



SCHOOL OF ELECTRONICS ENGINEERING

Department of SENSE

PEOPLE COUNTER USING MATLAB AND THINGSPEAK

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Abstract

In today's world of cutting-edge technologies, Digital Image Processing is growing very fast and become an important part of many digital devices like mobile, security cameras, laptops, etc. So we are developing a crowd size estimation based project using MATLAB and its analysis on Thingspeak. Crowd count detection has various applications such as public safety, scheduling events, traffic control, etc. In our proposed method, we make use of OpenCV as a programming language that can be used to perform standard computer vision and image processing tasks.

Introduction

Automatic counting of people is very important when it comes to security applications. Aside from counting individuals, it also allows for the management of various areas of interest. When a person's face is in front of the webcam, the program does several things. It places a bounding box around the face. Tracks the person's face throughout the frame of the camera with the captioned bounding box. We must be connected to the internet in order for the people counter to transmit or receive data from Thingspeak. The faces are tracked based off some key facial structure points and this method helps the algorithm of the program to track faces even if the face rotates in the view from the camera. One of the important applications of counting includes counting people easily in a hall or in a shopping mall etc. People can be counted based on the number of faces detected. Face detection is the process in which the human faces are detected from a color image. Once the number of faces is detected the density can be calculated. There are many ways by which faces can be detected and one such method is skin based detection. Rectangles can be used to map the faces in the image. Face detection is used in many day-to-day applications. The automatically face counting using the system of face counter where the counting is highly challenging where some variety of techniques or Parameters are used to proposed by the face counting system. Some techniques are moving object segmentation, skin color detection, face detection and counting. The skin color detection to improve the accuracy of the face detection we applied the reference white with NCC (Normalized Color Coordinates) color spaced consider with balance white color automatically and changes of skin color in images caused by intensity difference in light.

Literature Review

S.no	Paper Title, year	Name of conference/journal
1	Crowd Detection Camera To Prevent COVID-19,2020	Electronics forum
2	People counting system using raspberry pi,2017	JMIS
3	Raspberry PI Controlled people counting system for croud management,2018	Springer Professional
4	Real time crowd detection to prevent stampede,2020	Researchgate
5	COVID-19 crowd monitoring and detection using raspberry-pi,2020	President University repository
6.	People counting system using raspberry pi and OpenCV,2016	IJREAM
7.	Crowd detection and management surveillance system,2020	IJCRT
8.	Crowd size estimation using raspberry pi and OpenCV,2020	CircuitDigest
9.	Crowd size estimation,2019	Hackster
10.	Crowd size estimation using Raspberry pi,2020	FlipBoard

Hardware and Software Details

Software:

- (1) MATLAB
- (2) ThingSpeak
- (3) Computer Vision Toolbox
- (4) Image Processing Toolbox

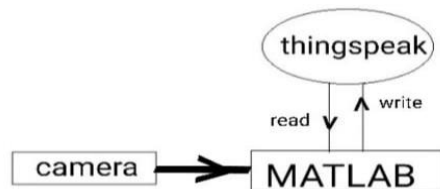
Hardware:

- (1) Webcam

Thingspeak: - ThingSpeak is a very popular IoT platform and by using the ThingSpeak platform, we can monitor our data which is on the internet from anywhere we want to. It is also used to control the system over the Internet, using the Channels and webpages provided by ThingSpeak.

MATLAB:- MATLAB is an abbreviation of "MATrix LABoratory" which is a numeric computing environment and proprietary multi-paradigm programming language developed by MathWorks. Matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, etc. can be implemented with the use of matlab

Block Diagram



Problem Statement

The COVID – 19 pandemic has become the world current emergency public health issue. Rise of COVID – 19 cases have urged the importance and necessity of health protocol implementation. Despite the implementation of health protocol, some people tend to disregard it. Crowd gathering still happens and some people are not even wearing masks which gradually will increase the number of COVID – 19 cases. This indicates that the current way of crowd monitoring is not quite effective to prevent the spreading of COVID – 19.

Proposed Work

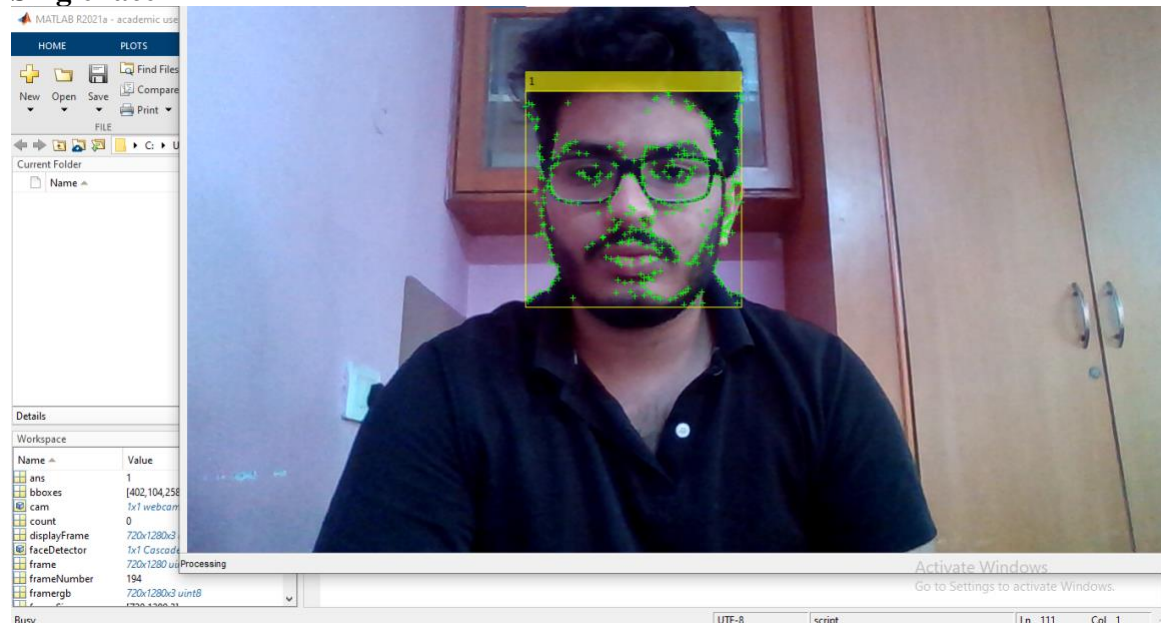
In our project, Crowd size is estimated with the use of MATLAB. This will help to count the number of people present at a particular location/area. The faces of the people in the area of the device are recognized and the count is added. This can be used to keep track of the number of individuals entering/staying in the field of the device. This especially can be very useful during the COVID-19 pandemic to keep account of the number of people in an area, which is essential for safety. Crowd counting has recently been considered as a remarkable contribution in many applications in terms of security and economic values in various areas.

Project Description

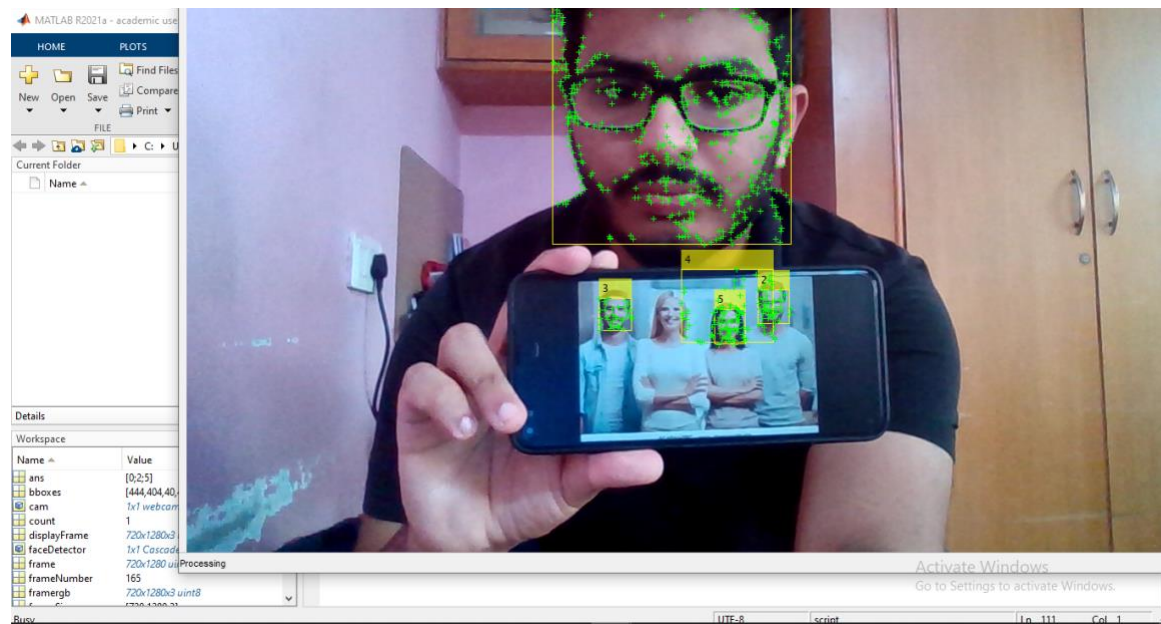
In this project, we are going to build a crowd counting using MATLAB and ThingSpeak. The most common applications of Digital Image Processing are object detection, Face Recognition, and people counter. Here, the pi camera module will be used for continuously capturing the frames and then these frames will be processed with detector to detect the objects in the image. After this, these frames will be compared with pre-trained model for people detection. The people counting will be displayed on the ThingSpeak channel which can be monitored from anywhere in the world.

Screenshots

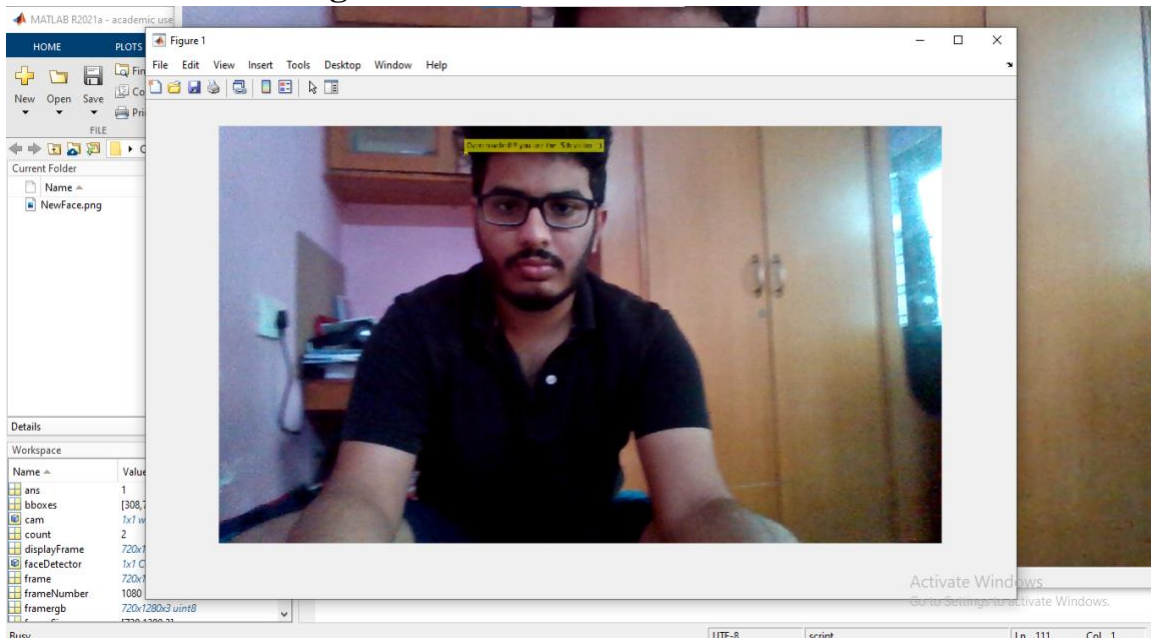
Single face



Multiple Faces



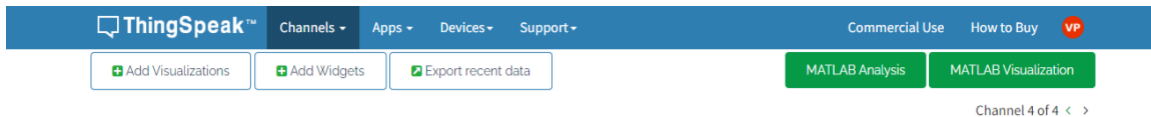
Overcrowded message



Result and Graphs

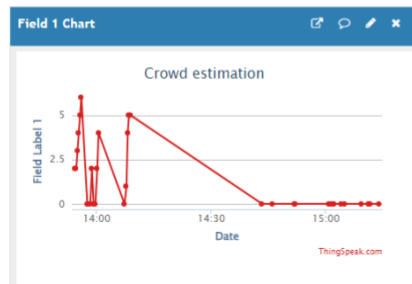
The number of people present in a particular section or area is identified and it can be monitored by the person operating the prototype.

The analysis of the number of people present over time is carried out in Thingspeak software from the fetched data of the prototype



Channel Stats

Created: 7 days ago
Last entry: about an hour ago
Entries: 31



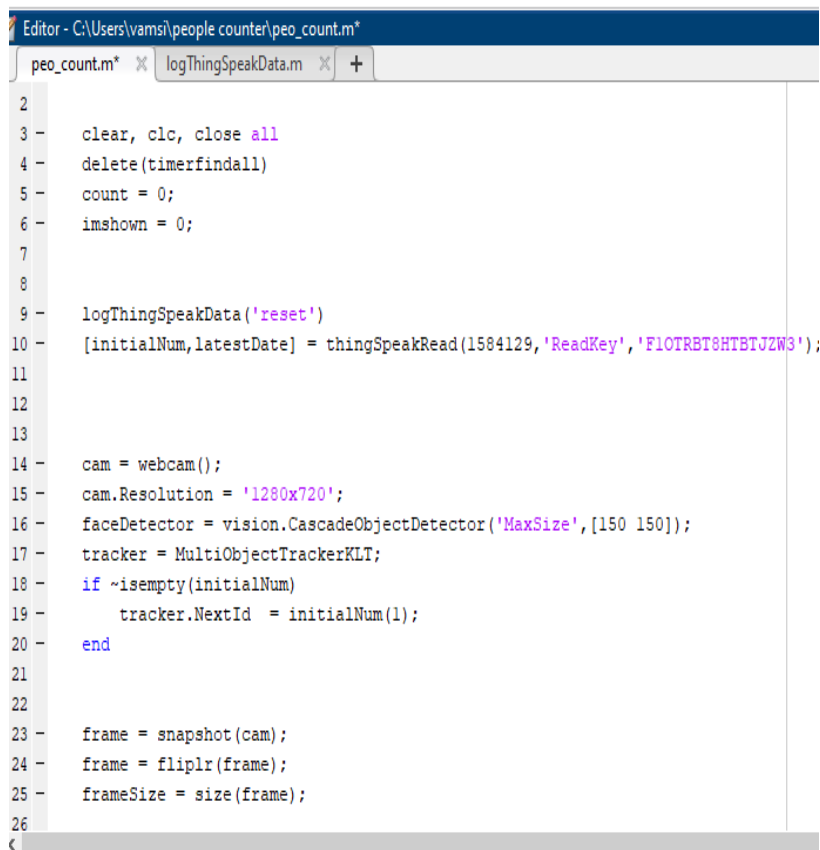
Conclusion

Using MATLAB, we built a people counter. It is possible to incorporate a model that calculates the distance between the bounding boxes and thus improves the precision of the violation. The performance of the object detection in image processing is required for a growing number of real- time applications, and we can detect any type of object with this application. We will use various types of extraction process techniques in the near future for various purposes, and this technique can be used in airports, shopping malls, businesses, parks, and so on.

References

1. Mora Albiol and V. Naranjo, “Real-time high-density people counter using morphological tools”
2. T.H.Chen, T.Y.Chen and Z.X.Chen, paper ” An intelligent people flow counting method for passing through gate”
3. Rafael C. Gonzalez, Richard E. Woods book based on “Digital Image Processing”
4. Crowd Detection Camera to Prevent COVID-19,2020 Electronics forum
5. Real time crowd detection to prevent stampede,2020 Research Gate
6. Crowd detection and management surveillance system,2020 IJCRT

Code



```
Editor - C:\Users\vamsi\people counter\peo_count.m*
peo_count.m* X logThingSpeakData.m X +
2
3 - clear, clc, close all
4 - delete(timerfindall)
5 - count = 0;
6 - imshown = 0;
7
8
9 - logThingSpeakData('reset')
10 - [initialNum,latestDate] = thingSpeakRead(1584129,'ReadKey','F1OTRBT8HTBTJZW3');
11
12
13
14 - cam = webcam();
15 - cam.Resolution = '1280x720';
16 - faceDetector = vision.CascadeObjectDetector('MaxSize',[150 150]);
17 - tracker = MultiObjectTrackerKLT;
18 - if ~isempty(initialNum)
19 -     tracker.NextId = initialNum(1);
20 - end
21
22
23 - frame = snapshot(cam);
24 - frame = fliplr(frame);
25 - frameSize = size(frame);
26
27
```



```

Editor - C:\Users\vamsi\people counter\peo_count.m
peo_count.m  logThingSpeakData.m  +
27
28 -   videoPlayer = vision.VideoPlayer('Position',[200 100 fliplr(frameSize(1:2)+30)]);
29
30
31 -   tim.ExecutionMode = 'FixedRate';
32 -   tim.Period = 20;
33 -   tim.TimerFcn = @(x,y) logThingSpeakData(tracker);
34 -   tim.StartDelay = 5;
35
36
37 -   fig = findall(groot,'Tag','spcui_scope_framework');
38 -   fig = fig(1);
39 -   setappdata(fig,'RequestedClose',false)
40 -   fig.CloseRequestFcn = @(~,~) setappdata(fig,'RequestedClose',true);
41
42
43 -   bboxes = [];
44 -   while isempty(bboxes)
45 -       framergb = snapshot(cam);
46 -       frame = rgb2gray(framergb);
47 -       bboxes = faceDetector.step(frame);
48 -   end
49 -   tracker.addDetections(frame, bboxes);
50
51

```

```

Editor - C:\Users\vamsi\people counter\peo_count.m
peo_count.m  logThingSpeakData.m  +
51
52 -   frameNumber = 0;
53 -   disp('Close the video player to exit');
54
55
56 -   while ~getappdata(fig,'RequestedClose')
57 -       try
58 -           framergb = snapshot(cam);
59 -           catch
60 -               framergb = snapshot(cam);
61 -           end
62 -           framergb = fliplr(framergb);
63 -           frame = rgb2gray(framergb);
64
65 -           if mod(frameNumber, 10) == 1
66
67
68 -               bboxes = 2 * faceDetector.step(imresize(frame, 0.5));
69 -               if ~isempty(bboxes)
70 -                   tracker.addDetections(frame, bboxes);
71 -               end
72 -           else
73 -               % Track faces
74 -               tracker.track(frame);
75 -           end

```

```
Editor - C:\Users\vamsi\people counter\peo_count.m*
peo_count.m* x logThingSpeakData.m x +
75 - end
76
77 - if isempty(tracker.Bboxes)
78
79 -     if any(mod(tracker.BoxIds,5) == 0) && imshown == 0
80 -         count = count+1;
81 -         displayFrame = insertObjectAnnotation(framergb, 'rectangle',...
82 -         [tracker.Bboxes(1) tracker.Bboxes(2) 5 5] , ['Overcrowded!!! you are the
83 -         imwrite(displayFrame,'NewFace.png');
84 -         imshow('NewFace.png');
85 -         imshown = 1;
86 -         pause(5)
87 -         close(gcf)
88 -         delete('NewFace.png');
89 -     else
90
91 -         if all(mod(tracker.BoxIds,5) ~= 0)
92 -             imshown = 0;
93 -         end
94 -         displayFrame = insertObjectAnnotation(framergb, 'rectangle',...
95 -         tracker.Bboxes, tracker.BoxIds);
96 -         displayFrame = insertMarker(displayFrame, tracker.Points);
97 -     end
98 -     videoPlayer.step(displayFrame);
99 -     tracker.BoxIds;
```

Activate

```
Editor - C:\Users\vamsi\people counter\peo_count.m
peo_count.m x logThingSpeakData.m x +
89 -     else
90
91 -         if all(mod(tracker.BoxIds,5) ~= 0)
92 -             imshown = 0;
93 -         end
94 -         displayFrame = insertObjectAnnotation(framergb, 'rectangle',...
95 -         tracker.Bboxes, tracker.BoxIds);
96 -         displayFrame = insertMarker(displayFrame, tracker.Points);
97 -     end
98 -     videoPlayer.step(displayFrame);
99 -     tracker.BoxIds;
100 - else
101 -     videoPlayer.step(framergb);
102 - end
103
104 -     frameNumber = frameNumber + 1;
105
106 - end
107
108
109 - release(videoPlayer)
110
111 - clear vidObj
112 - clear fig
113 - clear videoPlayer
```

Plagiarism Report

<https://www.check-plagiarism.com/plag-report/51648770b10e615d927d3224376d3d462bdbb1638962609>