A YOLO-V3 BASED DISTANCE MONITORING SYSTEM

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INTRODUCTION

- Detect students that pass through a security-like camera.
- Identify the distance between each other.
- Collect reliable statistics (% people violating social distancing rule)

MOTIVATION

- ★ Rapid growth of COVID-19
- ★ New variant
- ★ Social impact
- ★ Public gathering
- ★ Safety precautions
- ★ Monitor distance between people

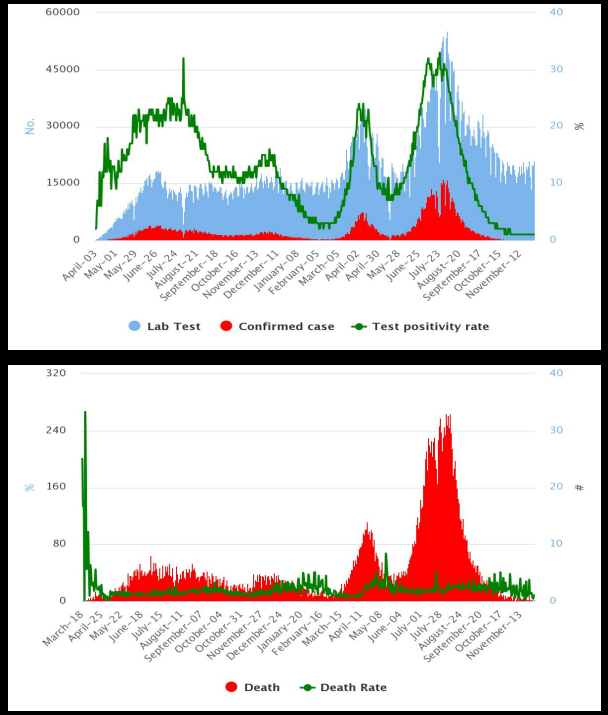

Fig: Daily New Cases & Death of Bangladesh (till 2 dec 2021)

Source: *COVID-19 Dynamic Dashboard of Bangladesh*

OBJECTIVES

We subdivide the aim of this project subdivided into **three** macro-areas:

1. **Counting** number of people
2. **Monitoring** a person respecting the prescribed distance individually
3. **Alerting** each other to maintain a safe distance

LITERATURE REVIEW

Counting People

(i) Count

(ii) Individual

(iii) Images

(iv) Pandemic situation

(v) Monitoring/Tracking

(vi) Study on implementation

LITERATURE REVIEW

Social Distance Monitoring

- Direct approaches
- Human pose estimation
  - Human body model based (generative)
  - Human body model free (discriminative)
- Top down vs Bottom-up
- Regression vs detection based
- One vs multi stage
- 2D vs 3D multi pose estimation

LITERATURE REVIEW

SL	TITLE	AUTHOR	ALGORITHM	FEATURE	DATASET	ACCURACY	LIMITATION
1	Real time data analysis of face mask detection & social distance measurement using Matlab	Devi, Menaka, Meival	RCNN, Fast RCNN, Faster R-CNN	Multiple and multitask picture detection problems with speed rates	1000 images for training	Faster R-CNN 93.4%	Framework shorted for facial detecting in the disable proof of dataset.
2	Detecting Masked Faces in the Wild with LLE-CNNs	Ge, Li, Luo, Ye	LLE CNN	Face Classification Aggregation framework	MAFA dataset 35806	MAFA Avg precision 76.4%	Improving the face detector & more difficult to capture in lighting
3	Real-Time Vehicle and Distance Detection Based on Improved Yolo v5 Network	Wu, Wang, Liu	YOLO v5, CARLA vnev	RGB-D camera Segmentation image	414 image for training & 105 image for detection	YOLOv5s 83.36% YOLOv5s-Ghost 80.76%	Inability to measure distance properly
4	Real-time Face Mask and Social Distancing Violation Detection System using YOLO	Bimvani, Sultanpuri	YOLO v4	Video footage and image	WINDER-FACE & MAFA Dataset 7959	YOLO 94.75%	No scope calibration depend positioning of camera

LITERATURE REVIEW

SL	TITLE	AUTHOR	ALGORITHM	FEATURE	DATASET	ACCURACY	LIMITATION
5	Monitoring COVID-19 prevention measures on CCTV cameras using Deep Learning	Cota, David	YOLO v4	Masked face detection CCTV camera frames	WINDER-FACE Dataset 32203	98.58%	Cannot measure performance if CCTV cracks
6	M-YOLO: A Nighttime Vehicle Detection Method Combining Mobilenet v2 & v3	Huang, He, Chan	M-YOLO, v3	Lane line & Car light	5,576	M-YOLO Avg Precision 94.96%	Need to improve driving safety
7	Distance Measurement Method for Obstacles in front of Vehicles Based on Monocular Vision	Gau, Chen, Liu, Yang	YOLO v4	Location detection Object classification	-	-	Large error on algorithm for bumps suffered for driving process
8	Image recognition and blind-guiding algorithm based on improved YOLOv3	Lu, Ma, Yan	YOLO v3	Image & video frame	-	-	No Practical implementation for this paper, They don't mention about limitations here.

PROPOSED METHODOLOGY

1. Camera Image/Video Capture
2. Image Frame Calculation
3. Image Preprocessing
4. Feature Extraction
5. Image Classification
6. Object Detection
7. Compare Distance
8. Result Generation

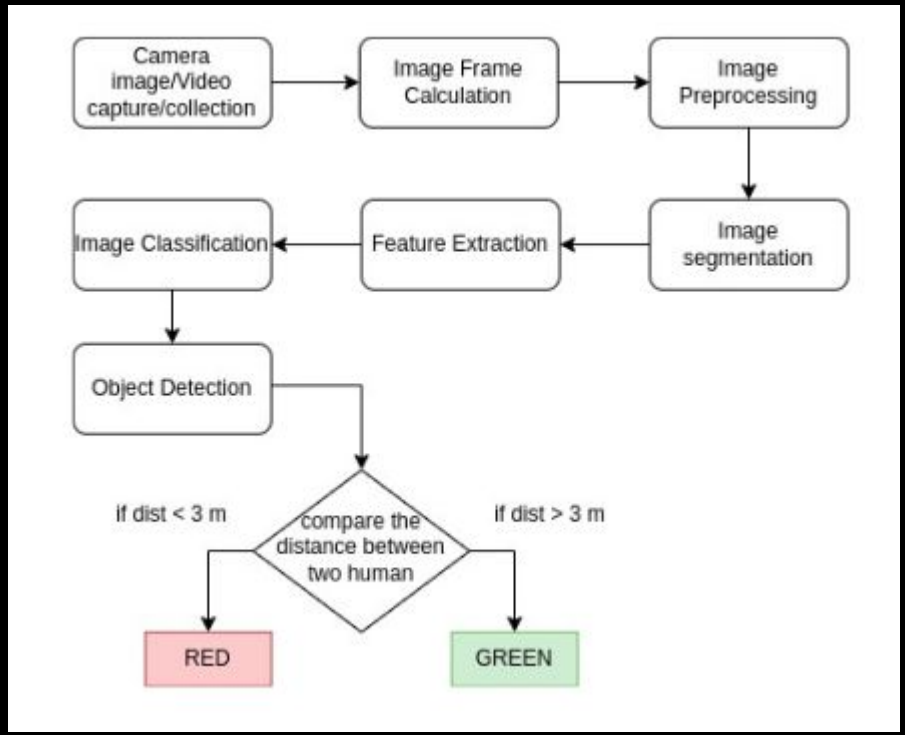

Fig: Proposed Time Schedule

TIME SCHEDULE & BUDGET

Fig: Proposed Time Schedule

Time Frame Phase 1: Study & Idea Phase 2: Method Generate Phase 3: Data & Result Phase 4: Book Writing	Working Cost = 20*50 = 1000 BDT Book Binding + Printing= 5000 BDT Total Cost = 6000 BDT *All cost are calculated approximately

COMPLEX ENGINEERING PROBLEM MAPPING

P : COMPLEX ENGINEERING PROBLEMS
with
CO : COURSE OBJECTIVES
PO : PROGRAM OUTCOMES

P1

DEPTH OF KNOWLEDGE REQUIREMENT

CO 1 - PO l

CO 2 - PO b c

CO 8 - PO j

Study of existing models with similar goals -> **K8**

Data collection -> **K7**

Knowledge of designing machine learning based models -> **K3+K4**

Integration of different components -> **K5+K6**

& proper documentation

P2

RANGE OF CONFLICTING REQUIREMENTS

CO 2 - PO b c

CO 5 - PO f h

Create appropriate machine learning/deep learning/ algorithmic models monitor social distancing from collected data

Our aim to develop this project in lowest time with high efficiency but accessing these types of user data raises privacy concerns as this process needs a branch of data

P3

DEPTH OF ANALYSIS REQUIRED

CO 2 - PO b c

CO 4 - PO g

No obvious formulation as a machine learning problem for the availability & variations of models & data. Depth of analysis needed to select a few specific algorithms from many alternatives

Long period sustainability may not be achieved while effect of pandemic situation mitigates

P7

INTERDEPENDENCE

CO 3 - PO k

CO 6 - PO i

Involves interdependent components i.e.: data collection, training models, object detection module

Individually read papers to find problems & corresponding solution

Data collection by team members

A : COMPLEX ENGINEERING ATTRIBUTES

A1

RANGE OF RESOURCES

Engage diverse resources : people, money, information & technologies

A2

LEVEL OF INTERACTION

Level of interaction among group members differs while making the dataset in model

A3

INNOVATION

Degree of innovation needs to develop the machine learning based data tracking & detection model using available data

A5

FAMILIARITY

Deals a newer area for computer science, machine learning, study of YOLO algorithms, object detection & image processing in context of Bangladesh

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THANK YOU