Smart Billboard System using Data Mining and IOT

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Abstract - *The methodology displays the implementation and design of a smart IoT billboard which is capable of showcasing multiple advertisements at a time that result in targeting an individual or group of individuals which are interested in buying certain type of products. The system is developed using a Raspberry Pi. Sales data from a particular department is acquired in the file format of '.csv'. The file is then processed by applying different algorithm and filters such as APRIORI and Market Basket Analysis, to analyze the behavior of an individual based on the previous buying patterns. Thus, helping in targeting of the people along with increasing the sales. We have also created a form of central system i.e. A website, for better understanding of ads and a User Interface where the product owner can manually post ads, if needed. The manually posted ads with go through a human filtration, then it will be approved or disapproved based on verification of the admin. So basically, the overall idea is to effectively target a specific number of customers which are likely to buy product based on the past data.*

***Key Words*: Raspberry pi, Data Mining, IOT, Machine Learning, Smart Billboard, Apriori Algorithm, Market Basket Analysis.**

1. INTRODUCTION

Advertising has the ability to change the perspective of human mind, a best and effective advertisement can lead to rapid increase in product sales. Therefore, the advertisers are finding more effective ways to present the product in front of their customers. Companies want their products should be used on the larger pace. Thus, they are researching on how to increase the popularity of the products by advertisement. The process of finding and analyzing usage patterns in a large amount of data is what is called Data Mining.

The raw data is first cleaned and the information is extracted out of it by using certain data mining algorithms and filtering techniques. IoT and Data mining has proved a promising way to advertise and to target a particular customer, eventually increasing the sales and better understanding of the customers. In the present scenario, although we can find digital billboard in from of big malls, or on the streets but they are limited to showing a single ad at a time using manual operation. Our system will try to replace this existing manual operation along with elimination of the drawbacks. And this will be done using machine learning algorithm and wireless networks to display and wirelessly control the operation.

Our primary aim is to get/ grab attention of the customers who are likely to by the products based on the buying patterns. The patterns will resemble the buying habits of the customers and will also tell us the engagement of the customers around a particular type of products. There will be a central system (i.e. our website) to retarget the customers via Google adverts. At present, there is not any system which has implemented the combination of social and spatial data to provide promising results. According to our research some system does not consider user preferences while others do not take into account the location.

In this model, we proposed the idea of combining both to recommend and to provide the best offers to customers along with the offers if applicable.

1.1 Implemented System

Our system can be implemented at various crowded area where indulging huge amount of people of various type and taste which traverse all the time like markets station areas, highways, malls. Our system will grab their attention through digital marketing by arousing curiosity or interest among the customers. With the big market line-up and large business icons the start-ups also referred as small firms doesn't get much opportunities to showcase themselves the reasons is the small firms don't put much in advertisement hence limiting the growth, this problem will be solved as we are using user's past information.

The work presented in this project contributes to the Billboard management of the business and of any individual. This model and technologies utilized to solve issues and address restrictions in the current systems like the limitation to ads displaying time, offline billboard system with consume time as well as energy. The implemented system identifies the requirements of the users and exhibit the right advertisement at an ideal time to engage as many consumers as we can.

We have carrying out the system on the raspberry pi, and the ads are shown on the billboard wirelessly; We are going to implement the backend of the system with core python and machine learning algorithms (i.e. APRIORI, reinforcement ML technique); The input to our model is sales data of malls or any firm and the output yielded is then displayed directly to the billboard we can set the ads reported by the output produced by algorithms or we can cycle amidst the ads using timers.

In addition to this, we are mailing messages and digital ads on the desktop or tablet about the recent offers to existing customers. We have done this using Google adverts and digital marketing. As mentioned above, users can also use our web application to apply for their ads if they want.

Advertisement data can be systematized and sorted using various ML algorithms. So implemented methodology advanced the system to predict the specific advertising based on the parameters given to the ML model. The system uses a machine learning approach for the precise prediction of advertises to discover and increase the sales or gain more profit.
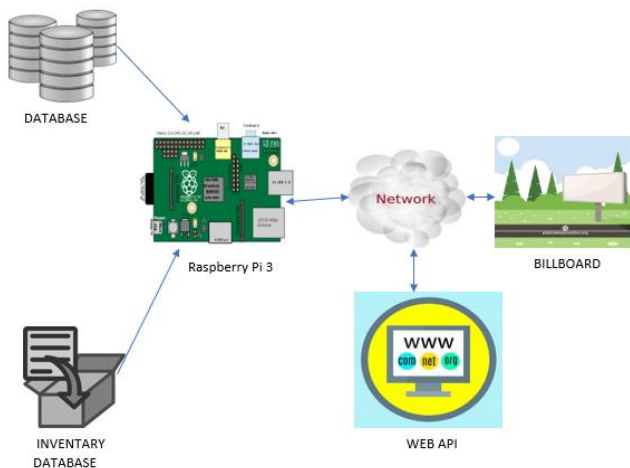
1.2 System Architecture

Fig -1: System Architecture

2. WORKFLOW OF SYSTEM

The implemented system works mainly in three different parts of execution. Following is the ideology behind those parts.

A.   Part 1
In this part we have collected all the data in form csv file, by importing this file into ML model which will

decide dependable and non-dependable variables. These variables are then used as training set and test set for the Apriori algorithm to get the resultant dataset. Using this dataset, the corresponding advertisement will be displayed on billboard.

B.   Part 2
Our web-based application is the second part of the system where we have created the website for customers to submit their ads and metadata. Which will then get extracted and posted on website by the admin.

C.   Part 3
This part of the system is mostly useful for admin. In this phase, we have done the implementation of digital marketing, where we have collected data of users like age, gender, income etc. using google advert demographics we can retarget peoples who have visited the ads site previously.
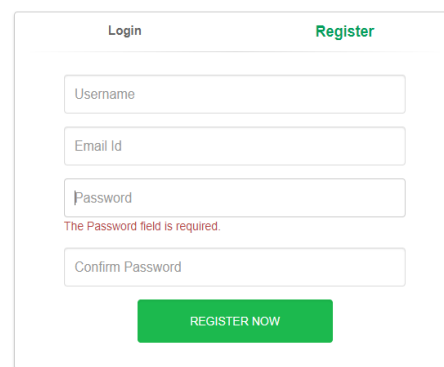
3. RESULTS AND ANALYSIS
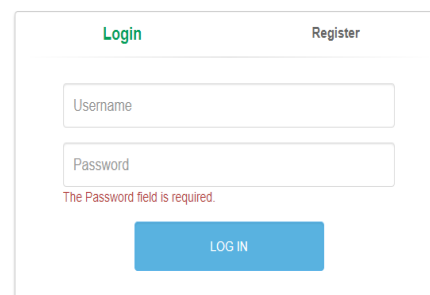
3.1 Software Results

Fig -2: Registration Page
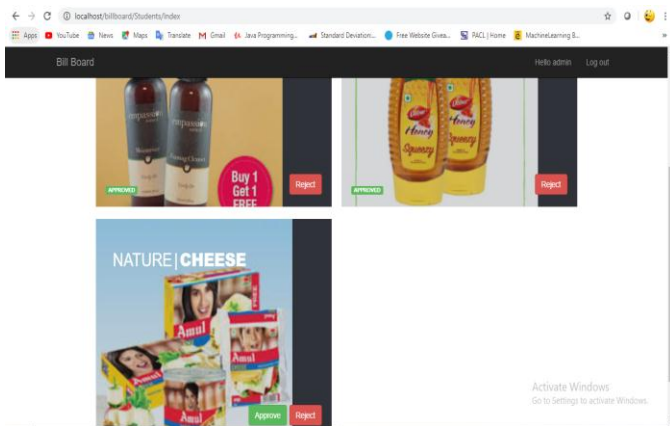

Fig -3: Login Page

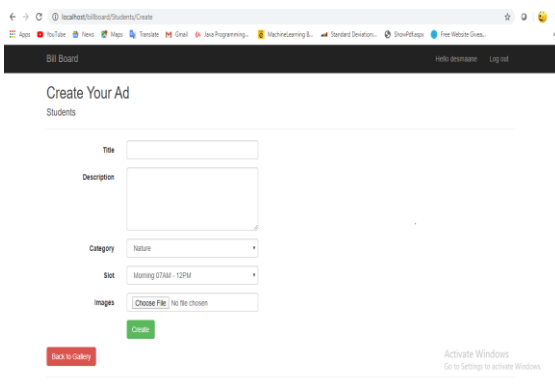**Fig -4**: Admin Panel

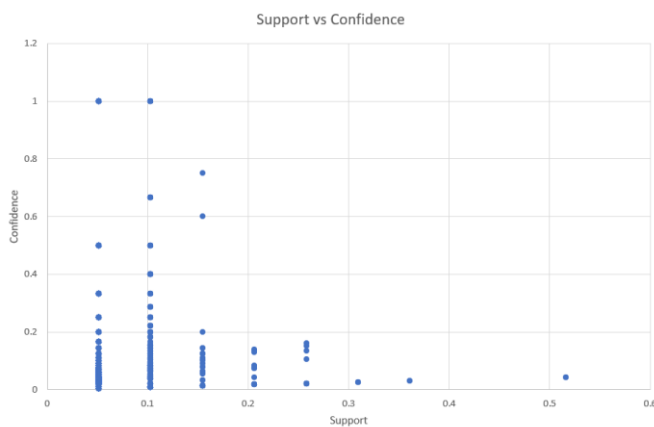**Fig -5**: User Panel

3.2 System Analysis

Chart -1: Analysis Graph

The above figure "Chart-1" shows the analyzed results of the implemented system.

4. CONCLUSION

This system provides competitive deals and offers to customers, thus giving them better options to choose from. It also provides the sellers better insights into customer needs. The implemented system is cost efficient and can be easily implemented on larger scale.

5. FUTURE SCOPE

In this system the problem and the limitations posed by the previous system such as poorly targeting of customers, less variety of advertisement are been eliminated and the system has been automatized with new technologies with is much more efficient in providing better advertisements. Our system has the ability to provide superior deals and offers to customers thus giving them best wide varieties of options to select from. It also delivers sellers with preferable insights of the consumers. This developed and implemented system is low to the cost and can be easily implemented in various commercial sectors.

Implemented system can be upgraded in the future by using various new technique like AI and Deep learning. Active RFID tag can be used in future to directly update the database and no human interaction is need to processes the file i.e. to automate the process of processing of csv file, which will make the system real time and responsive.

ACKNOWLEDGEMENT

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