

Red Wings using Data Mining with Tracking System

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ABSTRACT

According to American Cancer Society, about 1.7 million people are expected to be diagnosed with cancer in 2020. Many of them will need blood, sometimes daily, during their chemotherapy treatment. Blood donation still is a challenge across various countries and a lot of heartbreaking deaths that have occurred just because a patient was not able to find a donor. Buying blood units is an expensive affair and finding fresh blood is even tougher (A.A.). In fact, stored blood comes with an expiry. Despite best efforts, when stored blood is not used for long, it is discarded, which means that over a million units of blood are wasted. Using GPS technology, Red Wings enables users to connect with other users and blood banks by giving them a list of filtered users based on various factors in their vicinity. It might be possible to save lives if a blood donor is available in time. The idea is to create a huge user base so that the probability of finding the donor increases. When a request is posted, a list of donors is curated using data mining to determine filtered users depending on various factors and they are notified immediately. Red Wings is an android application which can be used during emergency situations of blood requirement, you can quickly check for contacts matching a particular or related blood group and reach out to them via Phone Call/SMS through the application.

Keywords

Mobile Application to locate nearest Blood Donors, GPS based tracking of Blood Donors' Geo-location, Android based solution to find nearby Blood Donors

1. INTRODUCTION

Every 2 seconds someone needs blood. In order to reduce the number of required donors there is a need of a platform which bridges the gap between the donors and the needy. This project aims at achieving maximum possibility of success cases. That's why it uses data mining in order to filter the list of donors. And blood can never be manufactured. It can only come from generous and genuine donors. Now the task when there is a need of blood in an emergency situation is finding people who will be willing to donate blood. Because blood will always be in great demand and less supply. This application curates the list of users registered based on calculating the probability of users to donate blood. Additionally it will also filter out all the users who have already donated blood in last 3 months, as they won't be able to donate blood for 3 months from the latest blood donation. This feature makes the communication between the donor and needy more efficient.

2. SCOPE & RELEVANCE

Despite a huge population, the demand-supply gap for blood units persists in many healthcare facilities in a lot of countries. According to a 2017 report by the World Health Organization, only 9 million blood units are available annually and the actual demand goes up to 12 million (A.A.). In order to save lives and bridge the gap between the donors and needy, this idea is an ideal solution.

3. EXISTING SOLUTION

As the problem is very crucial, attempts have been made in past to solve the problem by combining it with the upcoming technology so that more lives can be saved in case of emergencies. Redcrossblood.org is one of applications used for the same. Redcrossblood.org runs algorithms to match potential blood donors in case of a request for blood. You don't need to contact donor after donor anymore, the application will do that for you and let you know if someone kind is willing to help you out. Also, the user does not get countless notifications – the algorithms used will contact you only if you're the ideal person. By signing up for Redcrossblood.org, the personal details and contact information of the user are perfectly safe - no one gets to see them unless you want them to.

How Redcrossblood.org works:

1. User signs up.
2. When we think user can make a difference by donating blood, we send you a tiny little notification. We won't bother you if you are far away, nor if you'd donated recently.
3. If a user or anyone user knows is in need of blood (say, for a surgery), just place a request. It's free.
4. We contact the relevant people - and send the user an SMS when they respond.
5. User doesn't have to call up their friends, reach out to known networks, etc. Congratulations! The user has made our community awesome! (Barton)

The existing solution is user friendly and successfully automates the process of blood donation by incorporating technology. But it does not take current location in perspective. The application contacts the donors on the basis of their addresses which might take usual time. Hence it is not dynamic solution.

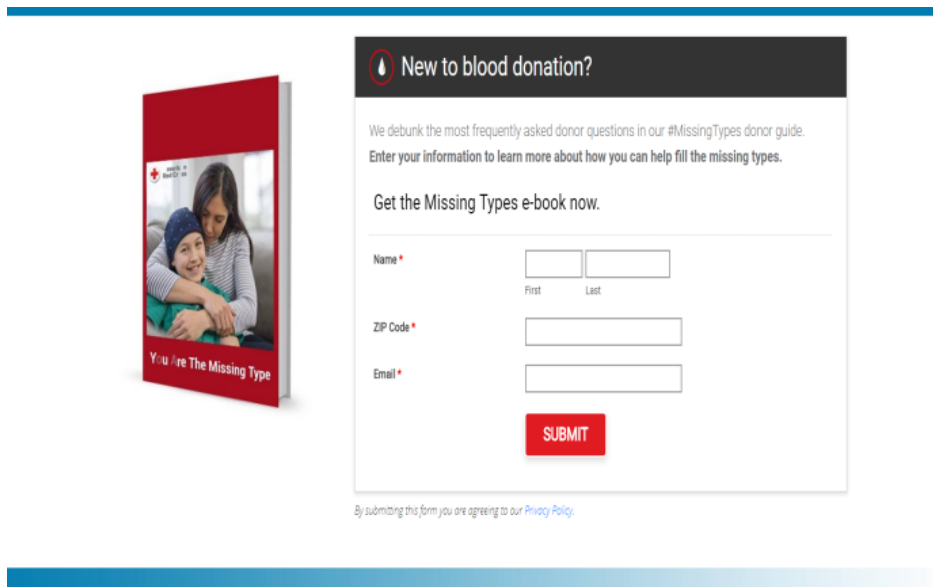


Figure 1. Redcross Homepage for registration

4. PROPOSED SYSTEM

Red Wings Application aims on providing a platform for users to find blood in case of emergency situation. It helps the users of the application to locate a particular donor of a required blood group type in the vicinity of 10 kilometers. Both the actors- the donor and the needy, must be registered as users on the application. While registering, he/she should provide his/her basic details like name, age, gender, contact number, his/her blood group type. The needy simply needs to give the required blood group and should make sure that his/her gps is switched on. After giving information about the required blood group type, the system will generate a list of all the users with that particular blood group type in the needy's vicinity. This list will be provided to the needy. (Barton)

The needy can therefore request any of the mentioned donors to donate blood. Blood banks are also incorporated in the application. The list of donors is obtained by performing data mining operations in such a way that the first donor in the list will have the highest probability of donating blood. This probability is calculated according to the history of the users. Apart from that, the user won't be able to donate blood if he/she has already donated blood in the past 2 months. If any user accepts the request of the needy to donate blood, the user can live track the donor to get more updates on his location and estimate his/her reaching time.

4.1.Registering User

Like every other mobile application, the user is first supposed to register with the application in order to donate blood/request someone for donation. A form is supposed to be filled by the user, which includes details like Name, Gender, Blood Group, address and other contact details. After registering with the application, the user can login using Email Id and Password. Each time the user logs in, he/she is asked whether the user wants to request for blood or donate blood depending upon the requirement of the user. One user can also link people belonging in his/her family. (Wosh) Thereby increasing the dataset required to study various factors for the application and also increasing the probability of finding a suitable user.

Figure 2. Registering new user

4.2.Request for a particular blood

When the user is logged in, he/she is supposed to provide the current location where the blood is required and the type of blood group required. After that, the application uses the location provided by the user and compares the location with other users registered on the application and the required blood group. This can enable other people who are not actually present at the location where the blood is required to be able to request for blood. Thus increasing the dynamic nature. The application will perform data mining operations and give a list of all the donors in the vicinity. The application records the behavior of the users. Users who's probability to donate blood is very high will be shown first and they will be willing to donate blood. This calculation depends on their past donation history which is used to determine if he/she will be willing to donate blood or not. In this way, the fake or zero active users will be filtered out. The filtered list of donors will be displayed on the application for the needy to contact them and check if they are willing to donate blood

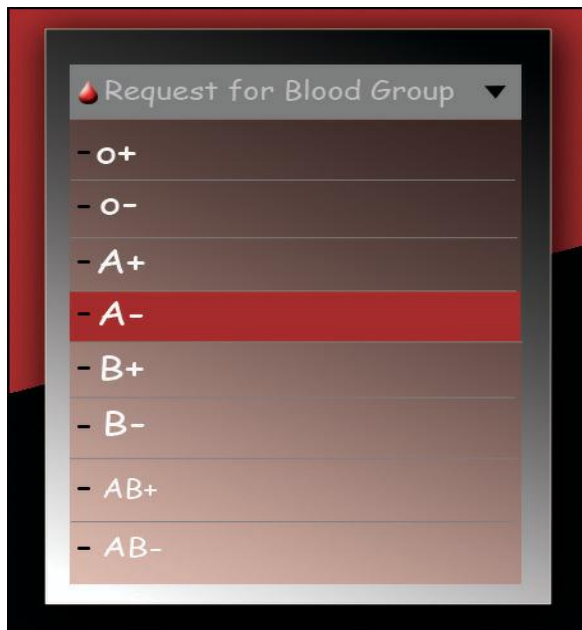


Figure 3. Requesting for a blood group

4.3. Filtering Donors based on their past history

One of the conditions that should be kept in mind while going for blood donation is that it should be made sure that the volunteer hasn't donated blood in the last 2 months. This application uses the very important condition as one of the filtering criteria. (Barton) As there is no point of showing the users as one of the potential donors if he/she has already donated blood in the past 2 months. Thus using data mining for applying this filtering criterion makes the application more effective and less redundant. Another important feature added in this application is maintaining the past blood donation history of every registered user. The idea is to display the list of users in the order of best fit to least fit. So the first person in the list displayed might be more willing to donate blood than the others in the list. This calculation of probability is possible by considering if the user has actually donated blood or not.

4.4. Live Tracking of the Donor

After the list of filtered donors is extracted from the data mining process depending on various factors such as user's past history, probability of him/her donating, an in app notification is sent to all the filtered donors. Here the donors, which have already donated blood in the last 3 months, are already filtered out. The notification includes needy's name, location provided during the request, contact details and the blood group required. The filtering of all the donors is done using K Near Algorithm. The donors are filtered according to their location and not blood group for referral purposes. (Wosh) The user who is registered and in the vicinity might not have the required blood group but can refer someone else who is willing to donate but not registered on the application. In addition, if the registered user is not of the same blood type but one of his/her family members is of the required blood group, he/she will still receive the notification of needy. The donor has two options of either accepting the request to donate blood or decline the request. If the user accepts the request, a push notification is sent to the needy to notify that there is a donor available. The needy then gets the contact details of the user that has accepted his/her request and the needy can

actually track where the donor is. Because every minute counts. The needy gets a gist of when the donor will arrive at the location where blood is needed.



Figure 3. Tracking of Donor via GPS

The application successfully connects users who are willing to donate blood with users who are in need of blood in an emergency in the vicinity of 10 kilometers. Data mining makes the process of finding donors quicker and gives an efficient list of users willing to donate blood. In addition, the live tracking system of the donor makes the application more dynamic. (A.A.)

4.5. Collaboration with Blood Banks and Hospitals

Apart from displaying the list of donors, the application also displays the list of all the nearest blood banks. Global Positioning System will be used to curate the list of nearest blood banks. (Wosh) The blood bank's current availability of blood types should be shown to the user. This data will be dynamically linked with the database of the blood banks, which will contain all the information related to the stock currently present.

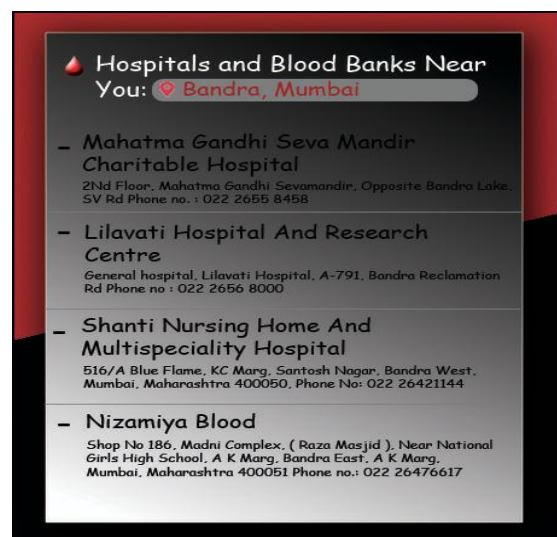


Figure 4. List of nearest Blood Banks in the vicinity of 10 kms

5. CONCLUSION

The application being user friendly helps finding the donors quicker which is very helpful in an emergency situation. As most of the people use smart phones nowadays, the application can be implemented at a higher scale increasing the availability of the donors hence making the process more accurate. The system provides a better, faster and effective way for the users to communicate with the blood donor in a medical situation. Thereby increasing the chances of saving patient's life especially in areas where hospitals and blood banks are very far.

This would turn out to be a life savior application which would reach out to all the needy users in the time of emergency. Blood banks can also notify users about the availability of the blood types when a user requests.

6. ACKNOWLEDGEMENT

I would like to thank Prof. Urvi Kore for her support and guidance without which I would have been unable to develop this project. I would also like to thank Dr. Tanuja Sarode, Head of the Computer Department, Thadomal Shahani Engineering College and Dr. G. T. Thampi, Principal of Thadomal Shahani Engineering College for their support.

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