

Intelligent Shopping Assistant System (ISAS)

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Abstract - Online stores are capable of capturing customer shopping behaviour by analysing the click streams and customer shopping carts. Retailers with physical stores, however, still lack effective methods to comprehensively identify shopping behaviours. Due to lack of knowledge of customer behaviour, business analysis becomes a difficult job. For Customers, waiting in a long queue for billing is a tedious task. Calculating final amount to be paid while purchasing and keeping track of budget is a difficult task. The details and review about the product are needed while shopping. Effective product recommendation is not possible with the traditional shopping method. We are trying to solve these problems by introducing a effective and smart shopping system (ISAS). ISAS is a revolutionary and disruptive idea for current market and a step towards our future

Keywords – *Barcode Scanner; Android Application; Pathway; WPS.*

I. INTRODUCTION

In previous era, Greece was served as a marketplace where merchants kept stalls and shops to sell goods. Rome utilized a similar marketplace known as the forum. Shopping lists anciently have been used by Romans. Establishment of Fairs and markets took place to facilitate the exchange of goods and services. People shop goods at a weekly market in towns.

Shopping center is a collection of entertainment, retail, and service stores designed to serve products and services to nearby region. Traditionally, shopping center were called bazaars or marketplaces where collection of stalls lining on streets, selling an enormous variation of goods. The modern shopping centre is now different from its earlier period, Stores are commonly in individual buildings or compressed into one large structure (Mall).

The shopping experience varied, based on factors like how the customer is treated, mood the type of goods being purchased and convenience of customers.

In current era customer focus is more transferred towards online shopping. People all over the world order products from different regions and online retailers deliver their products to their offices, home or wherever they want.

Offline stores are unable to attract customers due to lack of knowledge of customer shopping behavior. More efforts are required for customer satisfaction. Customers face many problems while shopping in offline stores like not being able to find actual product details, reviews and recommendations

easily. Long awaiting billing process makes customer frustrated.

In this project, we introduce a system for online shopping for retail stores to analyze their customer behavior and increase business by providing real time dashboard and for customers a better understanding of the product and provide accurate recommendations. This process has made it easy for consumers to select any product online from a retailer's website and have it delivered to the consumer quickly.

There is no need for consumer to utilize his energy by going out to the stores and saves his time and cost of travelling.

System will also help in reducing man power required. It also helps stores to analyze the customer behavior and advertise accordingly to increase business. In this system we will collect feedback from the customers about the product and sentiment analysis will be done to get accurate review of the product.

In this system, to analyze the customer behavior Wi-Fi technology is used to analyze the customer pathway and shopping behavior. Also system provides an Android Application for better understanding of the product by scanning the product barcode and gets accurate and necessary details and admin panel website which help in real time billing and management of shop.

II. BUSINESS ANALYSIS (BA)

BA provides a wide variety of applications, methodologies that enable organizations to collect data from internal systems and external sources prepare it for analysis develop and run queries against data. Also helps to create dashboards, reports, and data visualization to make the analysis results available to corporate as well as operational workers [3].

Benefits of BA help in fast-tracking and educating in making decisions, enhancing internal business processes, increasing operational productivity, driving new revenues and gaining competitive advantage over business competitors. BI systems help companies in identification of market trends and find business problems that need to be solved [5].

BA includes data picturing software for designing graphs and charts as well as for constructing real-time dashboards and performance statistics that show visualized data on business metrics.

III. SENTIMENT ANALYSIS

Sentiment is a view or an opinion for something or someone. It can be positive, negative or neutral. Sentiment analysis is Process of computationally detecting and categorizing opinions expressed to determine attitude of user towards particular thing, person. There are two types of sentiment classification: binary classification and multi-class classification

Neutral, negative or strongly negative. Sentiment analysis is carried out on different levels:

1. Word level: in word level sentiment analysis sentiment of each word is individually computed using lexical resource like SentiWordNet
2. Document Level: Identify if document (E.g. product reviews, blogs) express opinions and opinions are positive, neutral, negative.
3. Sentence Level: Identifies if a single sentence has some opinion and if yes it is positive, negative, neutral.
4. Attribute Level: Extracts the attributes of product (E.g. For mobile: battery, camera, zoom size) that are subject of opinion and opinion expressed for particular attribute. It expresses possibility that a negative review does not mean author dislikes all attributes of topic [1] [2].

Input for sentiment Analysis:

Organization data: Customer's feedback from email, call center, letters, etc.

Opinions in news articles and reports.

Comments, postings, review, etc. on social networking sites, e-commerce websites, etc.

Output of Sentiment Analysis:

Percentage. Pie chart, bar graph and Sentiment: positive, negative, neutral. By, sentiment perspective sentence can be objective or subjective. While objective sentence contains one or more facts about product, topic or issue, a subjective contains expressed opinion(s) about a product, feature, topic or an issue. A list of opinion terms is used to distinguish between subjective and objective sentences.

Main approaches for sentiment analysis are Machine Learning approach and Lexicon based approach. Machine learning approach use various machine learning algorithms to perform sentiment analysis and in lexicon based approach we use dictionaries for determining sentiment of sentence. In machine learning, there is a term called 'Classification' and 'Regression'.

Classification: Segregation of different ratings into discrete classes

Regression: Determination of regularities and irregularities in customer feedback, etc. over a single factor.

IV. WPS(Wi-Fi Positioning System)

Analysis of customer behavior, and pathway movements, Offline stores has been long of interest to retailers. Due to difficulty of tracking customers and collecting movement data, such analysis has been limited. Technologies for real-time tracking of off-line customers have been introduced. One solution available in the market is to track a customer's position and pathway by capturing the customer's cellphone signal via short- or medium-range

communication protocols, such as Wi-Fi, Bluetooth, NFC or Beacon.

Position of customer can be predicted by wifi-fingerprinting using signal of the customer's cellphone, grabbed by multiple receivers in a store. Wi-Fi-based indoor positioning system collects signals transmitted by smart devices and determines the positions of customers using fingerprinting algorithm. [6].

V. LITERATURE REVIEW

Ill hoe Hwang, and Young Jae Jang research study on Process Mining to Discover Shoppers' Pathways at a Fashion Retail Store Using a Wi-Fi-Base Indoor Positioning System tells about a smart store project of the fashion brand, Wi-Fi signal detecting device called Joyi Square is installed in retail stores to collect indoor location of customers. It is able to detect the current location of customers who have Wi-Fi enabled on smartphones. They divided the entire floor into zones according to the characteristics of the displayed items. Store manager noted that changes in display of the entering zone and viewing products, directly affects customer(s) pathways [9].

Nor Anza Noor Amran research about user profile based product recommendation is, to provide product recommendation to a consumer based on the consumer(s) profile, e.g. gender, age. Match the different products to a different consumer profiles. Automatically identify products based on scanned barcode. Having database, storing product and consumer profiles. It also helps in eliminating the manual process of adding the information about product. It also shared the future work to populate the product database with the readily available product information from an online database such as the online database for the Universal Product Code[8].

Noah Pritt Walkersville research on Indoor Location with Wi-Fi Fingerprinting, presented reliable indoor positioning system that runs on a smart phone or tablet and it takes advantage of the many Wi-Fi signals that are present at home or commercial environments. It uses waypoints which help in shortening the calibration time and renders the navigation stage more robust. Navigation is performed under realistic conditions. Calibration stage is determined and the optimal calibration time is found to be 60 sec[10].

Limitation to the system is that it has only been tested on one device. Experiments showed that different devices have different sensitivities to Wi-Fi signals and sample these signals at different rates.

VI. PROPOSED SYSTEM

Most of research has been done for products and services using electronic cart system or scan and go system.

Traditional shopping system doesn't provide real-time billing, real-time dashboard, customer pathway mapping, Hands-free Shopping, Pre-order and Take away System, self-checkout. It required no Networking and devices. It has Less powerful BI. Recommendation and feedback is done by Salesman

The system proposed is for local stores as well as customers who are willing to shop offline. It provides automatic and smart billing, product review and recommendation. It provides offline stores the ability to do Business Analysis with ease. Business Analysis can be done by capturing Customer shopping behavior. It also provides Customers to do Hands-free Shopping(through an Android App).

In this project, various techniques will be used to solve the above problems and make shopping easier and fast for the users.

A. Android Operating System

Mobile phone is a device which is close and personal to the user. Phone's mobility makes it always attached with the user. Foremost portion of the available smartphones and tablets now are running on Android operating system. Android is an open source platform, which allows many applications to be easily develop and host .There are approximately 700,000 applications being downloaded from the Google play store since October 2012 Android has brought a huge contribution towards the usage and advancement of smartphones.

Sunil Bangare et all have also researched on Android Operating System successfully.[9]

B. Shop Management Website

We ,are also providing website for the shopkeeper to manage the products ,staff and also dashboard for displaying business analysis to increase the business .It helps in viewing active customer list and products in their cart. It helps in stock management of the products and also provides billing software.

C. Barcode Scanning

ISAS application provides user with menus namely category menu, add product to cart function and the product barcode scanning. The scanning process includes the invocation of the Zxing library. Once this application is activated, the user is able to scan the product barcode and phone will display a camera-like interface to capture the product's barcode. Once the barcode is successfully scanned, the application will be able to identify the barcode number or id. This barcode will be used to extract the accurate product information that comprises of the product's name and description.

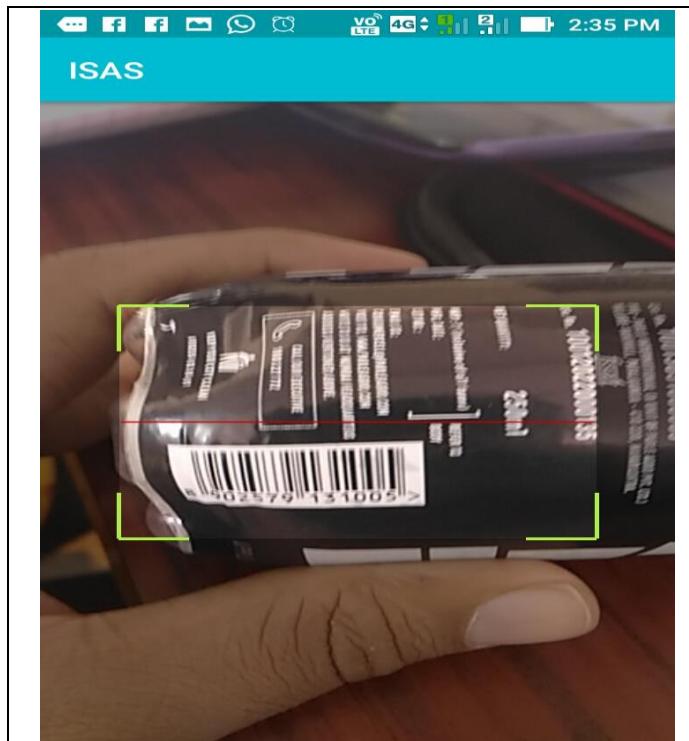


Figure1: Barcode Scanning

D.Collaborative Filtering

When we need to recommend something to a customer, the most reasonable thing to do is to find people with similar interests, analyze their behavior, and recommend the user the same items.

Basic approaches in CF:

- > user-based collaborative filtering
- >item-based collaborative filtering,

Procedure for recommendation system is:

Find how many users/items in the database are alike to the given user/item. Evaluate other users/items and predict what score you will give the user of this product, specified the total weight of the users/items that are more similar to this one. Vector of likings for each user as row of the matrix R and the vector of user ratings for each product as columns of the matrix R. Techniques to measure likeness are cosine similarity or associations between vectors of users/items. The last step is to take the weighted arithmetic mean according to the degree of similarity to fill empty cells in the table.

E..Social Sentiment Analysis

The process of predicting the emotional character behind a list of words, which is used to gain understanding of the attitude, opinions and emotions stated within an online forum.

INPUT of the sentences for which sentiment analysis is done

{“sentence List”:

[

“I like double cheese pizza”,

“I don’t want to have diabetes”

]

]

OUTPUT

[{

“positive”: 0.455,

“negative”: 0,

“sentence”: “I like double cheese pizza”,

“neutral”: 0.545, “compound”: 0.3612 },

{ “positive”: 0,

“negative”: 0.234,

“sentence”: “I don’t want to have diabetes”, “neutral”: 0.766,

“compound”: -0.0572

}]

It will give such output whether the feedback is positive, negative , neutral.

F. Apriori and Adaboost

For achieving business trends, profit and market analysis we used various techniques provided by business intelligence one which is used in this project is APRIORI algorithm approach. Procedure to this is:

Scan the business database to get the support(S) of each 1-itemset, compare S with min_sup and get a support of 1-itemsets, L1.

Use L_{k-1} join L_{k-1} to generate a set of candidate k-1-itemsets. And use Apriority property to prune unfrequented k-itemsets.

Scan the business database and obtain the support S of all candidate k-itemsets and compare S with min_sup and obtain a set of frequent k-itemsets L_k.

The candidate set=NULL.

If yes for each frequent itemset 1, generate all non-empty subsets of 1. If no the again go to step 2.

For each frequent item set 1, generate all non-empty subsets of 1

For every nonempty subset s of 1, output the rule is

s=>(1-s). If confidence C of the law s=>(1-s)

(=support s of 1/support S of s) min_conf.

Ada Boost

AdaBoost is an abbreviation for Adaptive Boosting, a machine learning algorithm used in combination with additional types of learning algorithms to improve their performance. The output of the weak learning algorithms is combined with a weighted sum that denotes the final output of the boosted classifier. AdaBoost is sensitive to noisy data. It is less susceptible to the over fitting problem. AdaBoost is popular and the most significant, historically it was the first algorithm that could acclimate to the weak learners. AdaBoost is a particular method of training a boosted classifier. A boost classifier is a classifier in the form

T

$$F_t(X) = \sum_{t=1}^T f_t(x)$$

t=1

each f_t is a weak learner that takes an object x as input and returns a value indicating the class of the object. For instance, in two class problem, the sign of the weak learner output recognizes the predicted object class and the absolute value gives the confidence in that classification. Similarly, the Tth classifier is positive if the sample is in the positive class and negative otherwise.

Each weak learner gives an output , h(x_i), for each sample in the training set. At every iteration t, a weak learner is nominated and allocated a coefficient α_t such that the sum of training error E_t of the resulting t-stage boost classifier is minimized.

$$E_t = \sum_i E[F_{t-1}(x_i) + \alpha_t h(x_i)].$$

Here F_{t-1}(x) is the boosting classifier that has been built up using the previous stage of training, E(F) is some error function and f_t(x)= α_t h(x) is the weak learner that is being reflected for addition to the final classifier.

At every iteration of the training process, weight is assigned to each tester in the training set equal to the current error.

E (f_{t-1}(x_i)) on that tester. Weights of the samples help in the training of the weak learner, for instance decision trees help to grow splitting sets of samples with high weights.

G. WiFi-Fingerprinting

WiFi-Fingerprinting is used to map the indoor location. There are two folds for mapping the location:

- Mapping at your location

1. Firstly , we need to divide the location into grid points.

2. Collect the signal strength from each grid to all the access points. If you are in position Y and you have 5 AP, you are going to collect all 5 measurements.

3. Put your collected data in database

- Locating Your Position

1. Find the signal strength that is received from different AP.

2. Algorithm will decide from the signal strength in a database and the current signal strength, the extreme position (from DB) that matches the signal strength, will be the calculated final position.

VIII.CONCLUSION AND FUTURE WORK

Most people waste their time in dealing with the confusion and troubles when they try to select correct kind of products for themselves and their family. This happens when users are served with variety of product types and brands in a big mall that offers discounts on most products. Such trouble could be eased by having a system as what we proposed in this paper, i.e. Intelligent Shopping Assistant System (ISAS) which is hosted on the Android mobile platform. It helps the user by providing a result on the examined product, that whether the product is appropriate for the user or not. ISAS application was developed on top of Android platform for the reason that Android supports mobility and portability, while preserving a close and personalized space with the user. Also at the manager end we introduce WPS technology with process mining techniques as a tool for study of customer pathways. The learnt process model delivers a formal representation of the overall shopping pathway of the customer that can be observed in the store. The analysis presented does not specify customer activities, such as asking help from sales staff, visiting the changing room, or paying at the cash counter.

Possible steps in direction towards future can be Cashless Shopping such as select products put in physical cart and direct payment can be done, Self-Checkout, Fully hands free automated experience. Urbanization in India is occurring at a break neck pace, our system will make the existing infrastructure smarter and it will be an innovative step towards building a smart city.

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