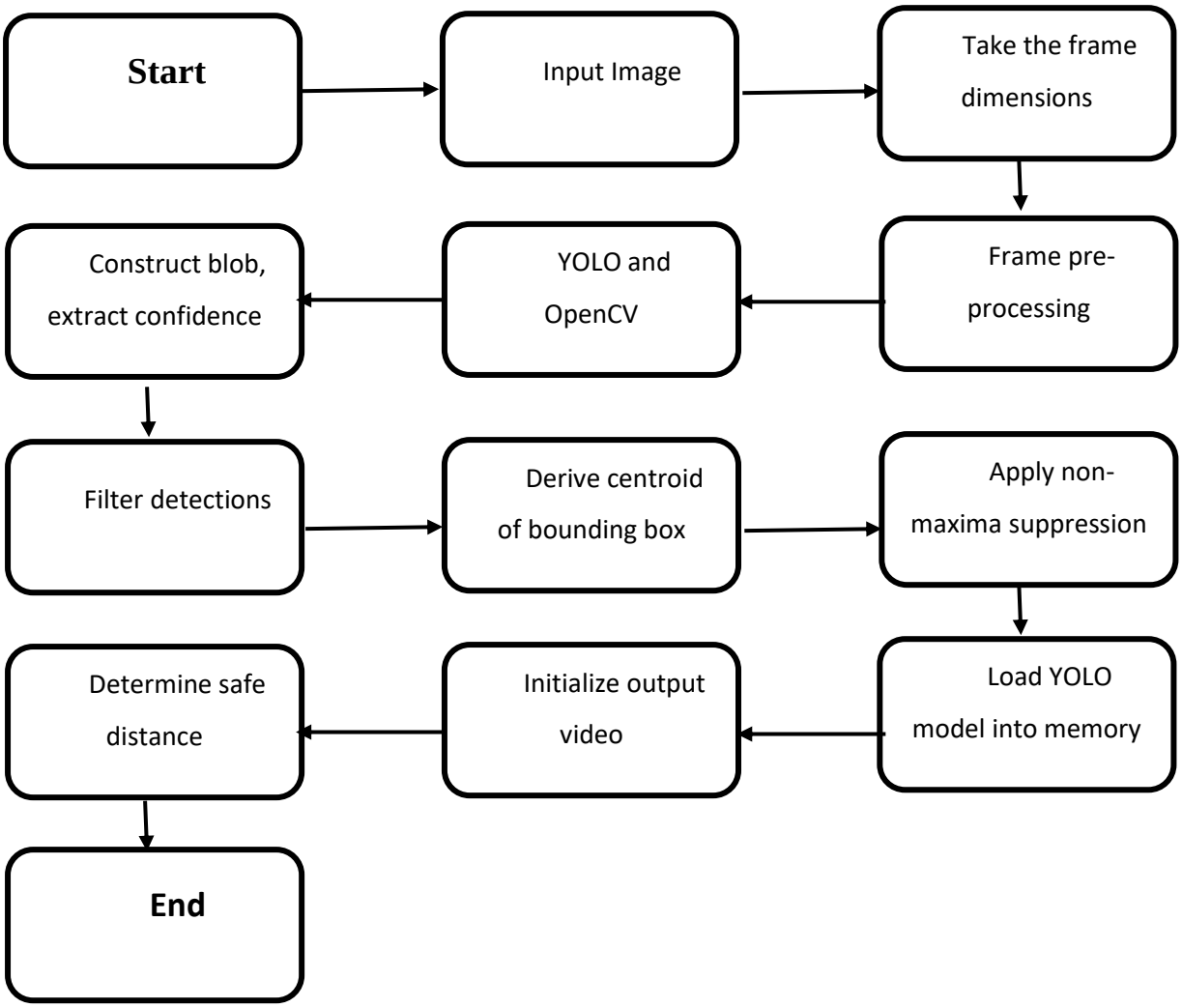
1.1 What is Low-Level Design Document?

The purpose of this Low-Level Design Document (LLDD is to give the internal logic design of the actual program code for Social Distancing Detection system. LLD describes the class diagram with the actual program methods and relation between classes and program specs. It describes the modules so that the programmer can directly code the program from the document.

1.2 Scope

Low -Level Design (LLD) is a component -level design proves that follows a step-by-step refinement process. This process can be used for data structures, required software architecture, source code and ultimately, performance algorithms. Overall, the organization may be defined during requirement analysis and refines during data design work.

2. Architecture



3. Architecture Description

“The YOLO framework (You Only Look Once) deals with object detection in a different way, It takes the entire image in a single instance and predicts the bounding box coordinates and class probabilities for these boxes. The biggest advantage of using YOLO is its superb speed — it’s incredibly fast and can process 45 frames per second. YOLO also understands generalized object representation”. It provides pre-trained model of 80 classes with weights, and names. We need to detect people using this model.

“OpenCV is the huge open-source library for the computer vision, machine learning, and image processing and now it plays a major role in real-time operation. By using it, one can process images and videos to identify objects, faces, or even handwriting of a human.”

detect_people(frame, net, ln, personIdx = 0)

Inputs:

- **frame :** The frame from your video file or directly from the webcam
- **net :** The pre-initialized and pre-trained YOLO object detection model
- **ln :** The YOLO CNN output layer names
- **personIdx :** The YOLO model can detect many types of objects; this index is specifically for the person class, as we won’t be considering other objects

Outputs

The results consist of

(1) the person prediction probability,

(2) bounding box coordinates for the detection, and

(3) the **centroid** of the object.

▶ Looping over the results , we proceed to:

- Extract the bounding box and centroid coordinates
- Initialize the color of the bounding box to *green*
- Check to see if the current index exists in the *violate* set, and if so, update the color to *red*
- Draw both the bounding box of the person and their object centroid. Each is color-coordinated, so we'll see which people are too close.
- Display information on the total number of social distancing violations (the length of the *violate* set) .

4. UNIT TEST CASES

Test Case Description	Pre-Requisite	Expected Result
Verify whether the Application with yolo model loads completely for the user.	Application is deployed	The Application should load completely for the user.
Verify whether user is able to see input fields.	Application is accessible	User should be able to see input fields.
Verify whether user is able to edit all input fields.	Application is accessible	User should be able to edit all input fields.
whether the recommended results are in accordance to the selections user made wrt. files.	Application is accessible	The recommended results should be in accordance to the selections user made.
Verify whether KPIs modify as per the user inputs.	Application is accessible	KPIs should modify as per the user inputs.
Verify whether the KPIs indicate all details.	Application is accessible	The KPIs should indicate complete details.