Emedcom : Medicine Wastage Management And Requirement Prediction System

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Abstract- *Presently, there are mobile apps for every walks of life and with no doubt, they have made and are making life tremendously easy for man on a daily basis. But, there is no means that a person can give medicines if it is not demanded or waste, to consumers who need it. Wasted or unused medicine is a severe and increasing problem you can help plunge. Often people may have an excess amount of medicines with them. After consulting doctors, several people throw away their unused medicines. Here, I am suggesting an android application where the people who have excess medicines can be re-used efficiently.*

Keywords- Android, Firebase Database, k-Nearest Neighbor, Naive Bayes, Decision Trees.

I. INTRODUCTION

People need to be educated not to waste unused medicines before expiry. It needs to be reused so that other people can get these medicines before expiry. In the current scenario, there are a lot of people in our country without proper healthcare facilities[1]. The aim of this paper is to provide them with unused medicines. Wasted medicine is everyone's responsibility and there are small changes you can make to help reduce the amount of medicine being wasted. When possible, try to make these medicines reusable. Pharmaceutical wastes are highly precarious and put people under several diseases.

In this paper, waste minimization and reusing of medicines are practised. This is a useful application for everyone who would like to donate or even sell their unused medicines to poor people. In this paper, I would relish introducing a Collection Centre, where people can return unused medicines before expiry. People can sell and buy these unused medicines within the expiry date. Further, the collection centre will re-distribute efficiently to other charity organisations. The system also predicts districts where a distinguished medicine is more received.

II. RELATED WORK

Healthcare apps are a boon to doctors and other pharmaceuticals. They are a blessing in far remote areas. It also incorporates a lot of advantages that ordinary people receive from healthcare applications. One of the major advancements of healthcare apps has been the decrease in medical charges and expenses. Skyrocketing bills and large medicinal expenses have always been the headache for people because the hospitals charge a fee at their will[2]. Many people depend on mobile devices to help them clarify their daily life. By developing a medical mobile app to help people to get medicines, we can provide more people with access to healthcare. Pharmacists have the potential to be at the forefront of this movement as healthcare professionals and pharmacists are in an admirable position to educate patients about safe drug disposal[3].

In the proposed system, the collection centre collects medicine and distributes it to the charity organisations. Often charity organisations can request their needed medicines. Collection centre also exchanges their medicines between districts. It includes a huge amount of data being transferred each day and the main aim is to predict the district where a particular medicine is most demanded. It shows which district needs a particular medicine more from the exchange of medicines in between collection centres based on the data analysed.

EMedCom is an android application. There is a simple to use user interface for all users. After installing, three types of users include collection centres, people and charity organisations. Collection centres and charity organisations have to register along with their license numbers as identity numbers. Different users can request medicines based on their needs. People can return their unused medicines before the expiry which is reused. Collection centre can block the illegitimate users if any fraudulent attempt id found. The user account can also be deleted.

III. IMPLEMENTATION DETAILS

A. SOFTWARE REQUIREMENT

1) Android Studio:

Android Studio is a software that is used to develop applications in smartphones. In this application, Android 3.3.2 is used. The hard disk drive should have at least 4GB RAM to install android studio.

2) python3

Python is widely considered as the preferred language for teaching and learning Ml (Machine Learning). Though it is slower than some of the other languages, the data handling capacity is great. Python along with R is gaining momentum and popularity in the Analytics domain since both of these languages are open source. The capability of interacting with almost all third party languages and platforms.

B. HARDWARE REQUIREMENTS

1) Android device:

A smartphone is used as an android device to run the application in order to meet the requirements of the user. The android device must have SDK>22 to run the application.

C. OVERALL SETUP OF PROPOSED SYSTEM

At present, there is no way to reuse the unused medicines. It also has a lot of human efforts. But through the usage of this application, many people can get the medicines for free of cost.

The overall setup of the proposed system is as shown in Fig 1. EMedCom is very easy to use application. One of the main aim while designing the application was to abstract as much lower-level details of the system as possible from the user. There is a simple to use user interface for all users. The application starts with a splash screen, provided by a set of functions in the dashboard of the application. Different users register here and are redirected to their particular pages. Collection Centre can add medicine and pharmacy details. They can also demand medicines to other collection centres. People can return their unused medicines with a valid bill. Charity organisations can request medicines to the collection centre.

The application also uses a simple interface for prediction. It uses an API call for the GET and POST requests for input and output. The phone and the server system is connected to the same network. The user enters the input through the android device. Now when the button is clicked, the protocol for API is called and the output is shown on the android device.
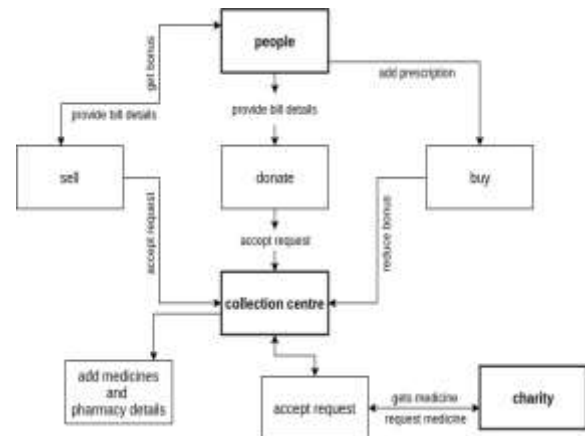

Fig 1. The outline of the Proposed system.

D. METHODOLOGY FOR PREDICTION

The dataset used for is from the medicinal data which is exchanged between different collection centres. It is a large-scale collection of generic name pf medicine, count, source district, destination district and month. From the collected data, the predominant characteristics are extracted with which a CSV file is created. With this CSV file, various models are trained, using k-Nearest Neighbor, Decision Trees, Naive Bayes, and accuracy is calculated. The goal is to suggest the best model that can be used for predicting the district.

The steps are :

- Read the CSV file into a data frame data.
- Convert the categorical variables and object types to numbers using the label encoder module.
- Select the relevant features to be considered and store it in features.
- Split the data-set into training and test set using train test split() method.
- With this data, train the machine.
- Now, fit an appropriate model. (kNN, Decision Trees, Naive Bayes).
- Print the classification report.
- Calculate the accuracy of the dataset.
- Connect the server with phone API.
- Make a prediction for new input and display the result on the phone screen.

E. PROPOSED SYSTEM

EMedCom is an android application. Collection centre, people and charity organisations are the users here. Collection centre and charity organisations have register by confirming their licence numbers. Registration is confirmed by sending an email. Users have to login to the application with their credentials as email and password. Collection centre adds pharmacy details and medicine details. The pharmacy details include the name, place, district and a unique identifying number. Medicine details include the medicine name along with generic name and condition. It also covers the unit price for each gram. People who register in the application can donate and sell medicines before a limited expiry. Those who sell medicine will be awarded points instead of cash in order to avoid fraud bills. A new user cannot buy medicine unless he sell medicine. Using these points, they can buy medicine.
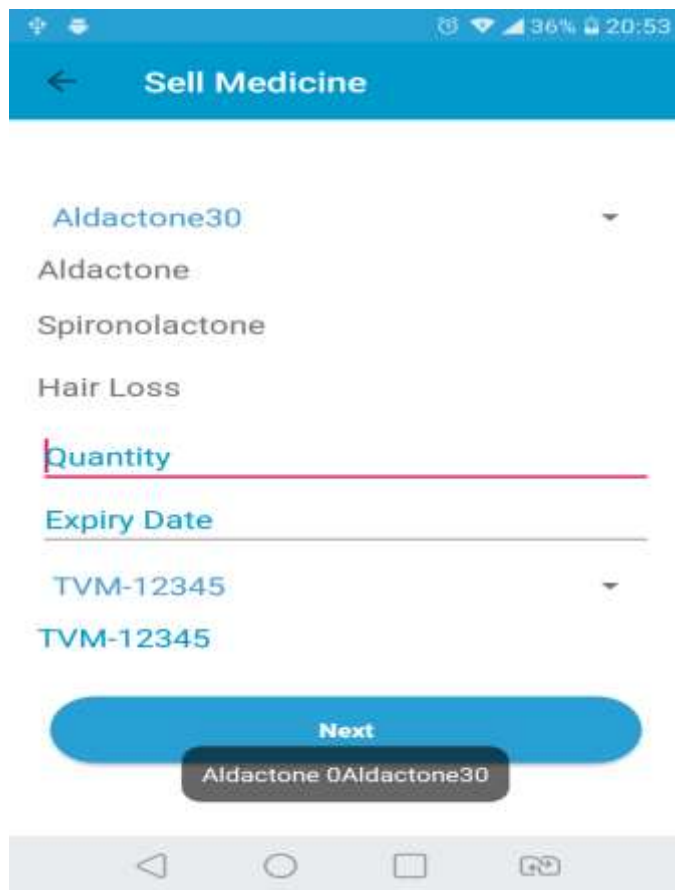

Fig 2. Sell medicine interface.

Donated medicines will be distributed to the charity organisations by the collection centres. People who are ready to sell or donate their medicines have to upload the medicine details along with the bill. This bill is viewed by the collection centre and they will validate the bill. If any fraudulent attempts are done, they can view users of their respective districts and also can block the person. The medicines that are donated by people are also verified by the collection centres.

Charity organisations can request the medicines to the collection centre in each week. They can also send push messages to the collection centres for the shortage of medicines. The collection centre from each district views the request from charity oraganisattions and distribute the medicines. In case of lack of medicine in the collection centres, they can request other collection centres. Here, the collection centre acts as a charittable non-profit organisation. And thus the unused medicines help to reach to every poor people. The database used in the application is Firebase.

On each transfer of medicine from one collection centre to the other, there transpires a lot of data daily. From these data, it is able to predict the district which receives a particular medicine more on a month. For that, the dataset is collected and the features are extracted. the features include the generic name, month, source district and the prediction class is the destination district. Now, the dataset is vectorised and the relevant features are taken for training and testing. Different models used include:

- k-Nearest Neighbor (kNN) - The classification is done by finding the most similar data points in the training data and making an educated guess based on their classifications.
- Decision Trees - Decision tree algorithm falls under the category of supervised learning. They can be used to solve both regression and classification problems. The goal is to create a model that predicts the district by learning the data features.
- Naive Bayes - Naive Bayes is a simple, machine learning classifier. It is a probabilistic classifier and can also be represented using a very simple Bayesian network. Naive Bayes classifiers id used for text classification to predict the district.

Now, accuracy is measured. Accuracy measures how often the classifier makes the correct prediction. The input is given using the application which includes the generic name of the medicine, month and source district from where the medicine is sent. The interface is built on the Android studio. A server is required along with Apache and PHP to make an API call with the android studio and jupyter notebook. The python file is loaded into the server with the whole code. PHP codes are written in the server and the output is displayed on the Android device which is the district that receives the medicine the most.

It is very tough to reuse the unused medicines in rural areas where people find very difficult to get a system generated bills. The application will be very useful to all those

areas as well. By this, people will get the medicines before expiry.
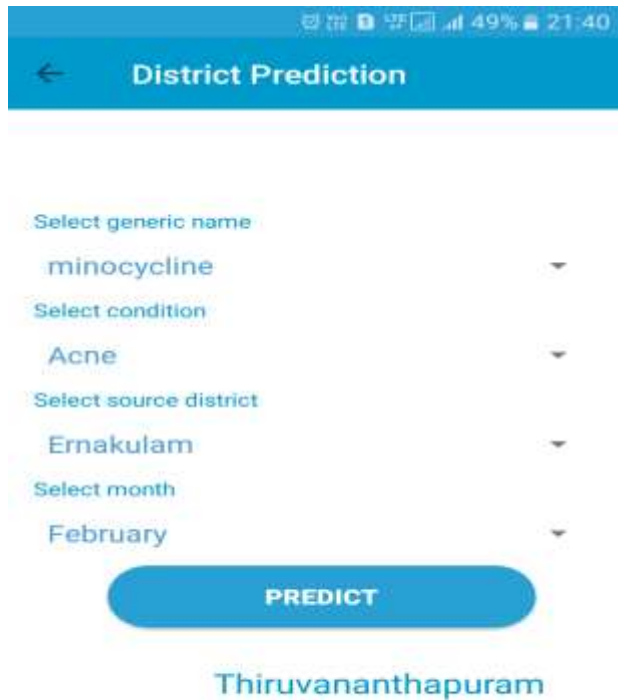

Fig 2. distrcit prediction on screen.

IV. RESULT

The result is the calculated accuracies from all models. The accuracies with the different models are compared and the best models have taken which has the highest accuracy with the dataset. The aim of using multiple models is to identify the best district prediction model, which can be helpful in developing future applications. The table below shows the obtained accuracies of different models.

Table -1: Accuracy Table

Algorithm Used	Cross-validation	Accuracy
kNN	0.93	0.91
Decision Trees	0.92	0.91
Naive Bayes	0.32	0.28

V. CONCLUSION & FUTURE SCOPE

Medication disposal is an alarming issue today and gaining more and more awareness from healthcare professionals as well as consumers. Reducing unnecessary dispensing and supply of medicines is an important way of reducing waste. The purpose of this system is to build a simple to use android application and to predict district according to the flow of medicines. In the current scenario, there is no way to reuse the unused or unwanted medicines in hand. People usually throw away the available medicines which can cause pollution. Also, no one knows how the medication making company reuse the medicines before expiry. In this paper, it provides an automated way to reuse unwanted medicines before expiry.

VI. ACKNOWLEDGMENT

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