

# **IBM Hack Challenge - 2022**

## **Report on**

**Project Topic : Rush Estimator for Corporate Cafeteria**

**Project Domain : Cognitive Artificial Intelligence**

**Team Name : Pyrofalcons**

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# 1 - INTRODUCTION

## 1.1 Overview

- It is important to estimate the number of people who will visit at a particular time, as we have to make necessary arrangements according to the rush. To save owners money and time we created a simple tool that will estimate the number of people who will come based on previous data.
- Based on previous data, we are going to estimate how the rush is going to be in the present day using **computer vision, Linear regression** and **object detection**. Our website indicates the analysis with graphs to portray a clear picture about rush detection based on the customer entering and leaving time of the cafeteria. Based on these metrics, alerts can be generated for the owners of Cafeteria to prepare the requirements in advance.
- To confirm the accuracy, we developed the model by collecting real-time data. The results are accurate by our simulation parameters when compared with the existing methods. **The Analytical page includes the estimation of customer rush by day wise, week wise and in terms of month.**

## 1.2 Purpose

**The use of this project. What can be achieved using this.**

- Cafeteria is one of the stress burster places where everyone comes to spend their time peacefully and to have healthy relationships with their colleagues. For the growth of the cafeteria and **to get better profit**, a website was introduced to track the rush of customers coming inside the Cafeteria within the particular time instances.
- The owners have to do proper planning by preparing the requirements for the next day. This helps to control rush situations, where the customers can come to a **cordial atmosphere** without food shortage and the owners can get good profits by saving the wastage beforehand.
- Our graphical explanation of the rush of previous data will make it easy to understand the rush which also gives an attractive analysis to the cafe's owner and get to work for the next day.

## 2 - LITERATURE SURVEY

### 2.1 Existing problem

- Cafeteria is one of the stress burster places where everyone comes to spend their time peacefully and to have healthy relationships with their colleagues.
- But due to the unforeseeable rush created in the cafeteria can lead to a displeasing experience for people who visit the cafeteria .
- These situations may cause **stress** for the people who run the cafeteria as they have to maintain time management for the customers pleasant service .
- The owner has to face **loss, food wastage** or **shortage** etc if they are not aware about the rush in advance .

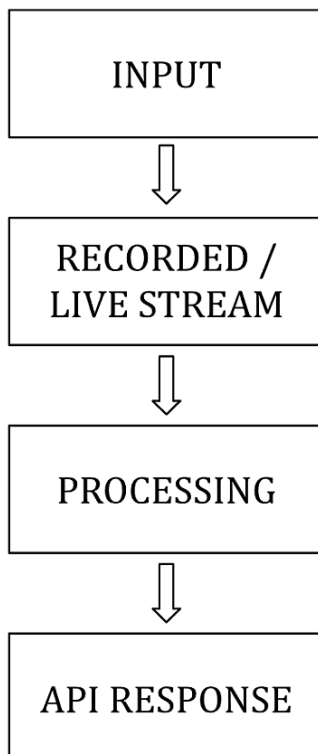
## 2.2 Proposed solution

- To manage the rush , we are going to estimate the present day rush based on previous data using **Computer Vision, Linear Regression** and **Object Detection** .
- The mode of Software Operation can be done in **both Automatic and Semi-Automatic** (Scheduled Time, Holidays).
- The **Graphical representation** of the rush is also specified for quick identification and to reduce the analysis time.

- **The Analytical page includes the estimation of customer rush by day wise, week wise and in terms of month .**
- For every page log in , home page , Analytics , Live stream we used **HTML, CSS, Java Script** . The use of **python, Opencv, Numpy, Tensor flow** for the live Page. Pedestrian detection is used to detect the persons that enter and leave the area and regression to calculate average rush during a particular day.

### 3 - THEORETICAL ANALYSIS

#### 3.1 Block diagram



## **3.2 Hardware / Software designing :**

### **Hardware requirements of the project :**

- I3 or rayzen 3 processor
- 4 Gb ram
- 2gb graphics card
- Windows or Mac or linux

### **Software requirements of the project :**

**FRONT END** - HTML , CSS , Javascript , Flask

**BACKEND** - Flask , python

**DATABASE** - NoSQL

## **4 - EXPERIMENTAL INVESTIGATIONS**

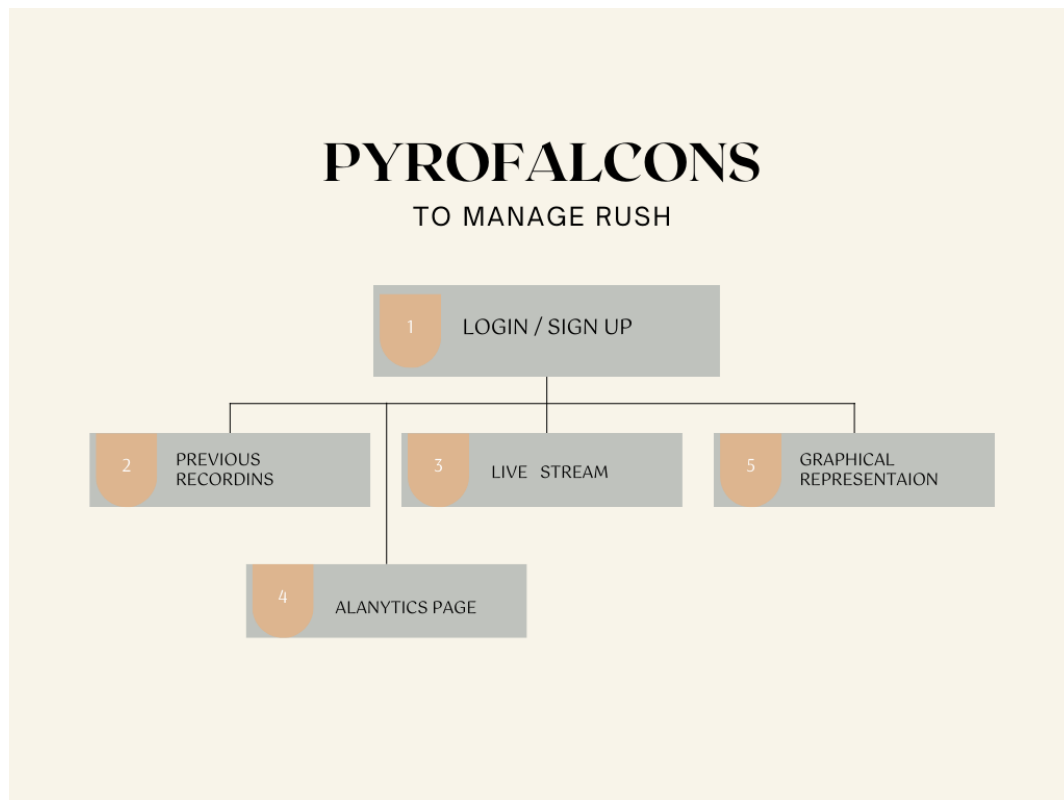
### **Analysis or the investigation made while working on the solution.**

- So while shaping an idea about how to create a website for the proposed project , we visited a lot of websites for referrals to study about any pre existing solutions and how to make a more advanced and useful model other than the existing one .

- To check the working of the website we created , we searched to get the proper video clips to predict the entry and exit of customers to a cafeteria .
- To Link all the recording and customers entry exit details on each visit in a particular day , in the database , for future reference , getting a proper referral site was a bit challenging .

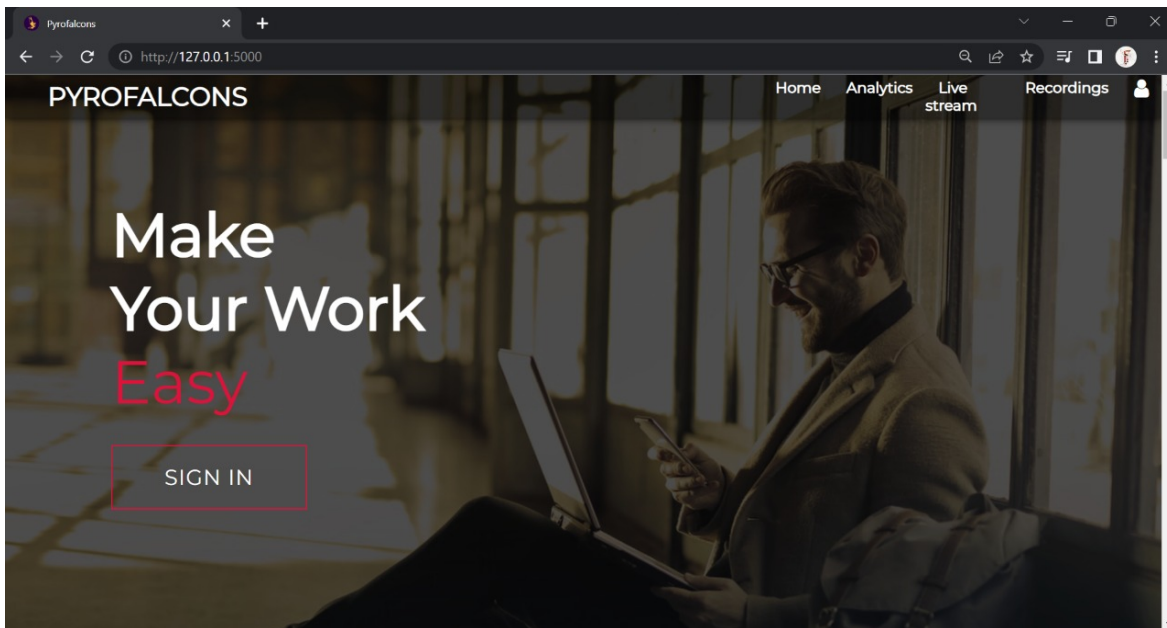
## 5 - FLOWCHART

**Diagram showing the control flow of the solution**

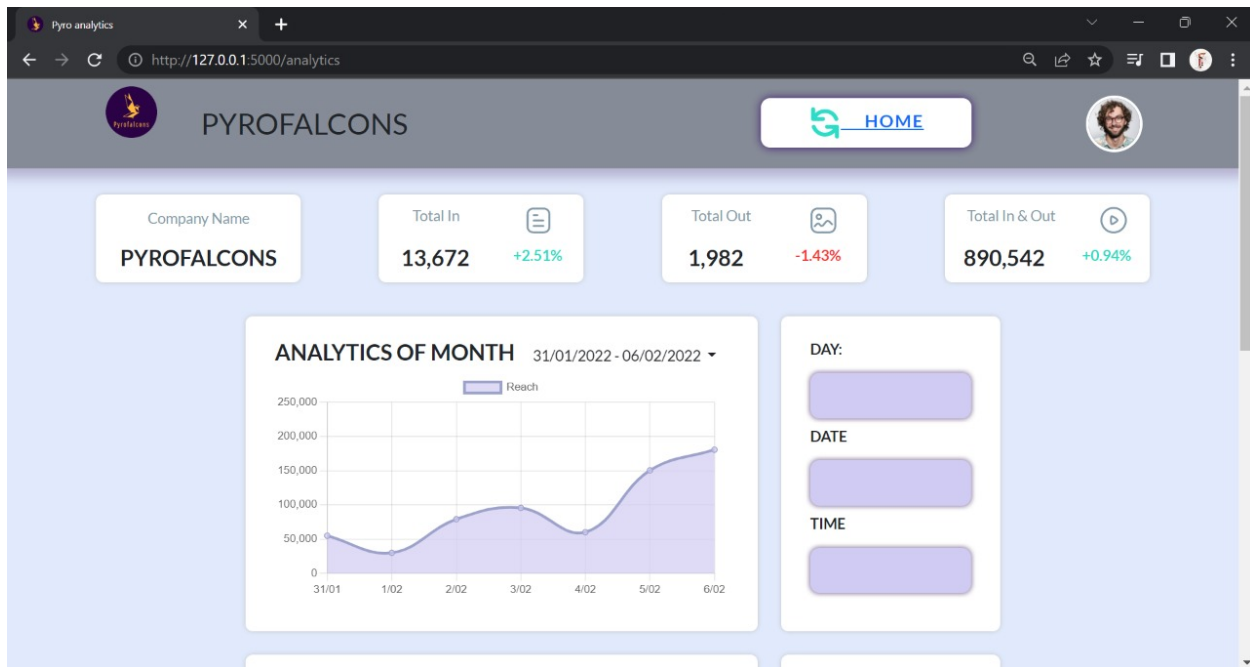


## 6 - RESULT

### HOME PAGE

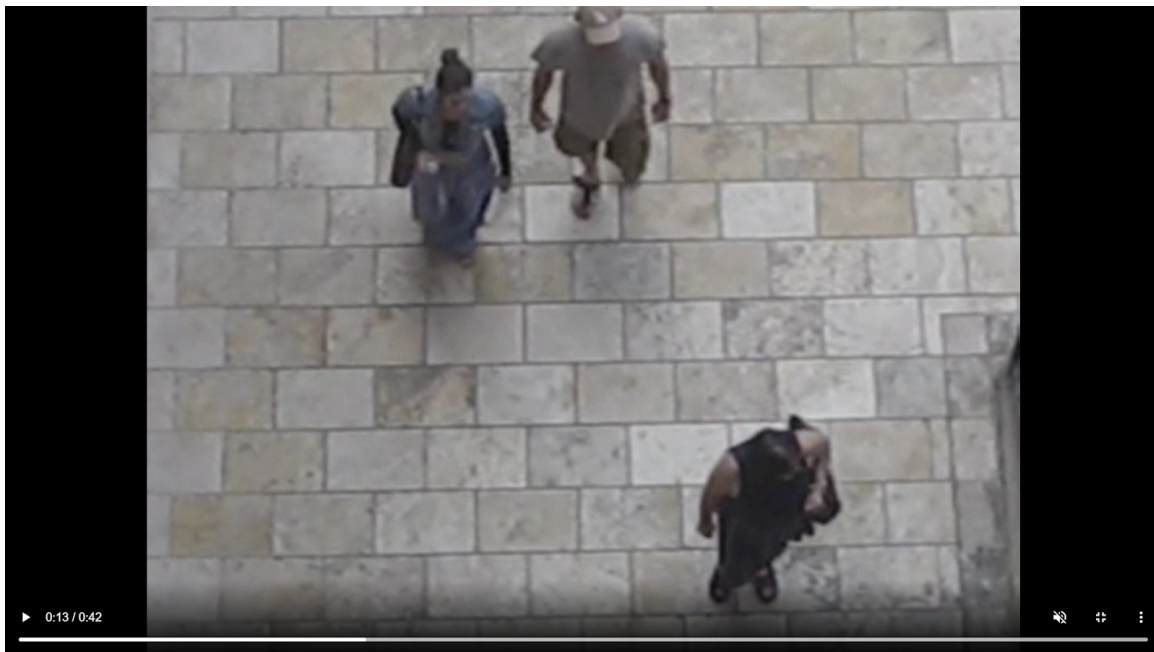


### ANALYTICS PAGE





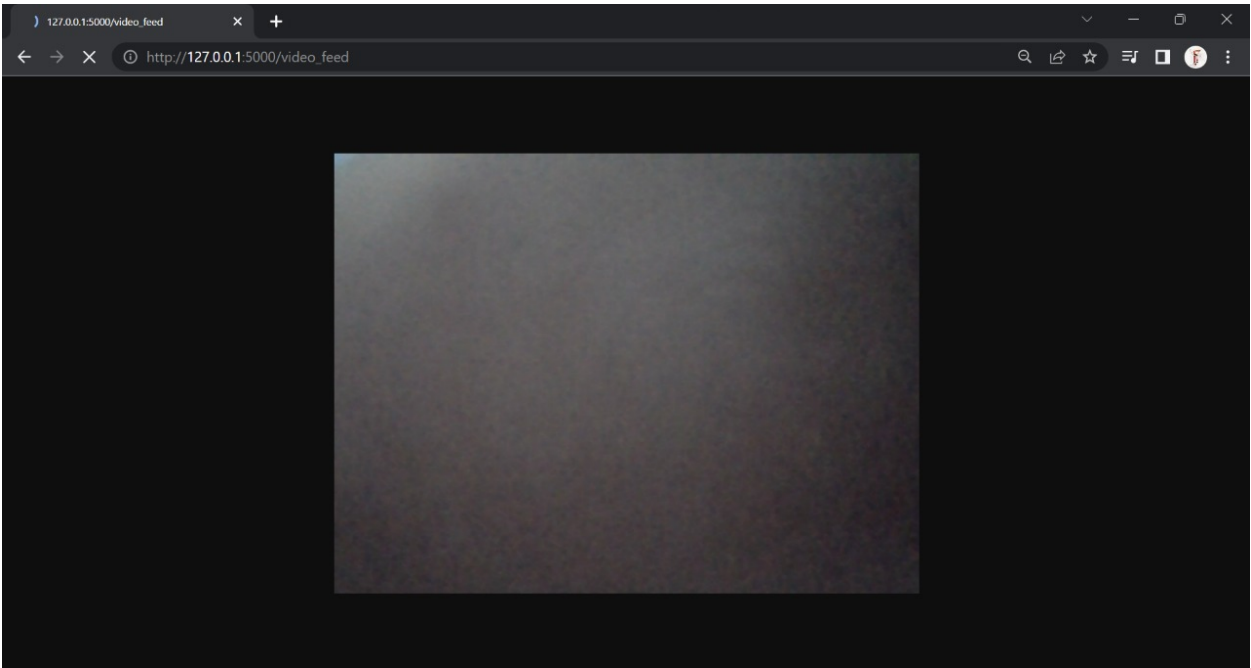
## BEFORE DETECTING



## AFTER DETECTING



# LIVE STREAM



# LOG FILE

15R x 2C							
	A	B	C	D	E	F	G
1	Time	In	Out	Totalmember			
2	23/09/2022, 20-24:14		1		2		
3			2				
4	23/09/2022, 20-24:15		1		3		
5			2				
6			3				
7	23/09/2022, 20-24:15		1		4		
8			2				
9			3				
10			4				
11	23/09/2022, 20-24:20		1	1	3		
12			2				
13			3				
14			4				
15	23/09/2022, 20-24:21		1	1	2		
16			2	2			
17			3				
18			4				
19	23/09/2022, 20-24:23		1	1	3		
20			2	2			
21			3				
22			4				
23			5				
24	23/09/2022, 20-24:29		1	1	2		
25			2	2			
26			3	3			
27			4				
28			5				
29	23/09/2022, 20-24:29		1	1	3		
30			2	2			
31			3	3			

Log

Ready

Average: 2.222222222 Count: 18 Sum: 40

100%

## **7 - ADVANTAGES & DISADVANTAGES**

### **ADVANTAGES :**

- Cafeterias can maintain the rush beforehand .
- Food wastage can be avoided or controlled .
- People who visit the cafeteria can have a cordial experience
- We can refer to previous recordings of any particular time , day , week , month , year .
- The Live stream also helps to check whether the predicted outcome is correct .

### **DISADVANTAGE :**

- During festival seasons there might be an un predicted rush in the cafeterias . It might be optimistic .

## **8 - APPLICATIONS**

### **The areas where this solution can be applied**

The website we designed can be used in

- Corporate cafeterias

- Restaurants
- Cafes , Small shops
- College , University canteen
- Hostel dining area

These are the places where we can expect a wide variety of crowds everyday . So predicting the rush of the next day's crowd will be useful for the managers as it makes their task easy for managing the palace tension free .

## **9 - CONCLUSION**

The Analytics page shows the rush predicted using computer vision , Linear regression and detection from the recordings . For this the live stream and previous recording of the entry and exit of customers are used . The predicted rush of the present day , using previous day recordings , helps the cafe owner to prepare in advance for the necessary requirements . This is useful for the people who run cafeteria in corporates, Universities, Colleges, restaurants etc... . These places have to maintain the situation of rush, so the people who visit these places have a pleasant experience and give them a feel of visiting again in future.

## 10 - FUTURE SCOPE

- For predicting the customer Rush of each day , the details related to the analytics page till the end of the previous day will be sent to the owner of the Cafeteria via **mail**.
- **Notification through mail** can be done to the owner **on the same day** when the **Estimated Customer limit of a current day exceeds**, which helps them to plan for the next day.
- Using these analyses we can also predict the number of workers necessary for the next day , by owners giving the necessary input . If there is any change in predicted outcome an alert message can be given to the owners beforehand . This is done by the live stream in check with the predicted customers count from previous day recordings .

## 11 - BIBLIOGRAPHY

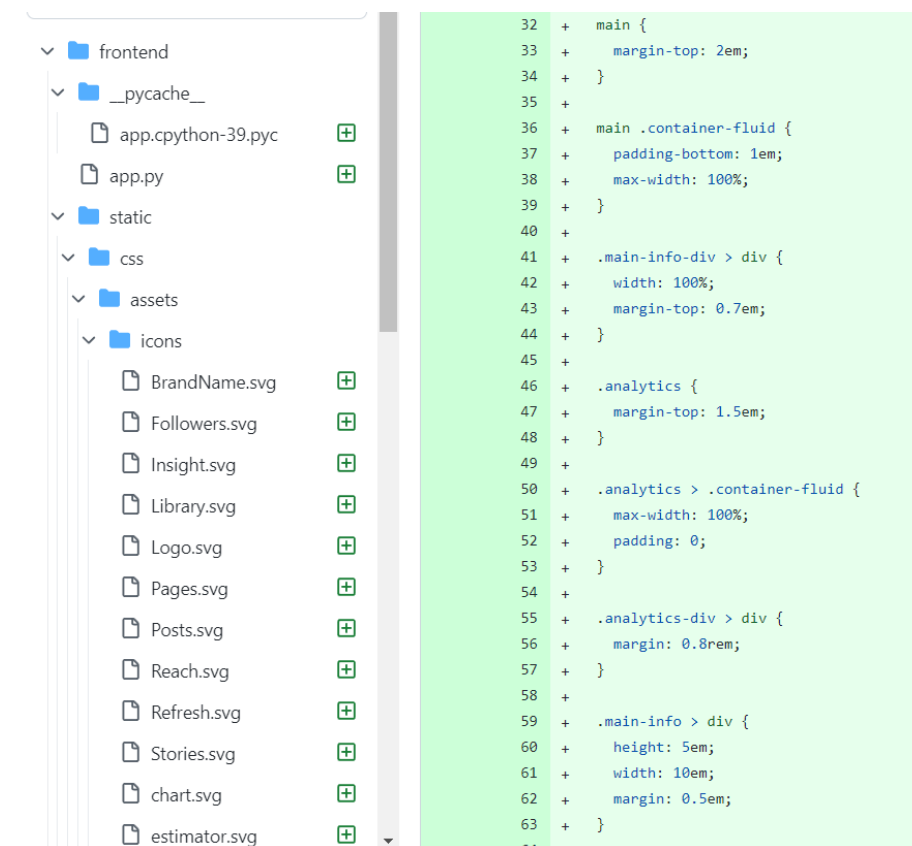
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- SSD paper: <https://arxiv.org/abs/1512.02325>
- MobileNet paper: <https://arxiv.org/abs/1704.04861>

- Centroid-tracker:<https://www.pyimagesearch.com/2018/07/23/simple-object-tracking-with-opencv/>
- <https://towardsdatascience.com/review-ssd-single-shot-detector-object-detection-851a94607d11>
- <https://pypi.org/project/schedule/>

## APPENDIX

### A. Source Code Attach the code for the solution built.

#### Code Sample :



## **Source Code Link :**

<https://github.com/smartinternz02/SBSPS-Challenge-9465-Rush-Estimator-for-Corporate-Cafeteria>

## **Demonstration Link :**

<https://youtu.be/1qJdKktJb3A>