



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 4, April 2025

Blood Group Detection using Fingerprint

Punam Bagul, Saurabh Chauhan, Ishwari Deshmukh, Akshita Nair, Tannu Roy

Assistant Professor, Department of Information Technology, K.C College of Engineering, Thane, Maharashtra, India

Student, Department of Information Technology, K.C College of Engineering, Thane, Maharashtra, India

Student, Department of Information Technology, K.C College of Engineering, Thane, Maharashtra, India

Student, Department of Information Technology, K.C College of Engineering, Thane, Maharashtra, India

Student, Department of Information Technology, K.C College of Engineering, Thane, Maharashtra, India

ABSTRACT: Fingerprint Blood Group Detection is novel and effective approach where a person's blood group is identified on the basis of characteristic patterns of that person's fingerprint. Finger print is anything particular to everyone and remains even if the individual passes away. Finger print based identification is one type of technique wherein ridges and valleys on fingerprints are taken in order to detect accurately, since every human possesses unique little details. Each fingerprint is distinct and different for an individual, even for twins. Fingerprint is the conventional technique employed for all analysis even for court laws due to its uniqueness. This method employs image processing for promising and accurate results. This method is premised on the discovery that antigens of blood group also appear on the sweat glands of fingers so that an individual's blood group can be surmised based on his/her fingerprint. The method is that a clear fingerprint image is obtained and analysed on the basis of its unique patterns by applying state-of-the-art imaging technology and algorithms. Detection of blood groups via fingerprints is promising as a cost-effective and easy technique for detecting blood groups with future uses in medicine, forensic medicine, and emergency response situations. In summary, this technology is a promising medical innovation that could potentially change the way blood types are identified and handled.

KEYWORDS: Blood Group Detection, Fingerprints, Deep Learning.

I. INTRODUCTION

The most dependable and distinct characteristic of human identity is the fingerprint pattern. The fingerprint pattern cannot be altered and stays as it is until death of a person. Until now in the case of events considerations fingerprint evidence is regarded as most crucial evidence even in court or law. The minutiae pattern of every human is unique and the probability of having similarity is very rare almost one in sixty-four thousand million. The minute pattern is also different for twins. The ridge pattern is unique and doesn't change from birth of person. The blood test, which is done using needle to infuse the blood is mixed with antibodies for desired result that charges money. There are three types of fingerprint plans present in fingers are Loops, Whorls, Arches which is commonly believed and is practically present around 65%.

II. LITERATURE SURVEY

[1] Classical Techniques: MedlinePlus.gov records the classical slide test procedure, which requires combining a blood sample with antisera and inspecting agglutination visually. It is cheap and rapid (5–10 minutes), making it effective for standard tests. It is, however, subject to error due to dependence on human inspection, particularly in borderline situations or poor illumination.

[2] Image Processing Algorithms: To reduce human error, Md Rabiul Islam et al. presented an image processing-based technique that measures the standard deviation of pixel intensity. Agglutination is indicated if it surpasses a certain threshold. The method enhances objectivity and automation but involves technical knowledge of image analysis. S. M. Nazia Fathima put forward a semi-automated microscopic technique employing histogram equalization and colour segmentation. Whereas this improves accuracy in image analysis, it is labour-intensive and requires trained staff, which restricts its scalability in large-volume labs.

- [3] Gel Test with Automation: Enes Ayan and Erdem Kamil Yildirim investigated a gel test-based method that uses centrifugation and image processing. This combination method improves accuracy and minimizes manual steps. It relies, however, on specialized lab machinery such as gel cards and incubators, and so is costly.
- [4] Embedded and Low-Cost Automation: Anurag Sadashiv Phad et al. used a Raspberry Pi-3 system in conjunction with image processing (morphology, thresholding, segmentation). This system is capable of digital output, automation, and possible integration with mobile apps. The drawback is the upfront cost of hardware, which might not be an option for under-equipped facilities.
- [5] Advanced Machine Learning & Computer Vision: Marife A. Rosales and Robert G. de Luna suggested a method based on machine learning that was 97.77% accurate. The model, by applying segmentation and classification, was successful in identifying blood groups with a low number of inputs from users. Nevertheless, it requires large sets of training data and computational power. Likewise, Neve et al. stressed the efficiency of machine learning algorithms in enhancing detection speed and accuracy, but recognized reliance on data quality and model training.
- [6] Non-Invasive Detection Techniques: Current advancements are centred on non-invasive techniques. B. Sasidhar et al. and R. Manjunath Prasad et al. employed spectrophotometry and NIR sensors to identify blood types without physical samples, minimizing infection risk and discomfort. These techniques, as encouraging as they are, are subject to sensor availability and calibration issues. S. D. Sahane and U. M. Chaskar showed that infrared sensors can be used to detect blood groups, with the advantage of rapid, painless detection. Their sensitivity, however, is prone to environmental changes.
- [7] Colour Image-Based Detection: A. Yamin et al. proposed an image processing method based on the analysis of color images of blood samples. It provides automation and minimal user intervention but is image quality and lighting-sensitive during capture. B. Panjavarnam et al. further established the usefulness of non-invasive image-based techniques, showing rapid results without sample extraction. Nevertheless, the need for specialized imaging equipment can be a limitation.

III. PROPOSED METHODOLOGY

PROBLEM STATEMENT

Detection of blood group via fingerprint through deep learning is a pioneering method that takes advantage of image processing and machine learning development to forecast and determine an individual's blood group from their fingerprint pattern. Conventional blood group detection methods include blood test analysis, which may be invasive, time-consuming and need to be done using specialized equipment. This new technique seeks to offer a fast, non-invasive and accessible method by examining the characteristic fingerprint peculiarities.

FLOWCHART

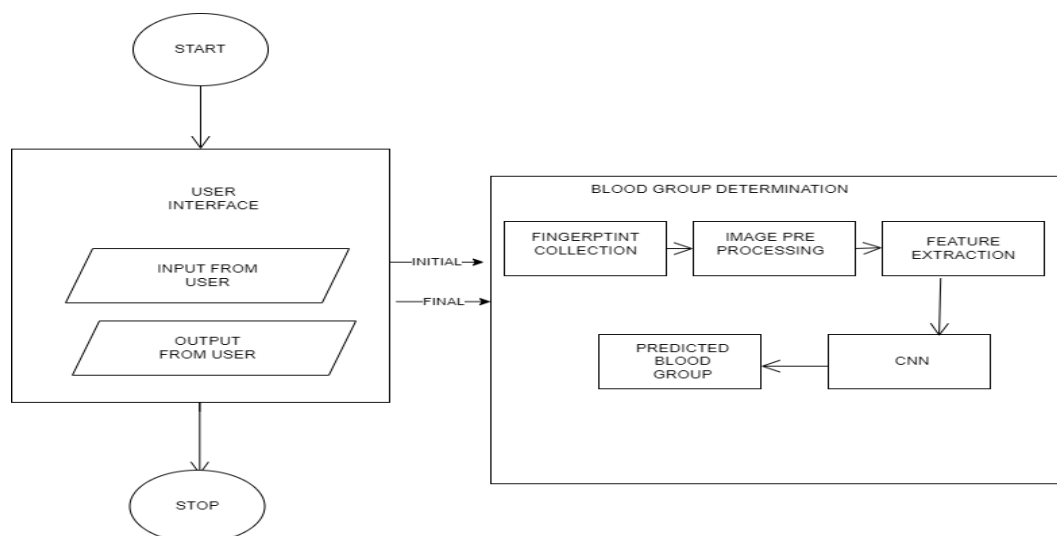
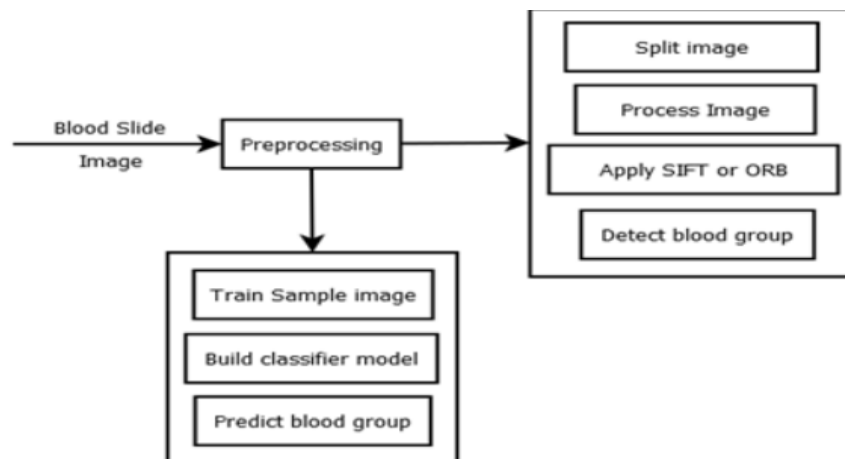


Fig: System Flow Chart

ALGORITHM

- Step 1: Start
- Step 2: Data Acquisition
- Step 3: Data Preprocessing
- Step 4: Train-Test Split
- Step 5: CNN Model Design
- Step 6: Compile the Model
- Step 7: Model Training
- Step 8: Model Evaluation
- Step 10: Deployment Pipeline
- Step 11: End



Architecture Diagram

DATASETS USED

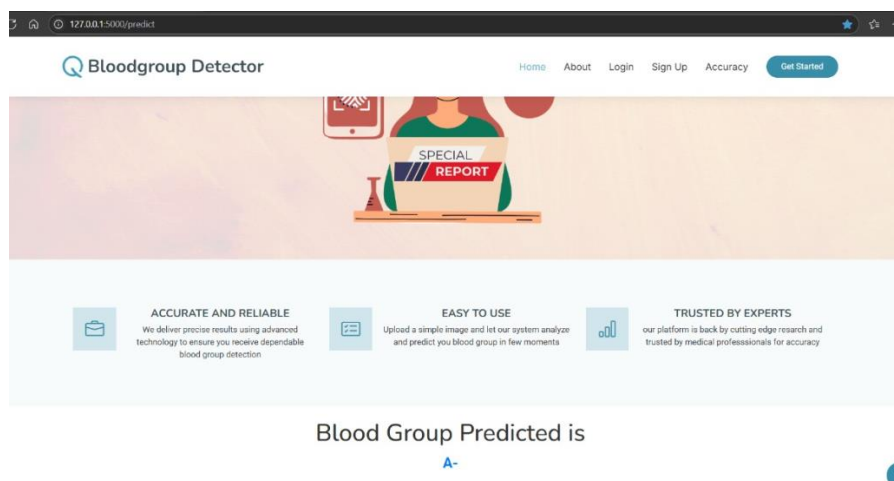
<https://www.kaggle.com/datasets/rajumavinmar/finger-print-based-blood-group-dataset> [1]

<https://www.kaggle.com/code/grohith/blood-group-detection-using-image-processing> [2]

<https://iee-dataport.org/documents/n-bgp-noninvasive-blood-group-prediction-dataset> [3]

IV. RESULTS





V. CONCLUSION

This work proposes a new method for the prediction of an individual's blood group from fingerprint images through the power of Convolutional Neural Networks (CNNs). The system offers a non-invasive, quick, and entirely digital solution for blood group classification, which can be of great benefit in situations where conventional testing is not available or not feasible. With efficient data preprocessing, training of the model, and real-time deployment approaches, the proposed system is seen to have potential to be integrated in portable low-power devices like smartphones or Raspberry Pi units. This is consistent with Green IT concepts by keeping the computational overhead minimal, less dependent on physical medical resources, and ensuring sustainability for AI-based healthcare solutions. Whereas the system records promising results, note that it should be treated as a non-biologically-deterministic, data-based model. For that reason, it ought to serve as a support tool only, not in lieu of the standard medical procedures.

REFERENCES

- [1] MedlinePlus.gov, "Blood Typing", [Online]. Available: <https://medlineplus.gov/ency/article/003345.htm>. [Accessed: Apr. 10, 2025].
- [2] Md Rabiul Islam, M. N. Islam, M. R. A. Bhuiyan, and R. Sharmin, "Automatic Blood Group Detection Using Image Processing", *International Journal of Computer Applications*, vol. 179, no. 7, pp. 6-10, Dec. 2017.
- [3] S. M. Nazia Fathima, "Automated Blood Group Detection Using Microscopic Images," *International Journal of Engineering Research & Technology (IJERT)*, vol. 9, no. 4, pp. 563-566, 2020.
- [4] E. Ayan and E. K. Yildirim, "A Novel Image Processing Based Approach for ABO and Rh Blood Type Detection," *Biomedical Signal Processing and Control*, vol. 56, pp. 101696, 2020.
- [5] A. S. Phad, A. K. Godse, A. R. Kshirsagar, and P. K. Kshirsagar, "Smart Blood Group Detection Using Raspberry Pi 3," *International Research Journal of Engineering and Technology (IRJET)*, vol. 6, no. 3, pp. 3129-3133, 2019.
- [6] M. A. Rosales and R. G. de Luna, "Computer-Based Blood Group Identification Using Image Processing and Machine Learning," *International Journal of Advanced Trends in Computer Science and Engineering*, vol. 9, no. 3, pp. 3650-3655, 2020.
- [7] B. Sasidhar, S. S. Kumar, and G. Kiran, "Non-Invasive Blood Group Detection Using Spectrophotometry and Image Processing," *International Journal of Engineering Research and Technology (IJERT)*, vol. 10, no. 2, pp. 78-83, 2021.
- [8] R. M. Prasad, P. Sridhar, and N. C. Kiran, "Blood Group Detection Using Near Infrared Spectroscopy," *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, vol. 9, no. 12, pp. 452-455, 2020.
- [9] S. Neve, T. Patel, and A. Mehta, "Machine Learning Model for Blood Group Prediction," *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, vol. 6, no. 2, pp. 123-128, 2020.
- [10] A. Yamin, H. R. Chaudhary, and M. A. Khan, "Image-Based Blood Group Detection Using Color Analysis," *International Journal of Computer Applications*, vol. 182, no. 26, pp. 5-9, 2019.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details