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SMART CAPTURING OF INTENDED FOOTFALLS IN A SHOWROOM

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Abstract:

Counting of Footfalls in Showrooms is very important for organizations and it becomes difficult for any organization to monitor the footfalls in a large scale. The traditional sensors which are used to count the footfalls have many drawbacks like they fail during group entries and cannot distinguish the employee movements from footfalls etc.In recent years image processing technology is developed and many classifiers are available to classify and recognize different objects. We propose a low cost Image Processing based Intelligent System that overcomes the drawbacks of existing system. This system not only counts the footfalls but also makes the insights and extracts meaningful patterns from the footfalls data.

Introduction:

Today the number of footfalls into a showroom is captured by the Sales Executives manually in a register or quotation book. How much of the footfalls are captured is at the discretion of the sales executive. In addition, no information about the prospect is captured like his demographic profile etc. hence it becomes difficult to make any meaningful analysis of leakages. Even if an app is provided to the sales executive to capture all footfalls, it is at his discretion whether to use it or not and a large scale makes it difficult to monitor the same. Other technologies like infra-red based sensors, camera sensors, thermal sensors etc are not efficient and such systems becomes useless in the event of group entries, multiple entries, employees'

movements etc. There is no efficient solution for this problem hence we came up with this solution which uses image processing based approach . This is a low cost, scalable and practically implementable system which we have already tested. A normal camera and a computer available at the showrooms are enough to implement this system.

Existing System:

Today the number of footfalls into a showroom is captured by the Sales Executives manually in a register or quotation book. How much of the footfalls are captured is at the discretion of the sales executive. In addition, no information about the prospect is captured like his demographic profile etc. hence it becomes

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difficult to make any meaningful analysis of leakages. The business analysts will take the data from these sales executives manually whenever they need so that they can take important decisions to improve the sales of the products. It becomes difficult for the business analysts to get the customer data from the sales executives from different branches located at different locations. It is very important to know the interests of the customers on the products so that the organization can take important decisions.

Proposed System:

Monitoring of Footfalls can become simple with this intelligent system. This system recognizes every individual who ever enters into the showroom. The face of every individual will be captured, processed and send to the cloud along with the timestamp hence no one can bypass the system. The cameras and the pc which are available in the showrooms are enough to do this job. This system can even process multiple persons at a time hence it will not fail in event of group entries or multiple entries. The employees' movements can be avoided by the system itself with the help of image processing. In addition the sales executive can view all the faces of footfalls through a secured android app and he/she can add additional details to footfalls such as demographic details etc. All this data can also be accessed by a higher authority through a secured web application.

It becomes easy for the Authority or the Business analysts to analyze the customer data, so that major decisions can be taken by organization to attract the customers.The data can be very accurate because no footfall can be escaped from the camera hence there

can be very less or no chances for the false data.

System Architecture:
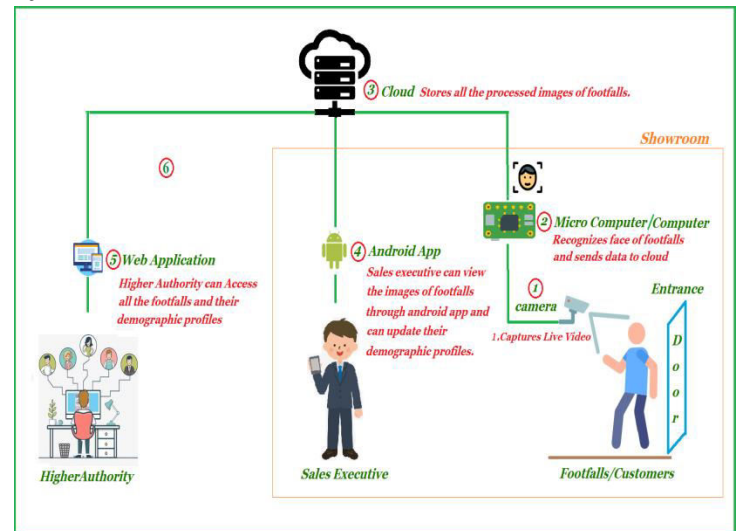
Modules:

Image Processing: Image Processing module is the most important module in this system, The footfall data will be collected at the showroom with the help of this module and hence the whole system will be based on the input given by this module.

Working: A camera will be placed at the entrance of the showroom and records the live video these video frames will be processed at the local computer using the Opencv Library (Open Source Computer Vision Library) When ever a person is detected, the face of the person will be cropped and features will be extracted from these images. The timestamp will also be noted down by the system at the time of capturing image.After applying image processing all the images along with their timestamp will be transferred to the cloud.

Android Module:

This module is an android application which will be used by the sales executives of a showroom. This app will provide the processed footfalls data of the respective

showroom, Here the sales executives can manually enter the demographic details for a particular customer.

Working:

The sales executive will Login to this secure Android app to view all the images of footfalls of respective showroom along with timestamp and can add demographic details to the respective footfall by clicking on the image, When a sales executive logins to this app, The footfalls data of respective showroom will be retrieved from the cloud and will be displayed in the app, Now the sales executive can select the image of a particular customer and can add the demographic details of him. Now this data will get updated to the cloud. The app will also have an option where the sales executive can mark the false data. This data will be used to train the system to avoid such false data.

The following features are for the Sales Executive.

- View Footfalls
- Employee Movements.
- Information.
- Reports.
- Enquiries.
- My Clients.
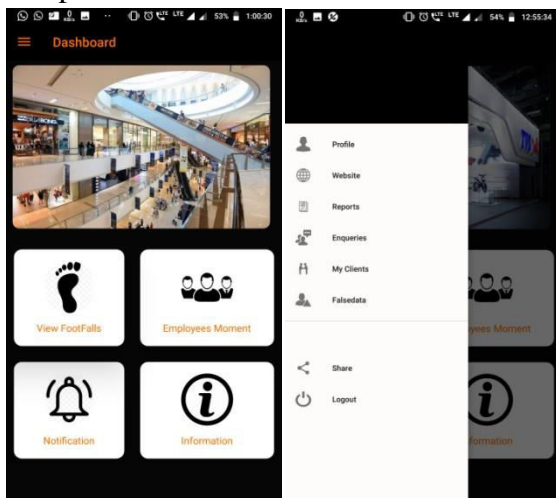- Notifications
- False Data.

The Detailed Explanation about the features:

- View Footfalls: Sales executive can view all the images of footfallsalong with the timestamp,whoever enters the respective showroom.
- Employee Movements: The movements of employees will be noted separately from that of footfalls, Whenever an employee comes into the vision of camera, his moment will be saved to cloud along with timestamp. These details will be shown here
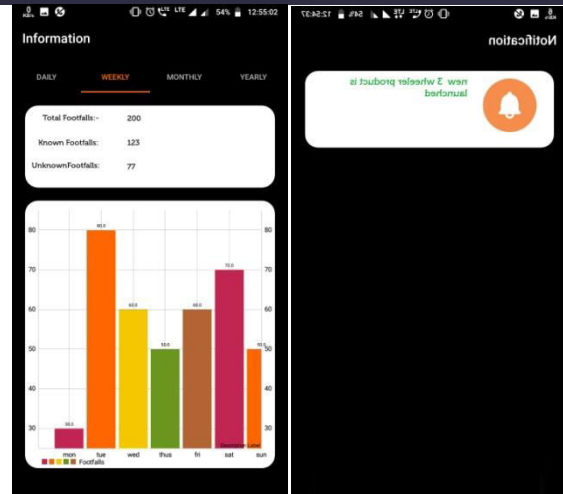
- Information: Here the sales executive can see the analytical data related to his showroom, daily, Weekly, Monthlydata will be displayed here.

- Reports: Instantaneous reports of daily, monthly and yearly footfalls and sales data can be downloaded from here.

- Enquiries: If the sales executive marks a footfall as interested then the data of all these interested footfalls will be displayed here .

- My Clients: If the sales executive marks a footfall as bought then these footfalls will be marked as customer under the reference of respective sales executive .

- Notifications: sales executive can view the important messages that are sent by the Authority .

- False Data: In this system, during Image processing sometimes $1/100^{th}$ of data can be a false data. We can still minimize the false data by training the system with false data.Hence, with this option the sales executive can mark an image as a false data, this data will be used to make the system still more efficient.
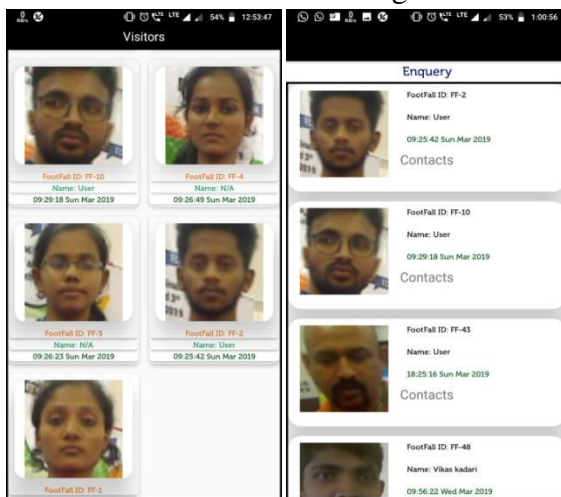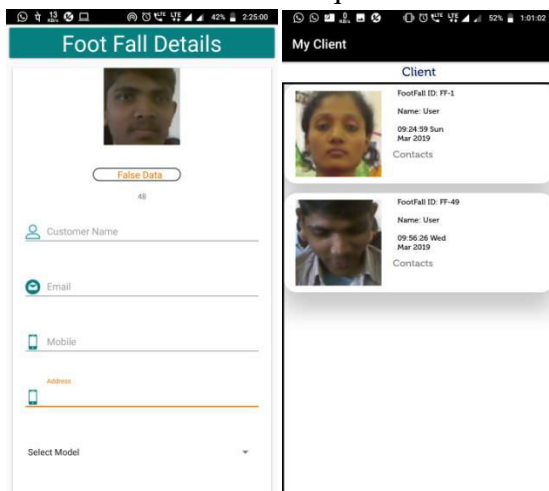
Sample Screens:

Dashboard Navigation bar

View Footfalls Enquiries

Demographic details My Clients

Information Notifications

Web Module:

This module is only for the Authority, where the authority person can view the interesting patterns extracted from the overall footfalls data. This Dashboard consists of Data Visualizations, Predictions, etc based on the footfalls data. This will be very helpful for the authority to take important decisions

Working:

The Authority person will login to this web application. The dashboard consists of useful data such as Insights, Data Visualizations, and Predictions etc. The data will be related to the total sales, interested customers, Products etc. Daily, Weekly, Monthly and yearly data will also be available at the dashboard. He can also see the data related to a particular city or branch or a single showroom and can also send notifications to that particular group of sales executives. The data analysts can use this processed data to take important decisions

The following features are for the Authority.

- View Showrooms
- Daily Analytics
- Weekly Analytics
- Monthly Analytics.

- Yearly Analytics
- Employee Details
- Send Messages

The Detailed Explanation about the features:

- View Showrooms: The important data and analytics of a particular showroom or a group of showrooms can be seen.
- Daily Analytics: This page consists of Daily analytics. Daily wise data will be displayed related to sales, footfalls, etc.
- Weekly Analysis: This page consists of Weekly analytics. Weekly wise data will be displayed related to sales, footfalls, etc.
- Monthly Analytics: This page consists of Monthly analytics. Monthly wise data will be displayed related to sales, footfalls, etc.
- Yearly Analytics: This page consists of Yearly analytics. Yearly wise data will be displayed related to sales, footfalls, etc.
- Employee Details: The details of employees can be seen in this page. Automatic ranking will be displayed based on the performance of the employees depending on his/her sales.
- Send Messages: The Authority can send messages to the sales executives by a single click. The sales executives can see this message in through the android app.
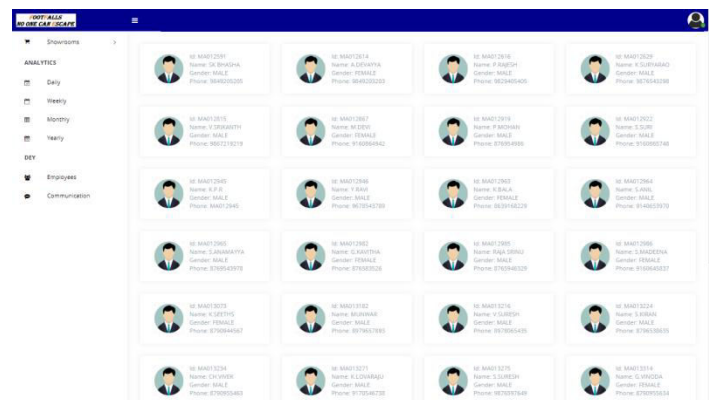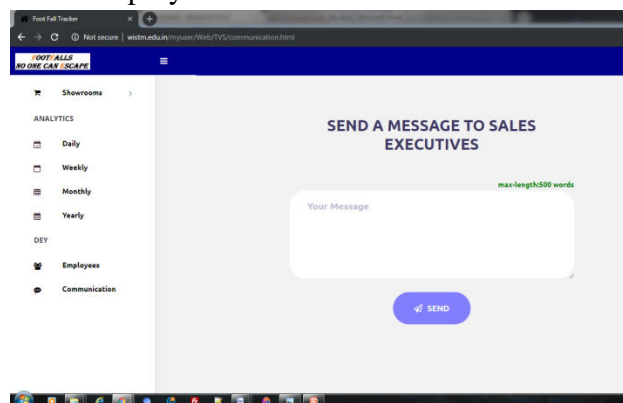
Authority Screens:
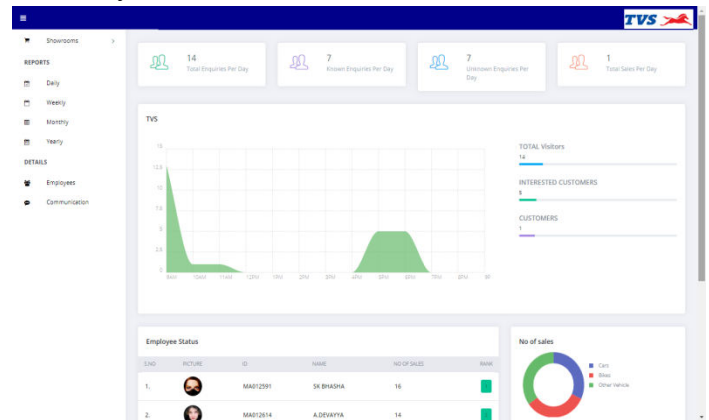
Admin dashboard
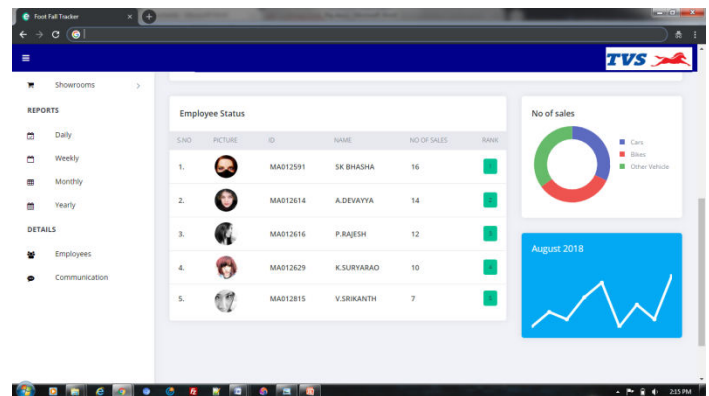
Employee Status

View Employees

Send Messages

Conclusion:

We conclude that our proposed system is very effective system based on the research work we did, it is using the advanced technologies such as image processing to solve the real-time problems, It can be one of the best solution because it overcomes all the drawbacks of other existing systems that works with sensors. Another advantage is this system can be implemented with a camera and a computer which are generally available at any showroom hence it is very cost efficient. It is a scalable system and can be implemented at anyshowroom.

Future Enhancements:

1. System can be made completely automatic: by installing some more cameras in the showroom, the system can be made almost automatic, hence the amount of employee interaction can be reduced to a maximum extinct. The cameras will observe the customers and says how much a customer is spending his time at a particular product

2. Clustering or Grouping customers: Sometimes the customer will come along with his friends or family members and our system can detect them and group them to a

single customer group this helps in minimizing the interaction of sales executives with the android app to manually group the customers.

3. Image Compression: Image compression techniques can be applied on the captured pictures so that the images can be transferred to cloud even in a low band width internet connection.

4. Data Encryption: The customer data is very important for the company and it should be handled with care. Leakage of customer data will lead to bring bad name to the organization. Hence the data should be highly secured. We can use some robust encryption algorithms on the customer data so that the data can be saved and transferred securely over the public networks.

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