

VISO PAY- FACE RECOGNITION BASED SMART SHOPPING SYSTEM

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Abstract - Viso-pay is a web-based application, which is used for simplifying the shopping procedures and improving security in a shop. It enables customer to pay a specific bill amount with ease and simplicity, which is based on face recognition, thus eliminating the usage of privilege/debit cards for shopping. The user account is created for a customer at the time of first bill payment based on the following conditions: his/her facial patterns, mobile number and an initial amount. When the customer arrives at the bill counter of the shop his/her face pattern is used for identifying the customer if no matches are found there is a provision for adding new customer. The customer will get an alert reporting the details of purchase and the amount that is deducted from the account after billing is done. It also detects the customers or users who are enlisted in the look out notices of the government by linking the application with the government authorities database. This information is captured using security cameras at shop entrance and implemented with the alert system installed at the shop.

Keywords— Face recognition, Machine learning, Security.

1. INTRODUCTION

Consumer makes choices about where to shop based on their preferences for a shopping environment and experience as well as the selection of products at a particular store. The explosive growth in data has led to an urgent need for new tools and techniques and that can intelligently and automatically transform data into useful information and knowledge. Viso-pay is a facial recognition based system where the customers can pay the bills more easily. The customer can pay the bills using their facial patterns. Threat detection is also provided by the system. The system provides a smart and secured bill payment.

2. LITERATURE SURVEY

From the study of Pan (2007, p.5), the author cited from Engel, Blackwell and Miniard (1990), that defines purchasing intention as a psychological process of decision-making. According to Pan (2007), "purchasing decision process" is when the relevant information is searched by the consumers that are motivated by the fulfillment of demands according to personal experience and the external environment; then after accumulating a certain amount of information, they begin to evaluate and consider; and finally after comparison and judgement, they make the decision on certain products.

According to Monsuwe, Delleart and Ruyter (2004), there are five external factors to understand consumer's intention to purchase using wallets which is the consumer personality, situational factors, product characteristics, previous shopping experiences and the trust in wallet shopping. Consumer's trait includes their demographic factors such as age, income, gender and educational level will lead them to have the intention to shop online. For age factor, consumers that are aged under 25 has more potential to shop because of their interest in using new technologies to search for product information and compare and evaluate alternatives (Wood, 2002). For educational level, higher educated consumers are more likely to use the internet for their shopping medium because they are more computer literate (Burke, 2002). Time is also perceived as one of a factor that relates with intention to purchase in a shopping context. It is believed that consumers have their own perception of time, whether or not to shop from a shop. According to Hansen and Jensen (2009), accomplishing the shopping trip as soon as possible refers to the time-saving oriented consumers and they prefer store choices favoring quick shopping; people who dislike shopping and approaching for time saving retail stores refers to the economic shoppers or known as "problem-solvers". In wallet shopping, it requires less effort and better decision making for consumers who opt to purchase at the store (Jiang and Rosenbloom, 2005). The shopping system uses RF-id cards, privilege cards, credit and debit cards for bill payment and for getting customer satisfaction Security systems used are metal detectors and personal scanning in many shops.

3. IMPLEMENTATION

Facial recognition enables you to find similar faces in a large collection of images. Amazon web service makes it easy to add image analysis. It's based on the same proven, highly scalable, deep learning technology. It stores face feature vectors as the mathematic representation of a face within the collection. Indexing (blue flow) is the process of importing images of faces into the collection for later analysis. Analysis (black flow) is the process of querying the collection of faces for matches within the index. One of the more powerful features of recognition is the ability to detect and analyze faces within an image. This feature is scarily accurate and detailed and can identify a lot of characteristics about individual faces. Face recognition cameras are used for identifying the customer. A camera attached along with the billing system is used to identify the customer. Customer can deposit cash to their shop account and make payments from

existing account. Payment cards are not required for paying bill. A camera attached at entrance is used to detect faces of all customers entering shop. Website is designed according to requirements of sellers and customers. It calculates the bill, gives it to the customer and maintain proper database. The bill generated is accurate in calculation and printing. It also generates records of purchase.

The different modules in this project are namely Face recognition, website and the Data mining. Face recognition has been implemented with the help of Amazon web services (AWS), the captured images are also uploaded into S3 database provided by AWS. The KNN algorithm implements data mining. This project uses GNU Make to orchestrate a data pipeline, which is defined in Make file. The necessary packages for python are documented with Anaconda Distribution 5.

The Fig 2 shows the use case diagram of viso-pay. Use case diagram identify the functionality provided by the system, the users who interact with the system (actors) and the association between the users and the functionality. The primary goal of use case diagram include providing a high-level view of what the system does, identifying the users (actor) of the system and determining areas needing human computer interfaces. The users are the admin and the biller. The use cases are biller details, customer details, face recognition and threat detection/ customer identification, creation of carts for billing, bill payment from customer account, saving the purchase status in database for analysis, notify the shop owner for stock requirements. Biller details are stored in biller database. Customer details are stored in customer database. Threat details are stored in threat database. Purchase details are stored in purchase database, which can be used for analysis.

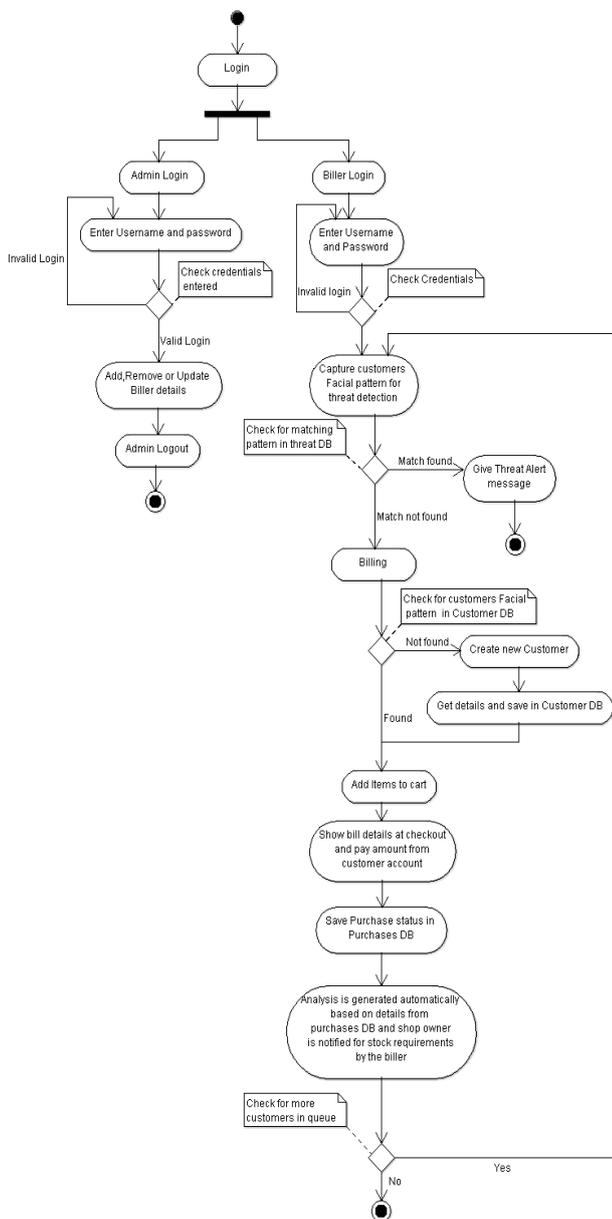


Fig 1 Activity diagram

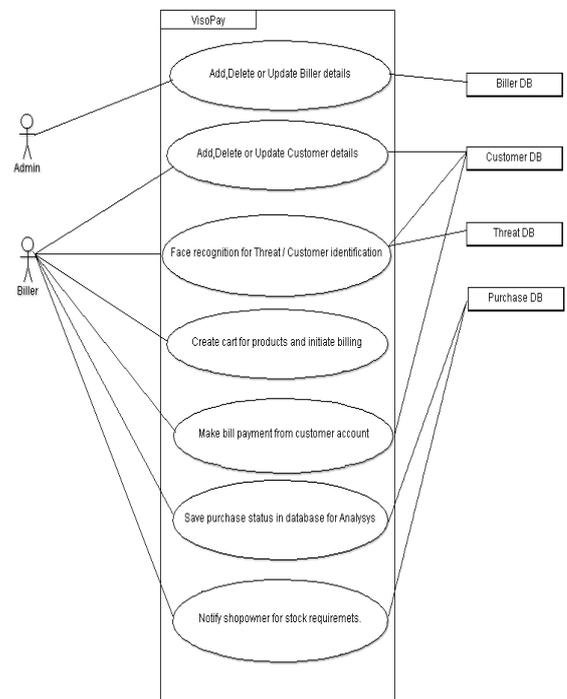


Fig 2 Usecase Diagram

Fig 3 shows the deployment diagram for viso-pay. Deployment diagrams are used to visualize the topology of the physical components of a system, where the software components are deployed. The website is designed using HTML, CSS, PHP, Javascript. Mysql is used to store the data values. Deployment diagrams are used to describe the static deployment view of a system. The facerecognition is implemented using erb, ruby and AWS cloud. Deployment diagrams consist of nodes and their relationships. The communication of website and facial recognition system is through the port 4567.

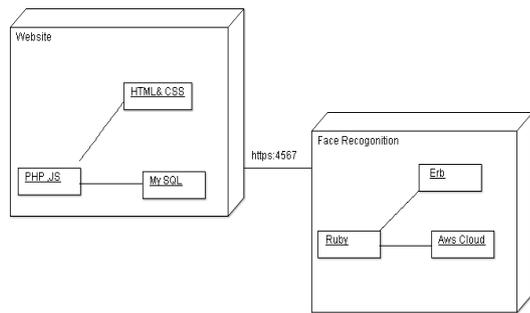


Fig 3 Deployment Diagram

4. Results & Discussions

The customers are identified using our face recognition system. The face patterns are stored in the database. Based on the threat list provided, the system identifies the persons included in the threat list and necessary notifications are given to the shopkeeper. The wallets of the customers are managed effectively. The customer can add amount to their respective wallet. The customer purchase behaviour is analysed and detailed analysis report is given to the retailer. The Fig 4 shows the customer purchase behaviour based on the datasets provided. The transaction data is used to calculate the total gross profit of all the products sold under each product category. The total gross profit is the sum of gross profits for every transaction associated with the product. A transaction's gross profit is its sales revenue minus its costs. The most profitable are Vegetables, Snack Food, Dairy, Meat and Fruit. Fig 5 shows the analysis based on mean vs total profit. The x axis is mean profit (as a continuous variable, not bucketed) and color of the dots represents the total sales.

We can see clearly that although unit sales ultimately drive profits, brands only tended to have high unit sales if the mean profit margins of their products were between \$1.10 and \$1.50.

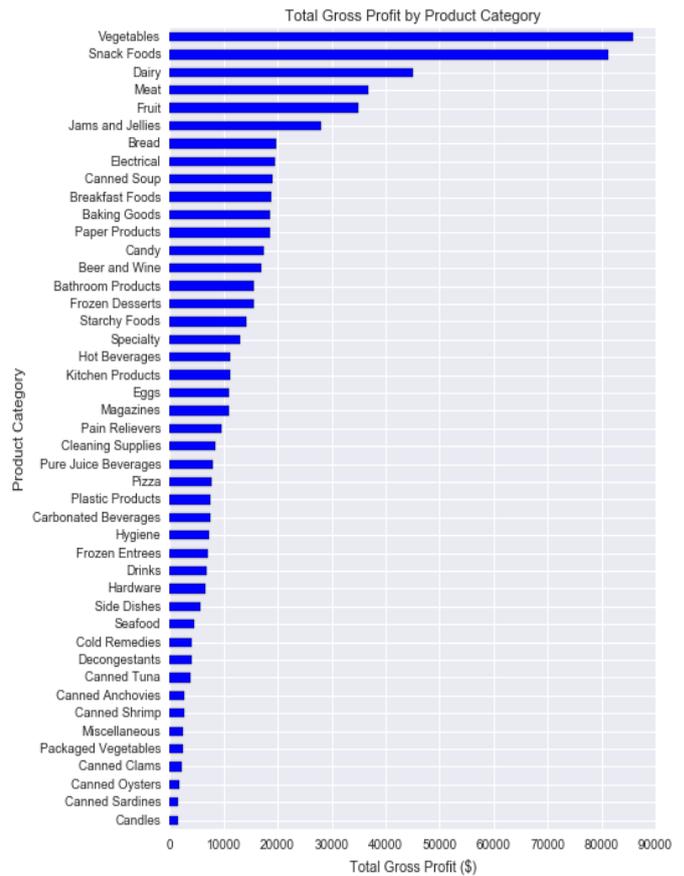


Fig 4 Analysis based on products sold

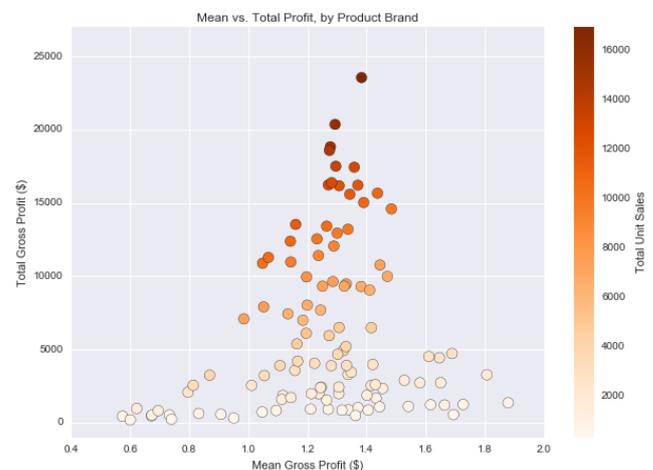


Fig 5 Mean vs Total profit

5. CONCLUSION

The system has been successfully implemented and has been found to be working efficiently. It is very much user friendly and comparatively comfortable to operate. The facial pattern of the customers has been recognised. Threat identification has been successfully implemented. The customer's bill amount has been successfully deducted from their wallet. The consumer purchase behaviour has been analysed. Our project will create a new era in shop maintaining and

shopping. It will make shopping easy with new card/wallet free shopping. The security at shopping malls and supermarkets can be given a new dimension. The implementation of AI on purchase records improves customer satisfaction.

6. FUTURE ENHANCEMENT

Face recognition systems used today work very well under constrained conditions, although all systems work much better with frontal mug-shot images and constant lighting. All current face recognition algorithms fail under the vastly varying conditions under which humans need to and are able to identify other people. Next generation person recognition systems will need to recognize people in real-time and in much less constrained situations. The system can be implemented as a mobile application. The threat detection module can be used in many areas where security is important. The genetic property evolution framework for facial expressional system can be studied to suit the requirement of different security models such as criminal detection, governmental confidential security breaches etc.

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