

# Usage of Machine Learning in management of the Blood Donation System: A Review

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**Abstract**—Blood donation is a noble cause which can be helpful in saving a lot of lives all across the globe. There is always requirement and need for blood in blood banks as blood banks cater to victims and patients with the high frequency every day. This leads to constant requirement for the available blood types which need to be fulfilled by a particular Donor of the same blood type. As there are very less donors that actually want to donate the blood they need to wait it a certain time period before they can donate blood again. This donation frequency is highly inefficient as different individuals have different requirement for the wait time. Therefore there is an urgent requirement of a system that can effectively predict the blood donation interval for individual with high accuracy. For this purpose related researchers have been analyzed and studied to achieve an effective methodology for blood donation interval estimation through the use of X means clustering, Kendall rank correlation along with artificial neural networks and decision tree. This approach will be further elaborated in the upcoming editions of this research.

**Keywords:** X means clustering, Kendall rank correlation, artificial neural networks and decision tree

## I INTRODUCTION

A good health is a cornerstone of a fulfilling life for every individual. Health is one of the critical components that need to be maintained in perfect condition for enjoying the various stages and steps in life. There are various viruses' bacteria and other influences that can be detrimental to an individual health. There has been constant struggle in maintaining an efficient technique to maintain the health of an individual. The health of an individual is maintained through the implementation of various approaches in the medical field.

The medical platform has been critical in achieving various fields such as eradication of diseases and achieving milestones in trauma treatment. Most of the problems faced by the human race are related to Lifestyle related choices and mishaps such as accidents and other traumas. This by far have the largest impact on an individual which can be highly difficult from Medical point of view to be treated. The advances in the medical field have been effective in achieving and improved lifestyle for this individual.

Various individuals going for treatment for blood related problems or accidental victims usually lose a lot of blood. The blood is an irreplaceable part of our body and cannot be synthetically produced by any procedure as yet. This makes blood a valuable resource that is highly useful for saving such victims and their life. The only source of blood is from a healthy individual that donate the blood for effectively providing the affected individual or the victim. Therefore donation of blood is highly encouraged in individual that are healthy as there is always lack of blood in the blood banks and hospitals all over the globe.

Healthy individual can donate blood which can be used to save a life of a patient suffering from various illnesses or a victim of an accident. The individual can only donate specific amount of blood according to his or her health and can only do it after waiting for a period of time. Please wait periods between donations are essential to ensure that the person has produced The Lost blood and can donate again without any ill effects to the donor. But as every individual's bodies are different there are different times that are confined to individuals regarding the recovery of the Lost blood that is donated.

As the blood is a valuable resource and the healthy individuals can generated easier and faster but have to wait for the prescribed waiting time can lead to various losses. This reduction in the efficiency of the blood banks can lead to a lot less blood coming in for utilization for victims. Therefore there is the need for an effective system that can intimate and individual the next blood donation time that is customized for their body type. For this purpose a collection of researchers

have been identified and studied in this article which has helped reach our conclusion for such a system.

This literature survey paper dedicates section 2 for analysis of past work as a literature survey, and finally, section 3 concludes the paper with traces of future enhancement.

## II RELATED WORKS

R. Ali states that there should be a controlled system that can manage all the blood donations and the transfusion processes. [1] All the information should be stored in a central database. The proposed paper implements uncontrolled blood banks and parallel markets, raise awareness, and support confidence. To avoid uncontrolled donation processes from infected donors the donor's data should be registered in the system and also in blood banks and campaigns. Thus the framework helps blood banks and donors to save the lives of the patients through a controlled system.

A. Meiappane explains the quantity of blood benefactor is less in different nations. There are a lot of blood donation camps that provide but cannot provide the proper service to the needy. [2] Thus the proposed framework came with the solution by developing Haversine Mathematical formula and by benefactor detail of the donors. Whenever a donor donates the blood it will naturally evacuate the contributor detail for the next three months. After this the application searches for the nearest donor accessible by using a haversine mathematical algorithm. The main aim of the paper is to provide the required data in less time.

M. Fahim describes the health sector as growing very fast but the facility provided to people is not good. [3] In the health sector, the compatibility of blood group with the patient with the donor is very complex. Thus the researcher developed android based blood donation application as a solution to build the connection between the requester and donor at anytime and anywhere. The main aim of the author is to show the requester the number of owners available in his localities. The system architecture is divided into three sections such as volunteer blood donors, cloud computing, and blood requester.

D. Domingos explains to supply the blood demand in the world a strong need for actions is to be implemented. [4] To increase the number of blood donors many countries apply different strategies such South Africa created Club 25, Ghana created the national blood policy which regulates the blood donation and transfusion process and also seeking to educate, motivate, recruiting and keeping young blood donors. The proposed paper implemented an application,

named 'Blood Hero' by using the 'gamification' concept where users are rewarded by social acts after donating blood.

F. Alharbi narrates that to save lives the healthcare systems rely on blood donation, thus blood donation is the main source of blood supply in many countries. [5] The proposed paper provides information technology solutions after analyzing the blood cycle of the donor. This analysis is done under the Central Blood Donation Management System (CBDMS) is proposed with interconnected systems. It was the first e-management system for blood donation management. The time required for blood donation is reduced by the implementation of CBDMS just by decreasing the information collected from the donors. The efficiency of the blood donation management system is improved by the proposed system.

L. Evdochim states by using various force sensors the flow rate estimation are implemented in the existing systems for blood donation. The proposed paper implements the PPG-based blood flow rate estimation method. Photoplethysmogram has abbreviated PPG it is an image of blood flow changes in the human body. [6] The photoplethysmogram theory is dependent on two requirements the first is to involve that the examine substance or specimen to be distinguished from the surrounding environment by optical properties and the second one needs the specimen to be in motion or other says its local distribution needs to evolve in time.

A. Mantari aims to design a framework for the willingness of the participants to be a blood donor. And to know information about blood donation and its benefits. [7] Thus by providing this information participants as blood donors can be motivated and this technique is for raising awareness before blood donation campaigns on university campuses. In the proposed paper the questionnaire is designed with the help of the collection of information based on the public's opinions on blood donation. The reason behind this is to provide awareness before blood donation.

P.KIRCI describes for human survival in risky situations blood transfusion has critical importance. Thus by using the many machine learning approaches the number of possible donors and blood donation probabilities can be determined [8]. Algorithms in machine learning assist blood transfusion technique using datasets. To find patterns in large-scale data Machine learning technique is used. By using the available data algorithms complete the task of learning and machine. One of the best successful classification algorithms was compared on the blood transfusion data set on basis of the performance.

M. Kamalesh narrates basically when blood camps are conducted blood donation is referred to as donating the blood. Blood is one of the most crucial and important elements of human life. Getting the blood in an emergency is very hard

[9]. The proposed paper finds an easy way for finding the donor who is nearby the location which can assist in an emergency situation. If the person in need of any blood he can raise a request through a Website or Mobile application then the request is transferred to the person matching with the matching blood group in a nearby location.

L. Evdochim explains that photoplethysmogram is one of the most effective techniques that can be used for identifying cardiovascular tissues. This technique can also be used for the effective identification of the rate of blood flow with high accuracy. The blood flow rate can be effectively utilized for identification of various diseases and other inconsistencies in the heart [10]. The accuracy of the technique is highly based upon the wavelength and the optical reflectance of the light source. Therefore this research article has utilized this photoplethysmogram technique to achieve highly accurate blood flow rate identification which can be useful in determining various inconsistencies and arrhythmias with ease.

### III CONCLUSION AND FUTURES COPE

The paradigm of blood donation is highly inefficient where there is lack of automation in the approach. There have been multiple researches that have been performed to identify the donation interval for blood donors with varying levels of accuracy. As most of the blood banks all over the world do not have an extensive system for the purpose of maintaining and identifying individual blood donation frequency this makes the whole process highly inefficient. This inefficiency can lead to a loss of a lot of lives which can be attributed to the vague blood donation interval that doesn't regard personal parameters of the donor. For this purpose related researches have been evaluated in this research article to achieve our methodology through the use of machine learning approaches which will be detailed in the next research article on this topic.

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