Billboard Marketing Management System Using IOT and Data mining

Rupali M. Sathe, Priyanka C. Jadhav, Aniket M. Deshmane, Poorva S. Araj

Abstract—The system shows the implementation and design of an intelligent billboard marketing system which displays one or more Advertisements at a time in order to target a user or group of users. The system is developed using a Raspberry Pi. Sales data collected from the stores in the form of '.csv', the file will be processed with the help of different algorithms such as MARKET BASKET, and prediction of the targeted users is done along with the various deals that will help to increase the sales. When selling a product, choosing the optimum price, to maximize profit is important. For that we have used a reinforcement ML technique known as Multi arm Bandit. It works on exploration and exploitation. Epsilon-greedy algorithm is used for exploration of prices for a particular product and Auer Deterministic algorithm are used to choose the price that yielded the highest profit according to the trials. Also, we have created a website for our system so that customers can post their advertisement and information related to it. This can be done by digital marketing by applying website optimization techniques. In addition to this, notification can be provided to the previously registered users who are present within the region of the billboard, so that they can be targeted effectively.

Index Terms— Digital Marketing, Remote Billboard Management, Digital marketing website, Online advertisements, Market basket algorithm, Association rule, Wireless Billboard Display, Machine Learning, Data mining.

1 Introduction

Advertising carries with it the ability to persuade, the power to influence one's mind and mould the future. The company's profit margins and economy can be taken to new heights with the power of advertising. Therefore, the advertisers are finding more alternate and better ways for the promotion of their products to reach customers. The process of finding and analyzing usage patterns in a large amount of data is what is called Data Mining. The raw data is converted into useful and relevant data using techniques like data extraction and data analytics. IoT along with data mining has paved a way for more better and alternative ways to advertise at the perfect target. In the current situation, although digital billboards are present, they are showing a single ad at a time that too using manual operation. Thus, our system will provide automation in marketing ads using IoT, Data mining and various machine learning algorithms on the billboard. The aim is to grab maximum attention of customers who are likely to buy displayed products on the billboard system. There will be a central system (i.e. our website) to retarget the customers via Google adverts.

There does not exist any model that combines the idea of social and spatial data to provide effective results. Some systems do not consider user preferences, others do not take into account the location. In this model, we discuss the idea of combining both to recommend best offers to customers.

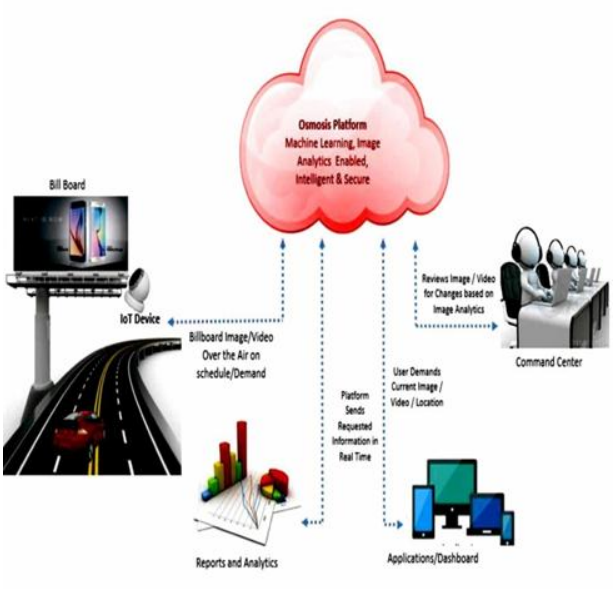
2 Implemented system

Our system can be implemented at various crowded places like markets, station areas, highways, malls where a huge amount of people traverse all the time, and our system will reach them by grabbing the attention through digital marketing. Even the small firms can get an opportunity to expand to a high gross margin. The work presented in this project contributes to the Billboard management of the business and of any individual. This model and use of technology to solve issues and address limitations existing in the current systems like a 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 displays the right advertisement at a perfect time to attract as many consumers as we can. We have implemented the system on the raspberry pi, and the ads are displayed on the billboard wirelessly; We are going to implement the backend of the system with core python and machine learning algorithms (i.e. Market Basket Analysis, reinforcement ML technique); The input to our model is sales data of malls or any firm and the output generated is then displayed directly to the billboard we can set the ads according to the output generated by algorithms or we can cycle between the ads using timers.

In addition to this, we are sending 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.

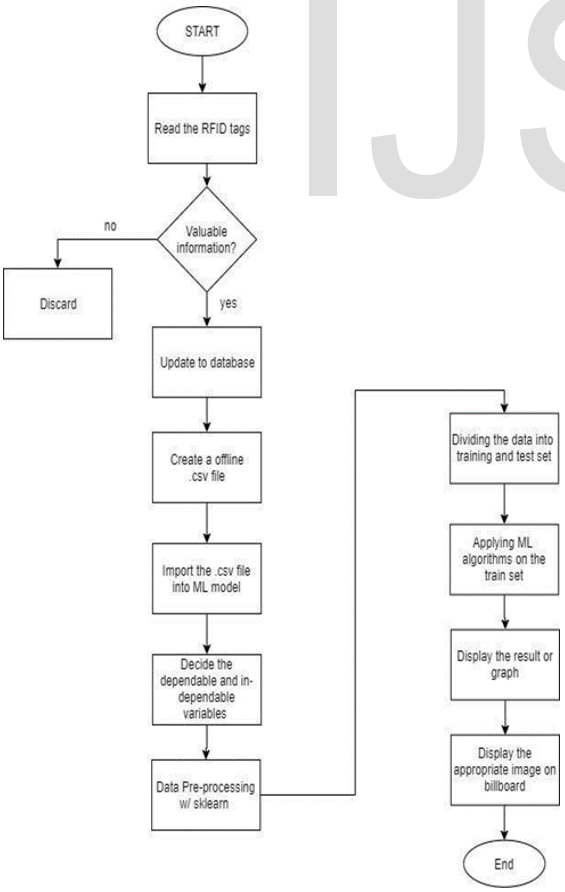
Advertisement data can be classified and sorted using various ML algorithms. So implemented methodology develops a system to predict the particular advertising based on the parameters given to the ML model. The system uses a machine learning approach for the accurate prediction of advertises to find and increase sales or gain more profit.

3 SYSTEM ARCHITECTURE



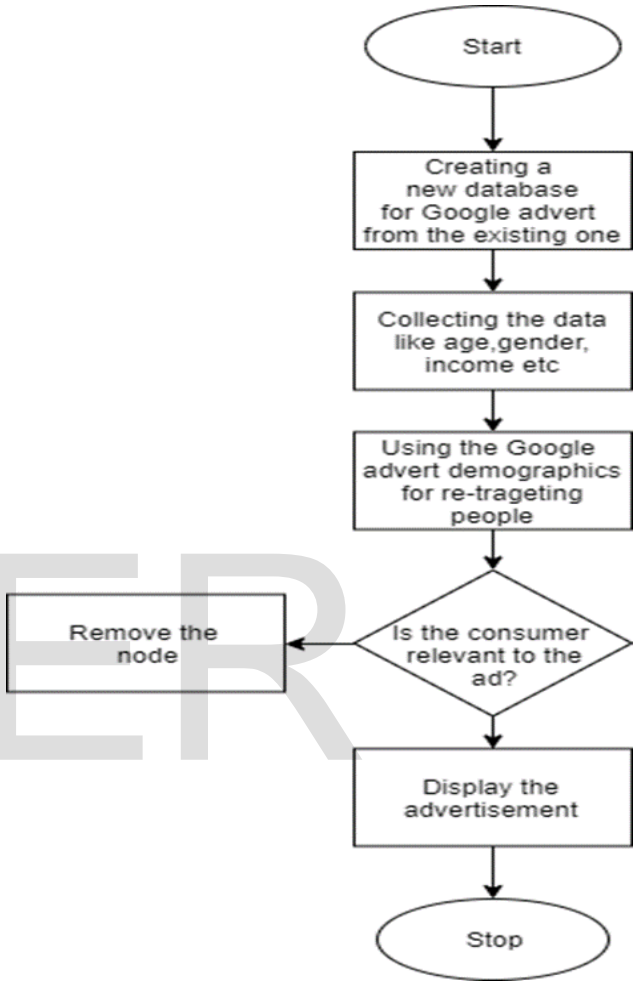
4 WORKFLOW OF THE SYSTEM

Part 1: Basic functionality



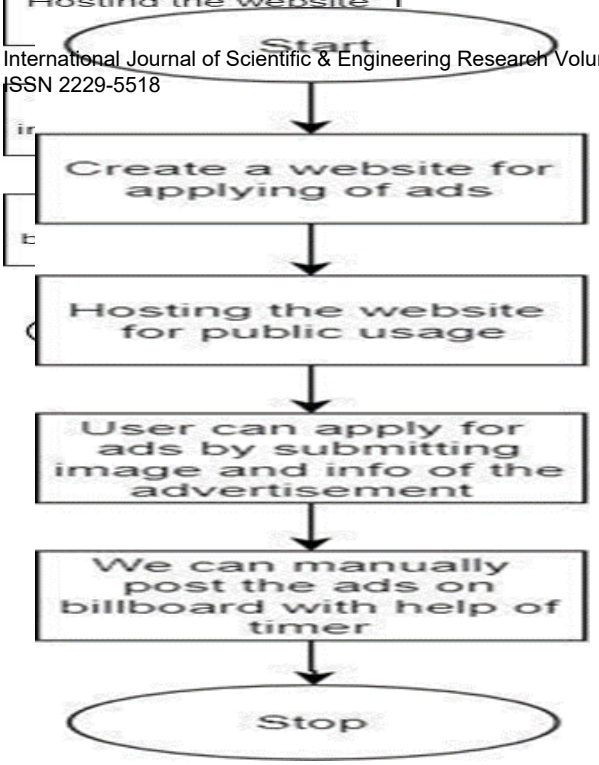
This is the backbone of the system; it consists of data collection and algorithms we are using data mining techniques to obtain optimal data from the database in the form of .csv file we are using MARKET BASKET algorithm to find the accuracy of the system and market basket algorithm to find the market basket factor between the products after the processing and association of the dataset we will post the ad on the web-based API which will be displayed on the billboard.

Part 2: Digital marketing



In the second part, we are doing digital marketing on the website which will help us to retarget the user.
For this, we are using the google advert demographics.
This will show the percentage of the people most likely to buy the product and we will display the ads accordingly. For the google advert to work we are considering certain parameters like age, sex, income and location. With the help of there parameters, we can find out the behaviour of a particular location.

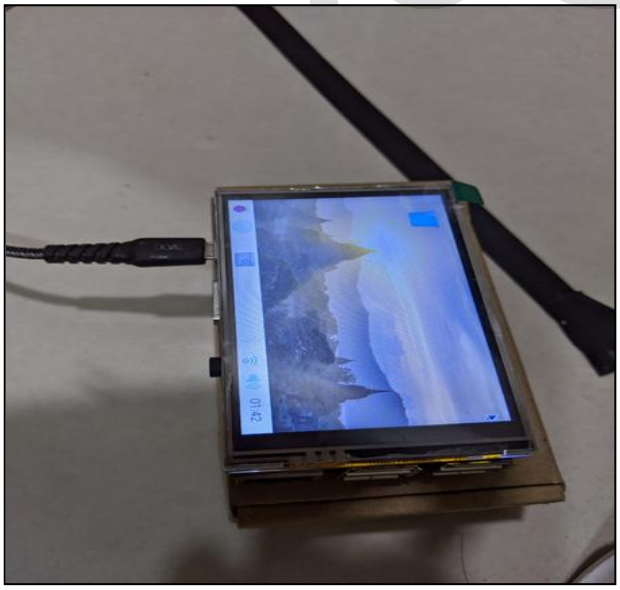
Part 3: Web API



In this part, we are going to create the main page for our project on which users can log in and apply for their advertisement's request to display on the billboard.
We will provide a list view of what sort of advertisements are trending current at the moment.

5 Results

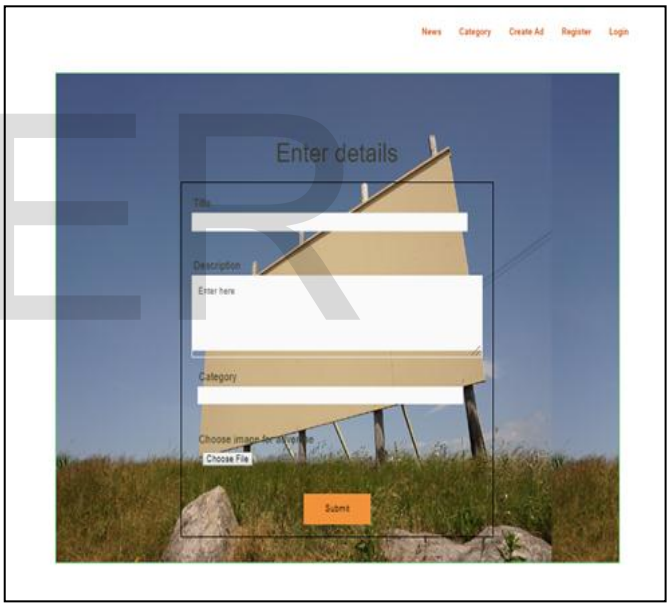
5.1 Hardware Results



5.2 Software Results

5.2.1 Websites Home Page

5.2.2 Advertisement Details Webpage



6 Analysis

Parameters	Previous System	Our System
complexity of adding multiple advertisements	High	Low
Multiple Ads.	Not possible	Possible
Operations performed	Manually	Using automation by ML algorithms
Maintenance	Regularly	One time investment, requires less maintenance
User Friendly	No	Yes
Interaction with users	Not possible	Possible
Use of advanced algorithms	No	Yes

7 Conclusion

This system aims at creating an Advertise Prediction system which is beneficial for the businesses and the user. Various machine learning concepts are used to develop the system.

We collect the purchase information through RFID read module and store it into the database as the billing information. All the purchases of products belonging to different categories are read by the RFID and stored in the database. This information is needed so that we can attach appropriate offers to these products to increase their chances of sales. Recommendation of such products will be made to the customer according to their purchasing behaviour/trends with the help of data mining. IoT board and RFID are all connected together via a network.

We are using association technique of data mining and implementing the Market Basket algorithm.

8 Future Scope

In this system the issues presented by the current system such as the current targeted advertising which is pretty poorly targeted. Our system provides competitive deals and offers to customers, thus giving them better options to choose from. It also provides sellers with better insights into customer needs. The developed system is cost-effective and can be easily implemented in various sectors. Implemented system can be enhanced in the future by using various parameters. The RFID can be used as an input parameter to the system so that the data will be real-time as well as updated.

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References

[1] Chui, Michael, Markus Löffler, and Roger Roberts. "The internet of things."McKinsey Quarterly 2.2010 (2010): 1-9.

[2] Sarma, Amardeo C., and João Girão. "Identities in the future internet of things." Wireless personal communications 49.3 (2009): 353-363.

[3] Gubbi, Jayavardhana, et al. "Internet of Things (IoT): A vision, architectural elements, and future directions." Future Generation Computer Systems 29.7 (2013): 1645-1660.

[4] IoT based Intelligent Billboard using Data Mining BY Saral Nigam- 978-1-5090-2084-3/16/$/31.00©2016 IEEE

[5] Saral Nigam, Shikha Asthana Punit Gupta “IoT based Intelligent Billboard using Data Mining ” (2016)

[6] Vrinda Bhatia, Varun Hasija “Targeted Advertising Using Behavioral Data And Social Data Mining” (2016)

[7] Vittayasak Rujivorakul,Sujitra Arwatchananukul, Nattapol Aunsri “Lightweight Smart Screen Architecture for Multichannel Control Advertising Display”(2018)