

Lecture Notes in Networks and Systems 971

Rajesh Kumar
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Om Prakash Verma
Tanu Wadehra *Editors*

Soft Computing: Theories and Applications


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Lecture Notes in Networks and Systems

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Preface

This book serves as a catalyst for discussions on a myriad of emerging trends, innovations, practices, and applications within the realm of soft computing. Encompassing fields such as Image and Signal Processing, Network Security, Supply Chain Management, Computational Biology and Bioinformatics, Human Resource Management, Finance and Economics, Internet of Things (IoT), AI for Smart City, AI for Healthcare System, Machine Vision, Remote Sensing and GIS, Aircraft Sensor Management, and Multidisciplinary Aerospace Design, it offers a comprehensive overview of the latest advancements.

We take great pleasure in presenting this compilation of research papers, which were originally presented during the three-day International Conference on Seventh International Conference on Soft Computing: Theories and Applications (SoCTA 2023). The conference was held at the IIIT Una, Himachal Pradesh, India, in hybrid mode, in technical association with Dr. B. R. Ambedkar National Institute of Technology Jalandhar, Shobhit Deemed University Meerut, and supported by the STEM Research Society.

It is our hope that this endeavor will prove both informative and engaging for those interested in the technologies addressing the challenges posed by the exponentially growing information in the core and allied fields of soft computing. This book is intended to be beneficial to young scholars and researchers working in the related domains. We extend our gratitude to the authors of the research papers for their invaluable contributions to the conference and for illuminating significant research and literature across the field of soft computing.

By offering valuable insights into soft computing for young scholars, researchers, academicians, and industrialists alike, this book aims to inspire further research in this dynamic field. We extend special thanks to the reviewers, Springer Nature, and the team for their invaluable support in the publication of the proceedings. With great enthusiasm, we eagerly anticipate bringing together researchers and practitioners in the field of soft computing year after year to explore new avenues in the field.

We eagerly anticipate the Ninth International Conference on Soft Computing: Theories and Applications (SoCTA 2024), scheduled for December 27–29, 2024, at the MNIT Jaipur, India, with a special focus on Ethics in Artificial Intelligence.

Jaipur, India
Haugesund, Norway
Jalandhar, India
Una, India

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An Extensive Review on Designing of Blood Bank Management System



Rahul Chauhan, Anant Kumar Neelkanthi, and Chandradeep Bhatt

Abstract As the increasing cases of accidents and illness in India, people required blood in every second of the day. Despite the large demand of blood in every corner of the country, only 5% of the Indian population donates blood. Even after this small part of donation many needy people are not able to get the blood at the right time. Blood Bank Management System stores the basic information of donor and the patient. It stores the basic information such as type, address, and other necessary details. It also stores the details of the patient and number of blood bags required by the patient. It also stores the quantity of blood bag stored in the blood bank. Then in website it will show the details of the donor, and according to the requirements of patient, patient can contact to the donor.

Keywords Accidents · Illness · Blood · Management · Patient · Donor

1 Introduction

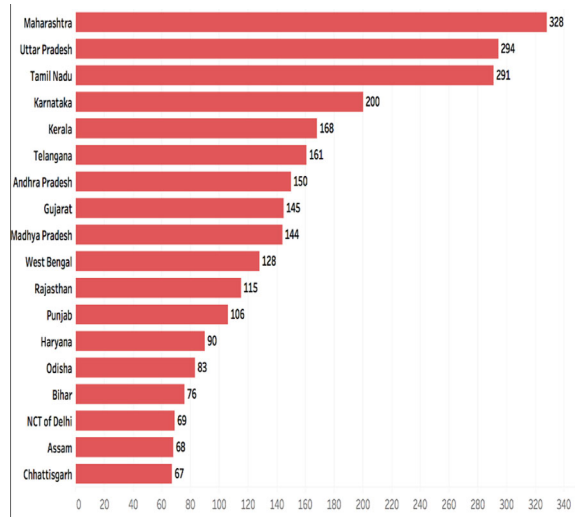
Blood is a life-sustaining fluid that is used to carry oxygen and essentials nutrients to various parts of the body. In order to survive, according to studies 7% of body weight is contributed by blood, and in every second, lot of people are counting their last days because they do not have blood in their bodies [1, 2]. Over 14 million blood transfusions are carried out annually, from the Centres for Disease Control and Prevention. In hospitals, transfusion is a procedure in which we are injecting new blood into someone instead of its own because of his/her illness. 1 out of 14,000 transfusion there is a case of mis transfusion- in which patient receive the wrong blood type [3].

India shows the tremendous growth in collecting and distributing the blood to the several hospitals across the India. Despite this expansion, there is a 1.92-million-unit blood shortage [4]. We proposed to construct a database framework to bridge the separation between the donor and the patient in order to solve this issue. The term

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Fig. 1 Number of blood bank in each state of India



“Blood Bank” means to the medical laboratory where blood is being stored from blood donation and where legitimate testing is performed to decrease the case of mistransfusion-related events. The project gives a stage, which utilizes the data about the donor that is accessible for the requester asking it. The paper includes brief information about working with the Blood Bank Management System. Figure 1 shows that how states are developing blood bank in their respective places to overcome the problem of blood disease in their places.

The entities included within the Blood Bank Management System are:

- Patient: The person who have accident or any blood-related problem requires blood.
- Donor: The person who have appropriate body weight, haemoglobin, and no acute or chronic disease can become the donor.
- Blood Bank: Blood bank can be basically characterized as an area of the blood bank where the blood is stored and tested, to decrease the chance at the time of transfusion.

Figure 2 shows how many people are donating blood across the world. India is in the second place after Saudi Arabia to donate blood, and this will help in India to overcome the problems related to blood.

Table 1 shows the various platforms and languages used in database created for the Blood Bank Management System worldwide. As shown from table the preferred language is SQL, and also MongoDB has been used extensively.

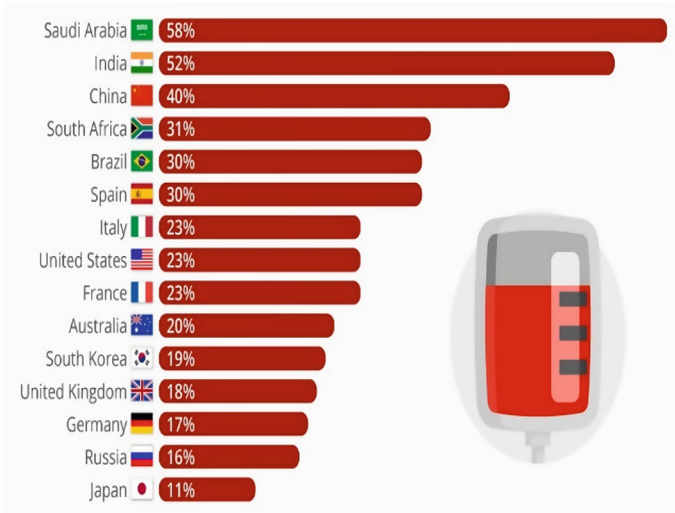


Fig. 2 Number of donors per country

Table 1 Languages used in database

Database	Type	Language
MySQL	Relational	SQL
Oracle database	Relational	SQL
Microsoft SQL server	Relational	SQL
MongoDB	NoSQL	JSON-like

2 Literature Survey

There are so many approaches that have been proposed to create a Blood Bank Management System. Few of the approaches from the past are described below.

2.1 Development of a Blood Bank Management System

Presented system of blood bank utilizing HTML, CSS, and JavaScript for front-end [5], using MySQL for SQL database. The strategy utilized to construct system uses Rational Unified Process (RUP). In this methodology in case there are any changes in the requirements given by the Pathology Division can be alter in next iteration of certain phase.

2.2 Blood Bank Management and Inventory Control Database Management System

This methodology [4] is the effective gap between the blood bank, donors, and Patient there's distinctive database for all three and assist partition the database to decrease the chances of irregularity of information and expanding the productivity of database.

2.3 Effective Blood Bank Management Based on RFID in Real-Time Systems

This strategy uses [3] Radio Frequency Identification and Detection (RFID). RFID is a technology that uses radio waves frequency to recognize the labelled object. If donated blood is infected, the message is passed to the donor through RFID tag and RFID data is updated so that it can be reused; if it is not affected, then it goes to the blood bank. After that through RFID tag, it checks the requirement of patient and does the work accordingly.

2.4 Computerized Central Blood Bank Management System (CCBBMS)

Agreeing to the National Blood Transfusion Centre NBTC [6] of Khartoum-Sudan, the most movement in blood bank is the enrolment of the donor. There are many details of donor which are submitted in form manually; this increases the chances of problems and errors. To overcome this problem system uses PhP language and Microsoft MySQL database, which runs on window-based operating system.

2.5 Web Based Blood Donation Management System (BDMS) and Notifications

All the data given by the donor is transferred by administrator in the system [7] and assigns unique identity to the donor. It can be fast and accurate to search the donor according to its unique identity. It also saves the time and money.

Table 2 Major contribution in Blood Bank Management System

S. No.	Year	Author	Methods
1	2014	Adarsh N, Arpitha J, Md. Danish Ali, Mahesh Charan N	Radio Frequency Identification (RFID)
2	2015	Sumazly Sulaimana, *, Abdul Aziz K. Abdul Hamida, Nurul Ain Najihah Yusria	Rational Unified Process (RUP)
3	2018	Mohammed Y. Esmail Yousra Sayed Hammad Osman	Uses PHP language and Microsoft MySQL database
4	2018	B.M. Shashikala, M.P. Pushpalatha and B. Vijaya	Administrator gives unique identity to the donor
5	2019	Mr. Shreyas Anil Chaudhari and Ms. Shrutika Subhash Walekar A. P. Shah	Used cloud computing technology Platform-as-a-Service (PaaS)
6	2022	Aman Shah, Dev Shah, Devanshi Shah, Daksh Chordiya, Nishant Doshi, Rudresh Dwivedi	Different database for all three and further divide the database

2.6 A Secure Cloud Computing-Based Framework for the Blood Bank

Utilized cloud computing innovation within/the application, because cloud is latest and provides good backup, flexibility according to the users and increases the security in the system. It uses Platform-as-a-Service (PaaS) for creating the cloud platform [7] (Table 2).

3 Methodology

Figure 3 demonstrates that how will be the basic structure of the Blood Bank Management System. How different-different users will be connected to the database. The research methodology was built up with the problems based on data gathering; identification of correct blood is given to the patient; and ask for blood when required by any patient. When donor want to donate blood to any blood bank, he/she will visit the website of that blood bank. If they are existing users then through there username and password which will be unique for every user (Fig. 4), they can login into the website. If not, they must register themselves according to the details like name, age, sex, contact no., blood group, and address of the donor.

After the donation of blood, blood bank will examine the blood in their laboratory to check the condition of blood and generate the report of the examination of the blood. This report can be accessed by donor through their login credentials [8]. If the blood is in good condition, then it will be stored in blood bank and record of that will be stored in the database. Only admin can access the blood bank database with admin’s login credentials and demonstrated in Fig. 5

Fig. 3 Basic architecture of Blood Bank Management System

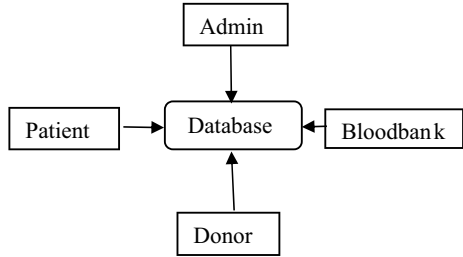


Fig. 4 Login page

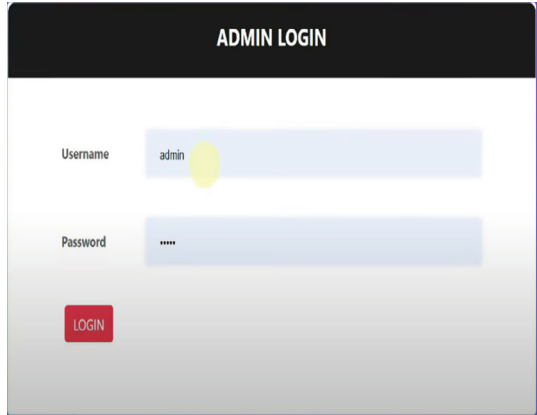
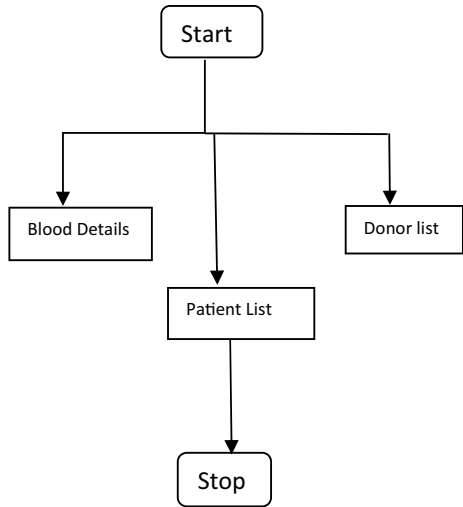


Fig. 5 Admin login page



If the user is the patient, he/she will fill the patient form and specify the blood he/she want. If the blood is available, he/she will get acknowledgement for that; otherwise sorry message will be displayed. Admin can see how many donors donated the blood and how many requests are there for the blood. Apart from this admin can also see the details of the patient as well as the details of the donor (Figs. 6, 7, and 8).

The request made by patient for the blood will be accepted or rejected based on the total availability of that blood group [9]. The admin will acknowledge the request of the patient and change in the database accordingly.

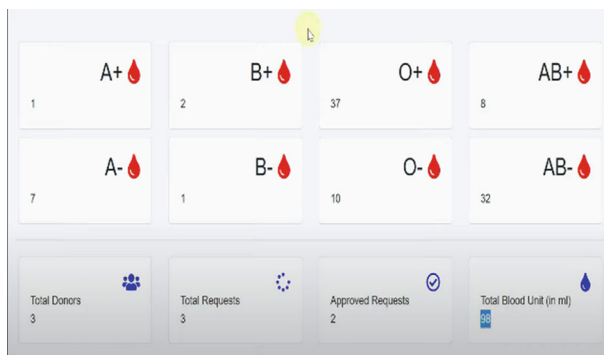


Fig. 6 Blood details display portal

Blood Requested							
Patient Name	Age	Reason	Blood Group	Unit (In ml)	Date	Status	Action
prashant	22	fever	O+	90	Feb. 20, 2021	Pending	Approve Reject
shubham	23	fever	A-	78	Feb. 20, 2021	Pending	Approve Reject

Fig. 7 Patient list displaying the active and pending request of blood for the patient

BLOOD DONATION DETAILS

Donor Name	Disease	Age	Blood Group	Unit	Request Date	Status	Action
sumit	Nothing	24	O+	7	Feb. 14, 2021	Approved	7 Unit Added To Stock
sumit	Nothing	24	B+	3	Feb. 14, 2021	Rejected	0 Unit Added To Stock

Fig. 8 Patient list displaying the donor request of blood for the patient

4 Conclusion

The blood bank plays very crucial role in ensuring effective operation of blood bank. With the improvement in technology many processes became automated. Blood Bank Management System can automate the process such as collection of donor information, collection of blood, testing of blood [8, 10], and other operations which are handled by the admin. Automation reduces the errors done by humans. One of the primary benefits of blood bank system is to maintain up-to-date inventory of blood units and track of blood units. A well-implemented Blood Bank Management System is a valuable tool for blood banks to enhance operations, safety of their patients and donors, and optimization of resources. Automated process will reduce the human errors which will be beneficial for our healthcare sector.

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Ensemble Models for Vulnerability Prediction Using Code Metrics



Purushottam Tiwari, Zope Sumedh Murlidhar, Amrita Chaturvedi,
and Shashank Kumar Singh

Abstract Software vulnerabilities are glitches or flaws that can be exploited by attackers to gain unauthorized control over systems. As such attacks can cause disastrous incidents related to information security, it becomes important to detect these vulnerabilities in code as early as possible. There have been multiple efforts towards building vulnerability prediction models (VPMs) using static string analysis and text mining in early 2000s. Those analysis tools were mostly some glorified forms of the famous regex tool grep. In this paper, we present a novel ensemble-based classification architecture that uses a stacking of advanced probabilistic machine learning classifiers to predict software vulnerabilities at project-level granularity. We have used static software metrics as features along with feature selection and have achieved much higher accuracy and precision scores than existing state of the works that use ensemble models for vulnerability prediction. Unfortunately, there was no suitable large-scale code metrics dataset present for C/C++ to the best of our knowledge. As part of this study, we have also created a large software metric dataset from projects and vulnerability testcases available on Software Assurance Reference Dataset (SARD) and made it publicly available for further research.

Keywords Automatic vulnerability prediction · Code metrics · Ensemble models

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