MES COLLEGE OF ENGINEERING, KUTTIPPURAM
DEPARTMENT OF COMPUTER APPLICATIONS
20MCA245 – MINI PROJECT

PRO FORMA FOR THE APPROVAL OF THE THIRD SEMESTER MINI PROJECT

(Note: All entries of the pro forma for approval should be filled up with appropriate and complete information. Incomplete Pro forma of approval in any respect will be rejected.)

Mini Project Proposal No : _____ *(Filled by the Department)*	Academic Year : 2021-2022 Year of Admission : 2020

1. Title of the Project : Identifying Customer Interest From Surveillance Camera Based on Deep Learning
2. Name of the Guide : _____
3. Number of the Student: MES20MCA-2008
4. Student Details (in BLOCK LETTERS)

	Name	Signature	Roll Number
1.	Anjali TP		08

Date:01/12/2021

Approval Status : Approved / Not Approved

Signature of
Committee Members

Comments of The Mini Project Guide Dated Signature

Initial Submission :

First Review :

Second Review :

Comments of The Project Coordinator Dated Signature

Initial Submission:

First Review

Second Review

Final Comments :

Dated Signature of HOD

IDENTIFYING CUSTOMER INTEREST FROM SURVEILLANCE CAMERA BASED ON DEEP LEARNING

Anjali TP

Introduction and Objective:

Identifying customer's interests is valuable as it intuitively represents the product the customer wants. It can also be an effective marketing strategy for determining potential customers. Therefore, large retail vendors like Walmart and Costco analyze customer purchase history to identify customer interest. However, purchase history alone cannot fully determine how much interest in the product a customer has other than what they have purchased. In other words, products that the customer does not purchase but are interested can never be identified.

This project focuses on identifying a customer's interest based on behaviors from surveillance cameras. We detect the customer's gaze direction as this behavior accurately reflects customer interest in a particular product. More specifically, we make the following contributions:

- A Facial emotion recognition (FER) dataset that contains various emotions, such as happy, sad, angry, etc.
- We experimented the state-of-the-art deep learning algorithms on the FER dataset to determine a suitable algorithm for identifying customer emotion. The experimental results demonstrate that deep learning algorithm is efficient in identifying customer interest.

In order to identify customer interest, it is necessary to analyze customer behaviors in a real-life shopping situation. In a real-life store, there is a shopping situation as well as general situations like walking, looking around something, and talking to each other. However, to effectively analyze customer behaviors while shopping, we need situations that represent customer and product. For this, we collected surveillance videos that contain various customer behaviors, such as stopping in front of a product and gazing at a product. The videos are obtained via YouTube, where we use different languages during the search to maximize the variety and number of videos. The dataset consists of the videos captured by real-world CCTV surveillance cameras, with various angles, different lighting conditions, and different resolution quality. This paper proposes a method to identify customer's interests in the product through the estimation of gaze direction. For effective identification, the FER dataset with various quality and conditions, including various behaviors of customers in the real-world store, was proposed. Considering that the accuracy of gaze direction depends on face detection, we applied the state-of-the-art face detection algorithms to the FER dataset.

Problem Definition and initial requirement:

Existing System

Finding customer's interests is valuable. It can also be an effective marketing strategy for determining potential customers and if a customer walk into a super market there won't be enough staffs or salesmen to manage a bunch of customers. And the mentality of each and every customer is different from one another. There might be many customers who are not enough happy with that facility and they might be dissatisfied even if we provided as much staffs that we can afford. There will always have communication errors with the salesman and customer. For a shop customer is the primary investment so it's our responsibility to make the customer satisfied. Currently there is only customer purchase history to identify customer interest. However, purchase history alone cannot fully determine how much interest in the product a customer has other than what they have purchased.

Proposed System

This project focuses on identifying a customer's emotions through CCTV camera footages. We detect the customer's emotions and gaze towards a product in order to find interest in a particular product. We are using Facial Emotion Recognition data sets (FER) which contains emotions like happy, sad, angry, etc. We are using Deep learning algorithms to process these data that obtained from Facial emotion recognition (FER) data set.

For identifying customer interest in a particular product, what is their emotion towards the product experience and also their emotion towards customer services is also monitored and analyzed in real world shopping condition. In a real-life store, there is a shopping situation as well as general situations like walking, looking around something, and talking to each other. However, to effectively analyze customer behaviors while shopping, we need situations that represent customer and product. For this, we collected surveillance videos that contain various customer behaviors, such as stopping in front of a product and gazing at a product. The videos are obtained via YouTube, where we use different languages during the search to maximize the variety and number of videos. The dataset consists of the videos captured by real-world CCTV surveillance cameras, with various angles, different lighting conditions, and different resolution quality.

This paper proposes a method to identify customer's interests in the product through the estimation of gaze direction. For effective identification, the FER dataset with various quality and conditions, including various behaviors of customers in the real-world store, was proposed. Considering that the accuracy of gaze direction depends on face detection, we applied the state-of-the-art face detection algorithms to the FER dataset.

Basic functionalities:

Functional Module

Deep Learning:

Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain—albeit far from matching its ability—allowing it to "learn" from large amounts of data. While a neural network with a single layer can still make approximate predictions, additional hidden layers can help to optimize and refine for accuracy.

Deep learning neural networks, or artificial neural networks, attempts to mimic the human brain through a combination of data inputs, weights, and bias. These elements work together to accurately recognize, classify, and describe objects within the data.

Deep neural networks consist of multiple layers of interconnected nodes, each building upon the previous layer to refine and optimize the prediction or categorization. This progression of computations through the network is called forward propagation. The input and output layers of a deep neural network are called visible layers. The input layer is where the deep learning model ingests the data for processing, and the output layer is where the final prediction or classification is made.

Another process called backpropagation uses algorithms, like gradient descent, to calculate errors in predictions and then adjusts the weights and biases of the function by moving backwards through the layers in an effort to train the model. Together, forward propagation and backpropagation allow a neural network to make predictions and correct for any errors accordingly. Over time, the algorithm becomes gradually more accurate.

USER MODULE:

1. Admin
2. Billing Staff
3. Sales Staff
4. Customer

Admin:

- Add and manage Staffs
- Add and manage products
- View Customers
- View feedback
- View complaints and Send reply
- Add Camera
- Send Notification to Staff
- View Notification
- View Offers and Approve/Reject Offers
- View Rating

Billing Staff:

- View Customers
- Add bill
- View Daily report
- View Rating
- View Notification from Admin
- Send feedback to Admin

Sales Staff:

- Add and manage Product Stock
- Add and manage offers
- View Notification from Admin
- View Camera Notification
- Send Feedback to Admin

Customer:

- Registration
- View Products and Offers
- View Transaction History
- View Wallet
- Send complaints and View Replies
- Send feedback
- Add Rating

Tools / Platform, Hardware and Software Requirements:

HARDWARE REQUIREMENTS:

The selection of hardware is very important in the existence and proper working of any software. Then selection hardware, the size and capacity requirements are also important.

- Processor - Intel x86
- Speed - 1.1 GHz
- RAM - 700 MB (min)
- Hard Disk - 150 MB

- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVG

SOFTWARE REQUIREMENTS:

One of the most difficult tasks is selecting software for the system, once the system requirements is found out then we have to determine whether a particular software package fits for those system requirements. The application requirement:

- Operating System - Windows 7 or Above, Android
- Technology - Python, Java
- Backend - MySQL
- Platform used - JetBrains, PyCharm, Android Studio
- Web Browser - Google Chrome, Fire fox, Microsoft Edge
- Front End - HTML, CSS, JAVASCRIPT
- Frame work - Flask

WORKFLOW OF PROJECT

We detect the customer's gaze direction as a method to identify customer interest. The process of identifying customer's interests contains three steps: input video, detect a face, and estimate gaze direction. We use the FCE dataset proposed in this Project as an input video. It is essential to accurately detect a face as it influences the accuracy of gaze direction.

The face detection and processing are done using deep learning. The collected FCE data sets containing CCTV camera footages processed to find the emotions of the customers.