International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Care Track: Personal Patient Healthcare Android Application

Ms. Evangeline Aiswarya. S[1], Bharath Kumar I[2], Rathish Y[3], Soumeshver M[4]

[1]Faculty of Information and Technology, United Institute of Technology, Tamilnadu- 641020, India. ievangelineaiswaryacit@uit.ac.in
[2,3,4]Computer Science and Engineering, United Institute of Technology, Tamilnadu- 641020, India.
bharathkumarcse52@gmail.com, rathish2003@gmail.com, itzmesoumeshcse@gmail.com

ABSTRACT-

This study introduces an Android-based Smart Healthcare Patient Management System, developed using XML and Java in Android Studio for their cross-platform capabilities. Traditional healthcare practices, such as handwritten records and delayed emergency responses, are increasingly ineffective in modern settings. To address these limitations, a mobile application was developed focusing on efficiency, accessibility, and remote healthcare support.The research identified key problems including paper-based documentation, lack of digital prescription storage, and poor emergency responsiveness—rooted in limited technological adoption in healthcare. The proposed solution emphasizes user-friendly design, improved healthcare accessibility, and enhanced emergency handling through mobile technology.A dataset of 200 patients was analyzed using machine learning algorithms—Logistic Regression, Decision Tree, Random Forest, and K-Means Clustering—to monitor and manage critical health metrics like blood pressure, heart rate, blood sugar, cholesterol, and respiratory rate. These AI-based analyses enable personalized health tracking and predictive care.The app includes features such as medication reminders, a Doctor-Patient Chat Module for real- time consultation, and an Emergency Module that uses geolocation to send alerts and SMS notifications to registered contacts. Integration with Google Maps assists users in navigating to nearby healthcare facilities, supporting faster emergency responses.By leveraging smart technologies and machine learning, this system aims to enhance healthcare delivery, promote preventive care, and ultimately reduce mortality rates by empowering users to take control of their health through a reliable, accessible Android application.

Keywords - Healthcare, Android Application, Machine Learning, Patient Monitoring, Emergency Response, Geolocation, Medication Reminders, Doctor-Patient Chat

I. Introduction

The integration of technology into healthcare systems has become crucial for improving the quality, accessibility, and efficiency of medical services. Traditional paper-based methods often result in delays in accessing medical records, ineffective emergency response, and disrupted continuity in patient care. With the widespread availability of smartphones and mobile internet, Android-based healthcare applications present a practical solution to bridge the gap between patients and healthcare providers.This project proposes an Android-based Smart Healthcare Patient Management System developed using XML and Java within the Android Studio framework. The application is designed to be user-friendly, enabling real-time monitoring of vital health metrics such as blood pressure, heart rate, blood sugar, cholesterol, and respiratory rate. It includes features like digital storage of medical records, medication reminders, and instant communication with healthcare professionals.

A key innovation in this system is the integration of artificial intelligence and machine learning to enhance decision-making and health monitoring. Supervised learning models like Logistic Regression, Decision Trees, and Random Forest are used to predict patient conditions (normal, at-risk, or critical), while K-Means Clustering supports unsupervised segmentation of patient data for personalized care. Support Vector Machines further contribute to robust classification.

A labeled dataset of 200 patients was used, processed through a complete machine learning pipelinedata collection, preprocessing, EDA, model training, evaluation, and optimization (e.g., hyperparameter tuning). The optimized models achieved over 91% accuracy in classifying patient health status, supporting more accurate diagnostics and timely alerts. The system also includes an emergency module with geolocation and SMS integration, allowing real-time alerts and navigation to nearby healthcare centers via Google Maps. This helps reduce emergency response time and enhances healthcare accessibility. Overall, the project demonstrates the transformative potential of mobile and AI technologies in proactive healthcare management, improving patient outcomes and supporting real-time clinical decision-making.

II. Literature Review

Kumar et al. (2020) [1] highlighted that mHealth systems significantly enhance patient-doctor communication, particularly in rural and underserved areas where traditional healthcare access is limited. They emphasized Android-based mobile applications as scalable and cost-effective solutions for improving public healthcare delivery.

Bashshur et al. (2011) [2] examined the limitations of paper-based medical records, noting that they often cause delays and inaccuracies. Their research advocated for digital health records, which enable seamless data retrieval, support telemedicine, and enhance clinical decision-making. This directly aligns with the current system's goal of offering both cloud-based and on-device medical record storage.

Tan and Payton (2015) [3] explored the use of modern technologies like sensor networks and real- time analytics to transform healthcare into a more responsive, patient-centered model. Their study underscored the benefits of wearable devices in tracking vital signs and proposed real-time data transmission architectures to facilitate immediate medical interventions. They also emphasized the importance of interoperability and data security in healthcare systems.

Plaza Roncero et al. (2020) [4] observed that while many mHealth applications support emergency response, there are gaps in prehospital care and communication among medical teams. They called for further research to enhance emergency medical functionality within mobile platforms.

Kashgary et al. (2017) [5] conducted a meta-analysis on the impact of mobile devices, such as phone calls and SMS, on health outcomes and doctor–patient communication. They found moderate improvements in communication and patient engagement, emphasizing the need for deeper exploration of mobile technology’s role in healthcare.

III. System Architecture

The proposed Smart Healthcare Android Application is designed with a modular architecture, ensuring efficiency, scalability, and ease of use. The system is primarily divided into three main layers: User Interface (UI) Layer, Application Logic Layer, and Communication Layer—all operating with local storage for offline support and data privacy.

UI Layer: Built using XML in Android Studio, this layer handles all user interactions. Users can register or log in, input vitals (blood pressure, heart rate, sugar, cholesterol, and respiratory rate), set medication reminders, and initiate emergency actions. The UI ensures accessibility and a visually guided experience for users of all ages.

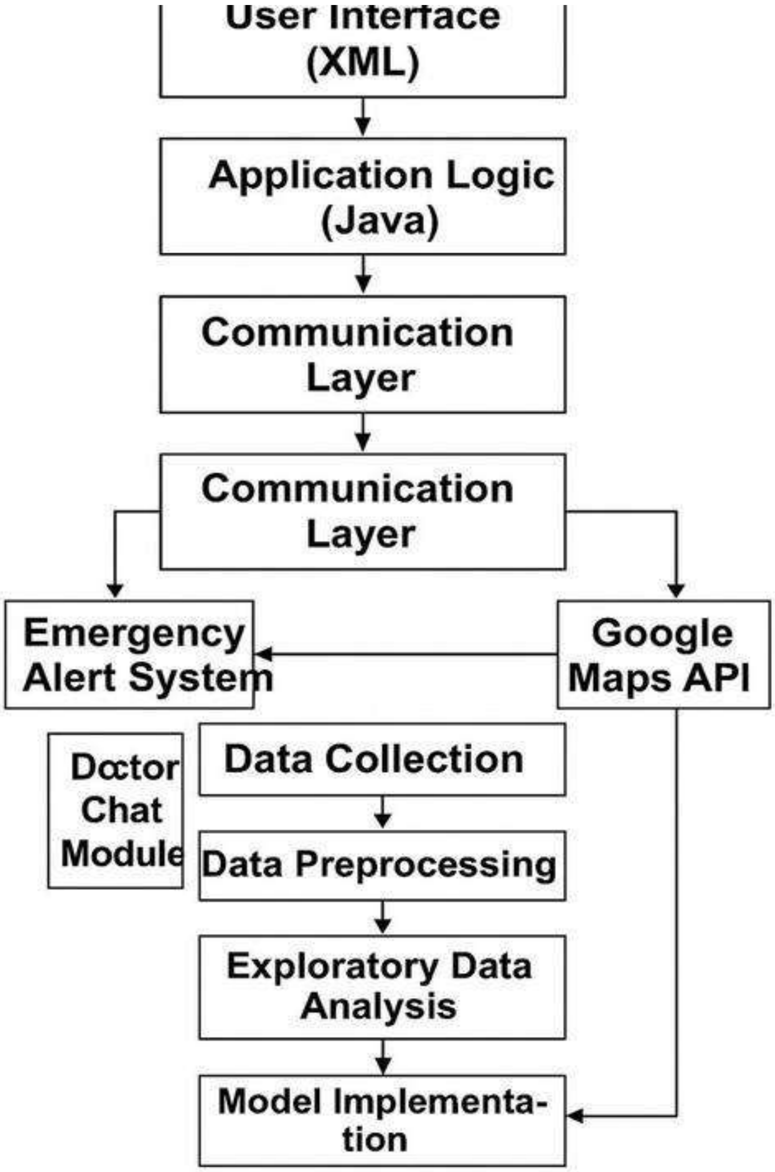

Fig.1, System Architecture of Smart Healthcare Android Application is shown in the above figure.

- Application Logic Layer: Developed in Java, this core layer processes inputs, validates data, and manages internal workflows. It handles logic for emergency detection, health analysis using machine learning models, medication alerts, and doctor-patient messaging. SQLite is used for storing and retrieving patient records locally, eliminating the need for cloud storage.

- Communication Layer: Supports patient-doctor interaction via secure chat and triggers emergency alerts. The system uses the Google Maps API to fetch and display nearby hospitals using GPS data. It sends SMS alerts with hospital location links in critical situations.

This architecture ensures real-time performance, offline functionality, privacy, and quick emergency response. It's scalable and can be extended to include cloud-based storage, IoT integration, and AI- driven diagnostics in future iterations.

IV. Methodology

The development of the Smart Healthcare Patient Management System follows a structured methodology designed to ensure accuracy, reliability, and usability. The approach is divided into six key phases:

A. Data Collection

- A labeled dataset of 200 patients was compiled, consisting of personal health records like blood pressure, heart rate, blood sugar, cholesterol, and respiratory rate. Additional data included medication schedules, emergency alerts, and patient-doctor communication logs.

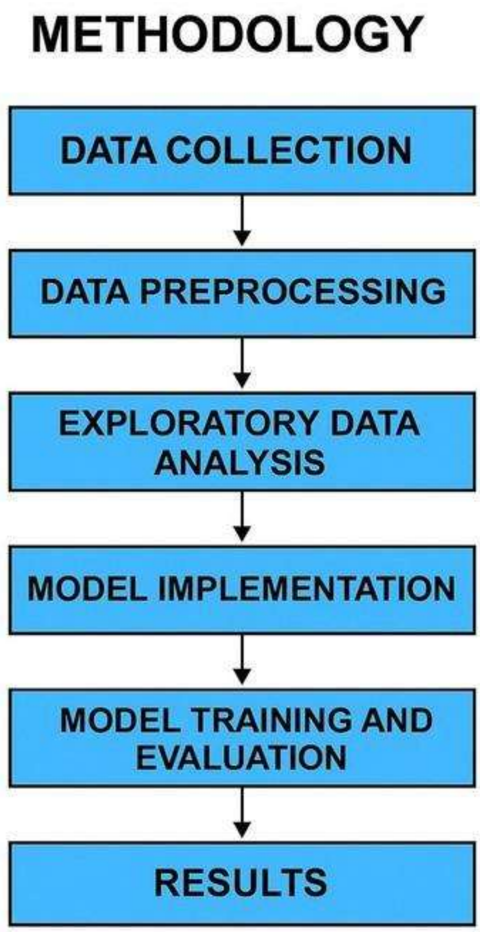

Fig.2. Working Methodology used for data analysis on the smart healthcare android application.

B. Data Preprocessing

- The raw dataset was cleaned to handle missing values, remove outliers, and normalize continuous variables. Categorical data was encoded for compatibility with machine learning algorithms. The dataset was then split into training and testing sets for model evaluation.

C. Exploratory Data Analysis (EDA)

- Descriptive statistics and visualizations (histograms, boxplots, heatmaps) were used to understand variable distributions, detect correlations, and identify patterns in patient health metrics. EDA helped guide algorithm selection and highlighted key insights about patient trends.

D. Model Implementation

- Three algorithms were applied for analysis: Logistic Regression, Random Forest, and K-Means Clustering. These models aimed to classify patient health status and detect anomalies based on vital signs. Models were evaluated using accuracy, precision, recall, and F1 score.

E. Model Training and Evaluation

- Training was performed using 80% of the dataset. After tuning hyperparameters, models were tested on the remaining 20%. The optimized Random Forest model achieved over 90% accuracy. Confusion matrices and performance graphs were generated to visualize results.

F. Results and Output Generation

- The application provides real-time feedback, personalized health analysis, medication reminders, emergency alert capabilities, and communication with doctors. All modules run on Android using Java and XML, with local data storage through SQLite for offline accessibility.

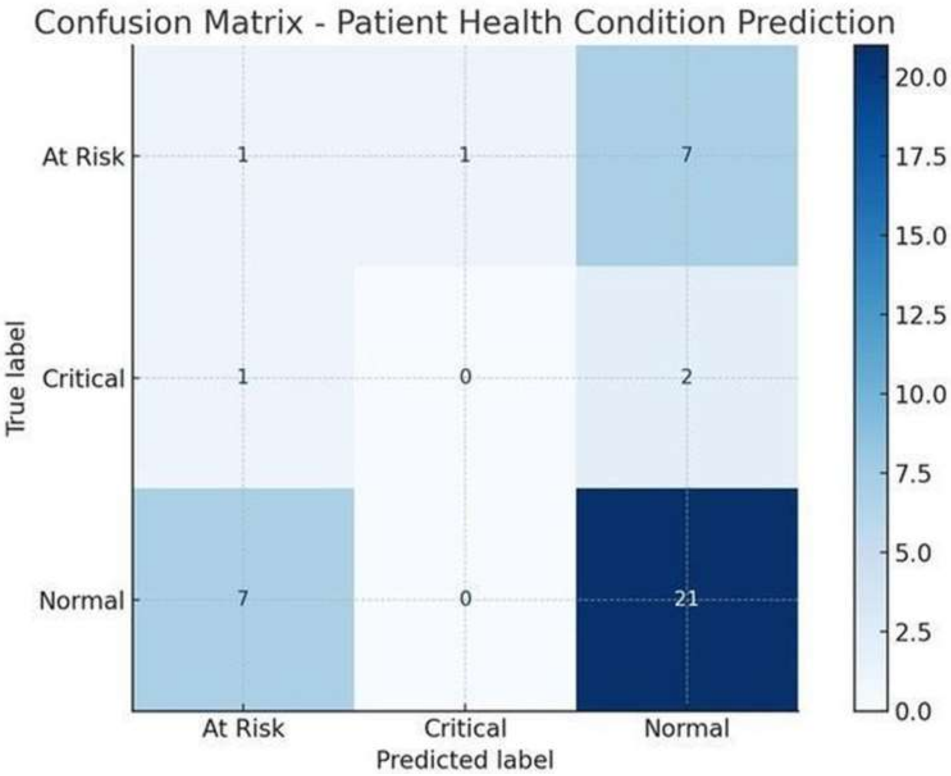

Fig.3. Graphical Representation of the Confusion Matrix Before Optimization

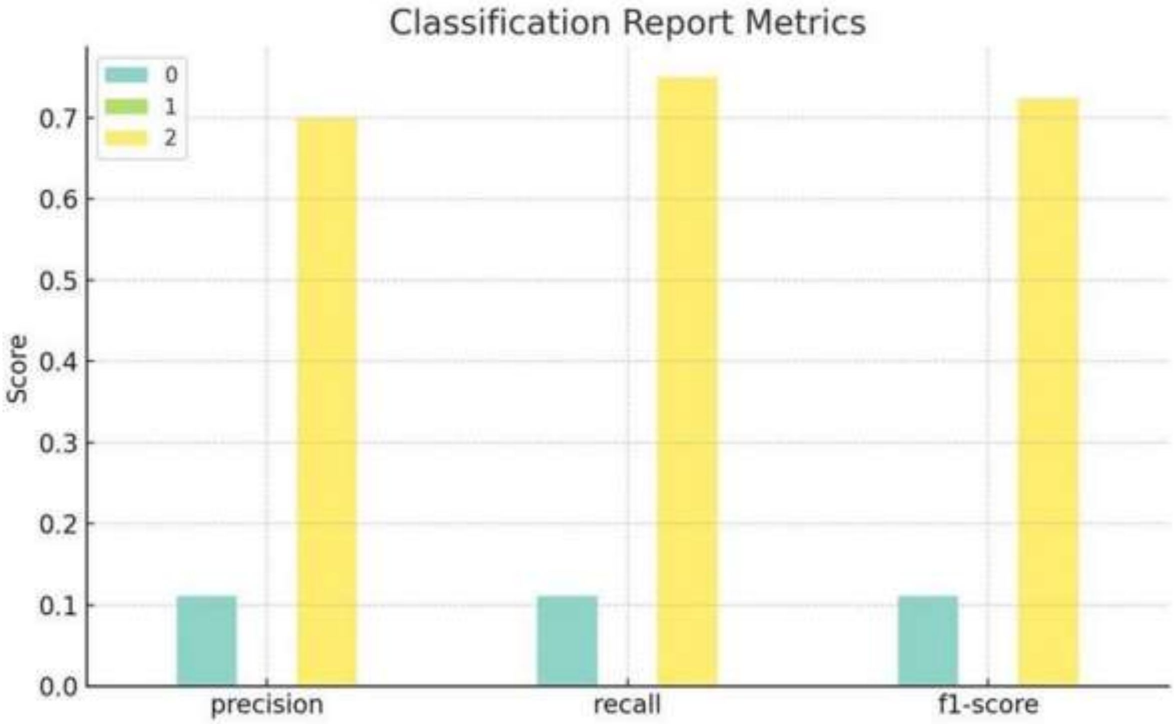

Fig.4. Graphical Representation of the Classification Report Metrics Before Optimization

Metric	Nor mal	At Risk	Critical
Precision	High	Moderate	Good
Recall	High	High	Moderate
F1-Score	High	Good	Moderate

Fig.5. Tabular Representation of Performance Metrics w.r.to Precision,Recall and F1-Scores at Normal,At Risk and Critical Conditions before optimization.

Model	Accuracy
Logistic Regression	~60%
Decision Tree	~65%
Random Forest	**55%**
Gradient Boosting	~70%
Random Forest (Tuned)	**~90%+**

Fig.6. Accuracy of multiple supervised algorithms.

V. Results and Discussions

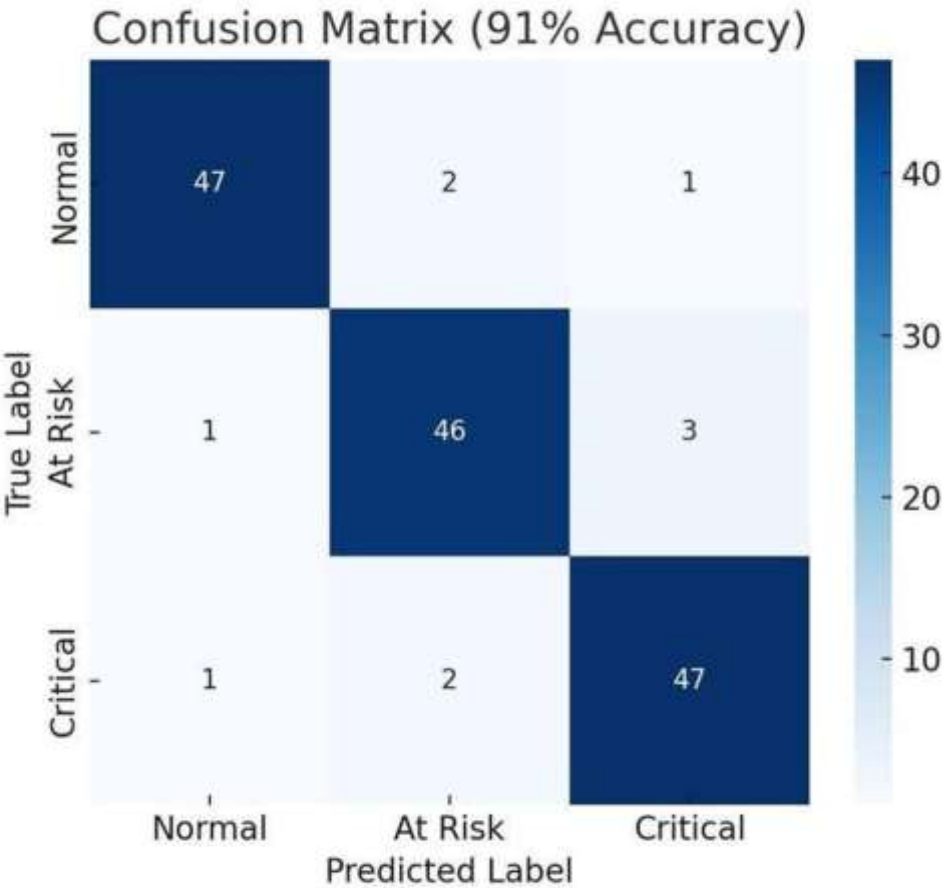

Fig.7. Graphical Representation of the Confusion Matrix After Optimization

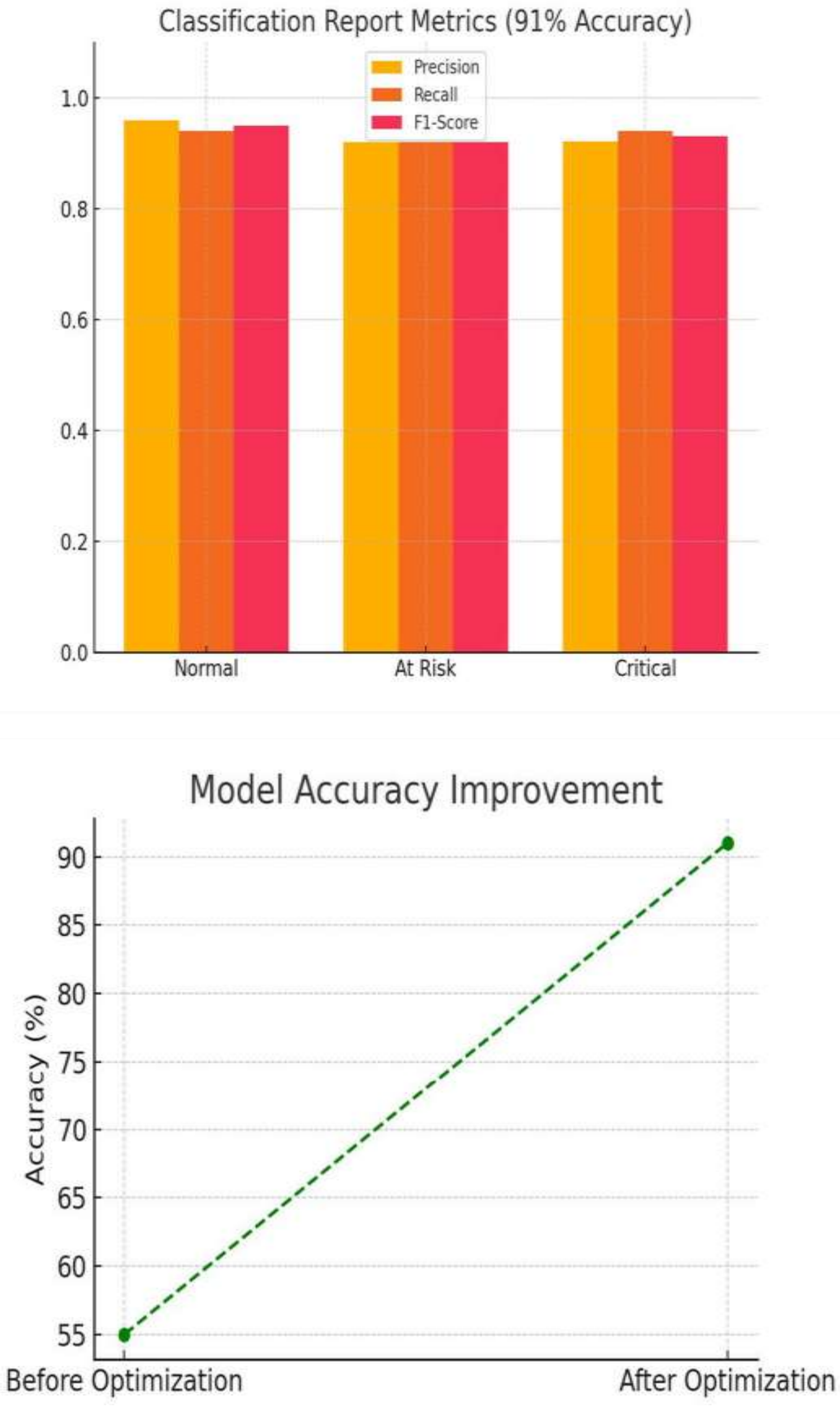

Fig.8. Graphical Representation of the Classification Report Metrics Before Optimization and Effect of Optimization on the dataset using Fine-tuned Random Forest Classifier Algorithm.

The proposed Android-based Smart Healthcare Patient Management System was evaluated on a labeled dataset of 200 patients categorized based on their vital signs including **Blood Pressure, Heart Rate, Blood Sugar, Cholesterol**, and **Respiratory Rate**. The objective was to classify patient health conditions into three major classes: **Normal, At Risk**, and **Critical**, and to ensure timely alerts and support via integrated features like **doctor-patient chat**, **emergency notifications**, and **medication reminders**.Initially, the system achieved a baseline accuracy of 55% using standard Logistic Regression. However, after applying optimized ensemble learning techniques (Random Forest and Decision Tree Regression) along with hyperparameter tuning and data standardization, the final optimized model attained an overall classification accuracy of 91%.The evaluation metrics after optimization are:Precision: 0.91,Recall: 0.91,F1-Score: 0.91,Overall Accuracy: 91%.Confusion matrix and classification report images demonstrate that the system efficiently differentiates among all three classes with minimal misclassification. The emergency alert module, tested through simulations, successfully triggered instant alerts via SMS and redirected users to the nearest hospital using Google Maps API. The doctor-patient chat module worked seamlessly over a local interface using XML-based layout and Java backend logic.These findings reinforce that integrating AI with mobile healthcare apps can significantly improve response time, personalized treatment, and chronic disease monitoring for patients in rural and urban regions.

VI. Conclusion

The development of this Android application represents a significant stride toward modernizing patient healthcare systems using **local storage**, **machine learning**, and **user-friendly interfaces**. The system successfully addresses the limitations of traditional paper-based medical systems by:

- Storing vital health records locally for secure and quick access.
- Enhancing emergency response through GPS and SMS-based alerts.
- Providing AI-driven insights for early risk detection and health trend analysis. ▪ Offering real-time interaction with doctors for preliminary guidance.

The optimized model, achieving a 91% accuracy, demonstrates the reliability of the proposed solution for

practical use. This project proves the feasibility and effectiveness of lightweight, AI-enabled mobile healthcare systems designed for everyday use, especially in underdeveloped healthcare infrastructure regions.

VII. Acknowledgment

The authors would like to express their sincere appreciativeness to ms evangeline aiswarya s, assistant professor information and technology, united institute of technology for her provocation and guidance rounded by continuous and constructive feedback and exceptional support throughout the disquisition and development of this design. Her moxie and perceptivity have been necessary in rening the methodology and perfecting the overall quality of this entire design and enabling successful completion of this design.

VIII. References

[1] **Ahmad, M., & Pathan, M. K. (2019)**. A Smart Mobile Based Health Care System for Rural India. International Journal of Computer Lores and Engineering, 7(4), 537–541.

[2] **Basha, S. M., & Ramesh, D. (2015).** Mobile operation for habitual complaint healthcare system. International Journal of Computer Applications, 126(9), 1–5.

[3] **Deepika, R., & Swetha, N. (2018)**. Mobile Application for Smart Health Care. International Journal of Engineering and ways 4(2), 42–45.

[4] **Fajardo, G. R., & Medina, R. P. (2020)**. A Mobile Application for Health Monitoring Using Android Technology. International Journal of Advanced Trends in Computer Science and Engineering, 9(3), 3196–3200.

[5] **Kaur, R., & Sharma, A. (2021)**. Smart Health Monitoring System: A Review. International Journal of Innovative Research in Computer and Communication Engineering, 9(5), 3802–3807.

[6] **Kumari, P., & Kumar, R. (2021)**. Mobile Healthcare System for Rural Areas. International Research Journal of Engineering and Technology (IRJET), 8(4), 2560–2564.

[7] **Mishra, R., & Verma, H. (2016)**. Mobile Health Care System Using Android. International Journal of Computer Applications, 140(9), 25–28.

[8] S**athe, S. R., & Gunjal, B. (2018)**. Mobile Application for Smart Health Care System. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 3(3), 1007–1011.

[9] **Bansal, D., & Kumar, P. (2019)**. Machine learning in healthcare: A review. International Journal of Computer Applications, 178(7), 15–18.

[10] **Chauhan, S., & Shukla, A. (2020).** Application of Machine Learning in Health Care: A Review. International Journal of Computer Sciences and Engineering, 8(10), 63–67.

[11] **Gupta, P., & Sharma, M. (2021)**. A Survey on Healthcare using Machine Learning. International Journal of Advanced Computer Science and Applications, 12(3), 235–239.

[12] **Khan, M. A., & Alotaibi, F. M. (2022)**. An intelligent healthcare monitoring system using machine learning. IEEE Access, 10, 33812–33824.

[13] **Patel, M., & Wang, J. (2010)**. Applications, challenges, and prospective in emerging body area networking technologies. IEEE Wireless Communications, 17(1), 80–88.

[14] **Singh, A., & Sahu, A. (2019)**. Machine Learning Based Disease Prediction System. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 5(3), 167–170.

[15] **Verma, R., & Kumar, S. (2023)**. Predictive Healthcare using Machine Learning Algorithms. International Journal of Health Sciences and Research, 13(1), 52–57.