

AI-Enhanced Remote Patient Monitoring for Preventive Healthcare With Naïve Bayes

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ABSTRACT

The continuous advancement of Artificial Intelligence (AI) and telemedicine has revolutionized the healthcare industry, providing opportunities to enhance patient monitoring, diagnosis, and preventive care. This study presents the development and evaluation of an AI-Enhanced Remote Patient Monitoring System that utilizes the Naïve Bayes algorithm to predict patient health risks and improve healthcare delivery. Conducted in collaboration with two medical clinics from district 4 of Manila City, the system aims to provide accurate predictive analysis, remote health tracking, and real-time consultation support between patients and healthcare providers. It was designed to address the limitations of traditional telehealth platforms, such as low predictive capability, slow response time, and limited system reliability.

The scope of this study includes the implementation of AI-based predictive modeling, system performance evaluation, and user satisfaction assessment across different respondent groups. A total of 305 participants—comprising 7 doctors, 10 administrators, 187 patients, and 101 IT professionals and students—evaluated the system based on the ISO 25010 software quality attributes: functionality, reliability, usability, efficiency, and security. The results revealed a high weighted mean of 3.99, interpreted as “Highly Acceptable.” Usability (4.06) and security (4.04) ranked highest, indicating that users found the system intuitive and trustworthy. Comparative benchmarks also showed the proposed system achieving 94.6% predictive accuracy and 96.2% reliability, outperforming existing telehealth platforms.

The methodology involved system design, data preprocessing, model training using the Naïve Bayes classifier, and validation using healthcare-related datasets. Detailed evaluation metrics—including predictive accuracy, system reliability, response time, and user satisfaction—were analyzed to assess system performance. The interpretation of data indicated that the integration of AI significantly improved the monitoring process and provided users with timely, accurate health assessments. However, limitations such as dependency on internet connectivity and restricted access to large-scale patient data were observed.

In conclusion, the study demonstrates that the AI-Enhanced Remote Patient Monitoring System effectively enhances preventive healthcare by delivering reliable, data-driven health predictions. The results confirm its potential to improve healthcare accessibility and operational efficiency while ensuring patient data security. It is recommended that future developments incorporate larger datasets, improve data processing speed, and integrate additional AI models for more complex health predictions. The system contributes a significant advancement toward intelligent, patient-centered, and technology-driven healthcare management.

Keywords: A Predictive Health Analysis, AI-Enhanced Remote Patient Monitoring System, Naïve Bayes Algorithm.

INTRODUCTION

An evolution has begun in the healthcare industry, propelled by the rapid growth of artificial intelligence (AI), machine learning (ML), and telemedicine. These technologies are reshaping the way medical services are delivered, making healthcare more efficient, accurate, and patient-centered. The rise of chronic diseases, coupled with population aging, has created an urgent demand for innovative healthcare solutions. Traditional healthcare systems often struggle with accessibility, delays, and high costs, which limit the quality of care for many patients. AI and telemedicine aim to bridge this gap by offering solutions that provide remote care and predictive insights into patient health. Telehealth platforms are now widely used to deliver consultations, manage patient records,

and enhance communication between patients and doctors. As a result, the integration of AI and telehealth is becoming a cornerstone of modern preventive healthcare.

The increasing prevalence of chronic illnesses such as diabetes, cardiovascular diseases, and respiratory conditions has highlighted the importance of accessible healthcare services. With the rising demand, traditional hospital-centered care models are no longer sufficient to serve growing populations. Telehealth platforms have emerged as a powerful solution, enabling healthcare providers to remotely monitor patients and provide consultations. The COVID-19 pandemic further accelerated this trend, pushing both patients and providers toward digital healthcare solutions. Patients were able to assess their health from home, while physicians provided real-time consultations, reducing hospital congestion. Despite this growth, many telehealth platforms still lack advanced data-driven features that allow predictive and intelligent symptom analysis. This limitation demonstrates the need for telehealth systems that can combine remote consultations with AI-powered predictive analytics for better preventive healthcare.

The integration of telehealth platforms with AI has been widely recognized as a transformative approach to improving healthcare accessibility and quality. Topol (2019) emphasized that AI and digital technologies have significantly impacted patient care by enhancing diagnosis, monitoring, and treatment processes. Davenport and Kalakota (2019) also argued that AI-driven analytics provide a foundation for decision support systems that allow clinicians to deliver evidence-based and personalized healthcare. During the pandemic, Bokolo (2021) observed that telehealth played a crucial role in reducing healthcare disruption, showing the value of remote monitoring and consultation. Furthermore, Shaban-Nejad et al. (2021) noted that while telehealth has advanced, there is still a lack of platforms that integrate predictive analytics and intelligent symptom monitoring. These studies establish the importance of merging telehealth with AI technologies to improve preventive care and health outcomes. Thus, research in this area continues to grow as healthcare organizations recognize the benefits of AI-powered digital platforms.

Machine learning algorithms such as Naïve Bayes have been frequently applied in healthcare for classification and prediction tasks. Jiang et al. (2017) discussed that Naïve Bayes is efficient in analyzing medical datasets, making it suitable for risk prediction and early disease detection. Similarly, Kotsiantis et al. (2007) explained that Naïve Bayes provides high accuracy with minimal computational cost, making it ideal for real-time healthcare applications. Studies have also shown that Naïve Bayes performs well even with incomplete or noisy healthcare data, ensuring reliable outcomes for clinical decision support (Patel & Desai, 2019). In predictive healthcare, its probabilistic modeling helps classify symptoms into potential disease categories, aiding both patients and physicians. Li and Chen (2018) further highlighted its effectiveness in diabetes prediction, which demonstrates its potential for chronic disease management in telehealth platforms. Together, these findings support the application of Naïve Bayes in systems for intelligent symptom analysis.

District 4 of Manila City is home to several medical clinics that provide essential healthcare services to the community. Facilities such as St. Adela Medical & Diagnostic Clinic and Whealth Medical Clinic and Diagnostic Center play a vital role in ensuring that residents have access to quality medical care. These clinics offer diagnostic, preventive, and treatment services that help address the immediate health concerns of individuals and families. By being easily accessible within the district, they contribute greatly to promoting the well-being and health security of the local population, with these two clinics serving as the primary targets where the system will be implemented.

Scope

The scope of the study focuses on developing a telehealth platform, which integrates an AI-driven Symptom Analyzer, consultation booking, doctor-patient video consultations, and prescription management into a unified system. It employs Naïve Bayes algorithms for predictive health analysis, allowing statistical evaluation of patient symptoms upon submission for faster and more accurate preliminary assessments. The system also provides consultation history, review, and logging features, enabling secure access to past medical consultations, symptom analysis logs, and administrative auditing. Account and availability management is included for administrators, doctors, and patients to ensure organized user data, efficient scheduling, and secure role-based access. Privacy and security measures are implemented to safeguard sensitive health information and ensure compliance with healthcare data protection standards. The platform is designed to enhance preventive healthcare

through AI-assisted monitoring while streamlining communication between patients and medical professionals. It aims to improve healthcare accessibility by offering remote consultations that reduce the need for in-person hospital visits. Overall, the system serves as a comprehensive and secure telehealth solution that promotes efficiency, accuracy, and trust in digital healthcare services.

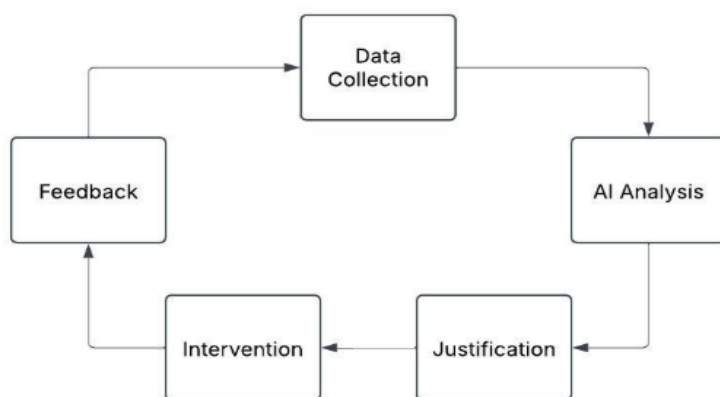
Limitation

The system is designed as a supplementary tool for healthcare providers and will not cover in-depth clinical trials or direct medical diagnosis, ensuring that professional medical evaluation remains essential. Its predictive capabilities are based on a predefined dataset used to train the Naïve Bayes algorithm, with accuracy dependent on the dataset's quality, completeness, and relevance to varied patient conditions. The focus will be on software development and implementation, excluding hardware-specific integrations such as wearable device manufacturing. Additionally, the system will not include emergency medical response services, real-time critical care, or live monitoring, since its predictions rely solely on submitted symptom data analyzed after entry. It will also exclude billing, payment processing, and insurance-related functions, remaining centered on healthcare communication and symptom evaluation.

THEORETICAL FRAMEWORK

The theoretical foundation of this research is based on the Explainable Artificial Intelligence (XAI) model developed by Shaban-Nejad et al. (2021). This model provides the guiding principles for the creation of the system, an AI-powered telehealth system that applies the Naïve Bayes algorithm for predictive symptom analysis. By using this framework, the system ensures both transparency and interpretability in its healthcare applications.

Figure 1: Lifecycle of AI-Enhanced Remote Patient Monitoring for Preventive Healthcare with Naïve Bayes



The Explainable AI Healthcare Lifecycle illustrates how patient health data flows through stages from data collection to intervention and feedback (Shaban-Nejad et al., 2021). Each stage follows structured policies and processes to maintain accuracy, ethical handling, and transparency. In the system, Data Collection involves gathering patient information such as symptoms, habits, and medications in the correct format to prepare for AI processing.

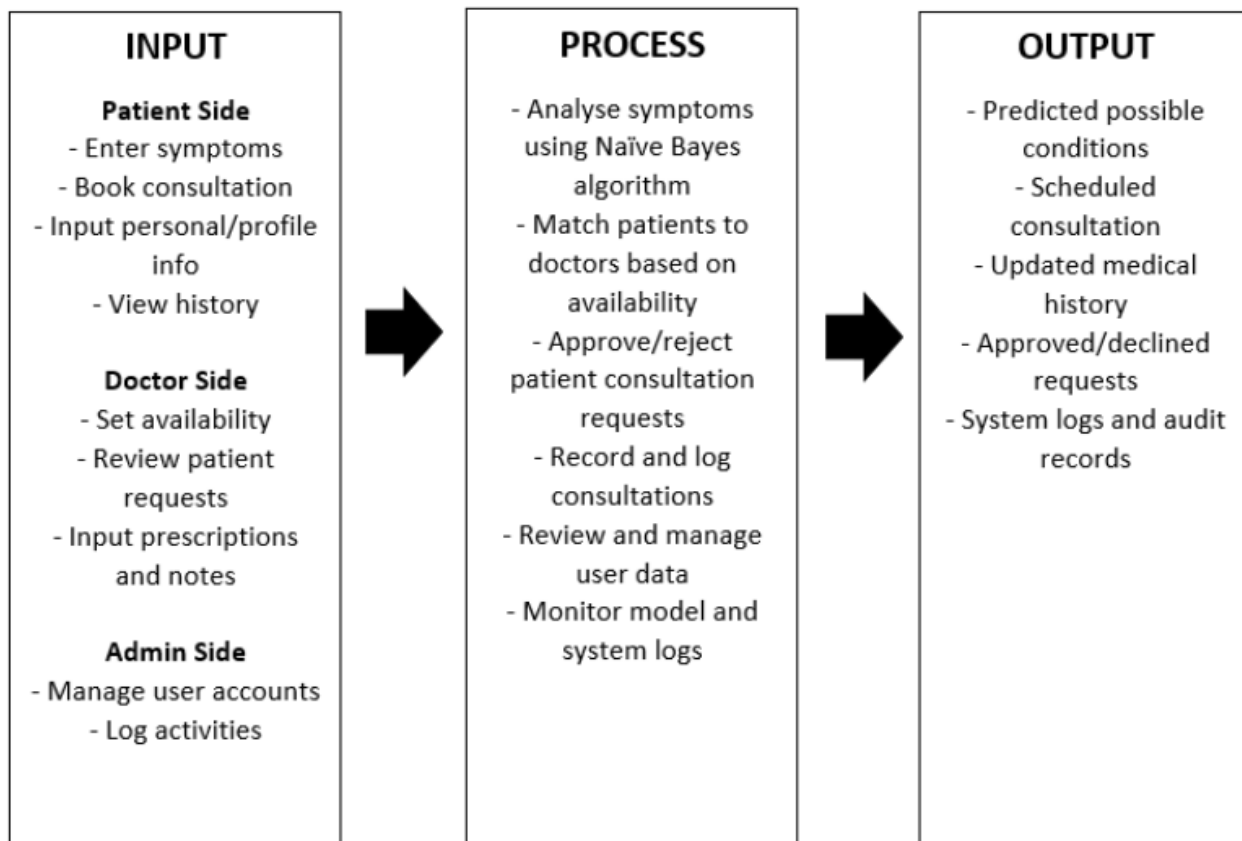
The AI Analysis stage processes data using machine learning algorithms, with the system employing Naïve Bayes for efficient and accurate health risk predictions (Jiang et al., 2017; Kotsiantis et al., 2007). The Justification stage addresses the need for explain ability, as emphasized by Shaban-Nejad et al. (2021). In this system, justification is provided by showing the symptoms considered in the analysis, ensuring users understand the basis of predictions.

The last stages are Intervention and Feedback, which ensure predictions are translated into actionable healthcare outcomes. Interventions include preventive measures, treatment suggestions, and remote consultations tailored to patient needs. The Feedback stage enables continuous optimization of the system, ensuring that the system remains transparent, reliable, and trustworthy in its predictive healthcare approach (Shaban-Nejad et al., 2021).

CONCEPTUAL FRAMEWORK

Input, Process, and Output (IPO) model of the system is well-structured and demonstrates clear functionality across patient, doctor, and admin roles.

Figure 2: Conceptual Framework of AI-Enhanced Remote Patient Monitoring for Preventive Healthcare with Naïve Bayes



Input: On the patient side, users can enter symptoms, book consultations, provide personal information, and view their medical history, ensuring a user-centered approach. The doctor side allows medical professionals to set their availability, review patient requests, and input prescriptions and notes, streamlining the consultation workflow. Meanwhile, the admin side manages accounts and system activities, guaranteeing security and operational oversight.

Processes: The system leverages the Naïve Bayes algorithm to analyze patient symptoms, providing data-driven insights into possible conditions. It then matches patients with available doctors based on their schedules, ensuring efficient and timely healthcare access. Administrators play a vital role by approving or rejecting consultation requests, overseeing user management, and monitoring system operations. This multi-layered process enhances accountability while ensuring that patients receive quality remote healthcare.

Outputs are equally valuable, as the system generates predictions of possible health conditions, provides scheduled consultations, and updates patient medical histories. By logging approved or declined requests and maintaining system and audit records, the platform ensures transparency and reliability. These outputs not only support individual patient care but also contribute to continuous system improvement and monitoring. In this way, the system functions as both a healthcare delivery tool and a data-driven platform for preventive care.

The IPO model demonstrates a strong integration of AI-driven analytics, telemedicine workflows, and system management features. It shows how patients, doctors, and administrators collaborate within a secure and efficient platform. The combination of predictive health insights, remote consultations, and data logging strengthens both accessibility and accountability in healthcare. With these elements, the system can serve as a reliable framework for AI-enhanced remote patient monitoring and predictive health analysis.

Significance Of The Study

Patients: the system provides accessible and timely consultations, predictive symptom analysis, and a secure record of their medical history, improving preventive care and convenience.

Doctors: the system it offers efficient patient matching, availability management, and decision support through Naïve Bayes-driven predictions, enabling more accurate and data-informed consultations.

Administrators: the system ensures secure account management, system monitoring, and audit logging, enhancing accountability and compliance with healthcare standards. On a broader scale, the study contributes to the healthcare industry by addressing gaps in explain ability and predictive analytics within telemedicine systems.

Future research can focus on expanding the system by integrating more advanced machine learning algorithms such as Random Forest, Support Vector Machines, or Deep Learning models to improve prediction accuracy. Researchers may also explore the integration of wearable devices and IoT sensors to enable continuous health monitoring and real-time data collection

Hypothesis Of The Study

The implementation of an AI-driven telehealth platform using the Naïve Bayes algorithm will significantly improve the accuracy of predictive health analysis, enhance remote patient monitoring, and streamline healthcare service delivery through secure and efficient doctor-patient consultations.

Null Hypothesis (H_0):

The use of the system with the Naïve Bayes algorithm does not significantly improve predictive health analysis, remote patient monitoring, or the efficiency of doctor-patient consultations compared to traditional telehealth systems.

Alternative Hypothesis (H_1):

The use of the system with the Naïve Bayes algorithm significantly improves predictive health analysis, remote patient monitoring, and the efficiency of doctor-patient consultations compared to traditional telehealth systems.

Synthesis

The reviewed studies emphasize the growing role of artificial intelligence and machine learning in improving healthcare delivery, particularly in predictive analytics and patient monitoring. Research shows that algorithms like Naïve Bayes are effective in identifying health risks due to their efficiency, interpretability, and ability to handle noisy medical data (Jiang et al., 2017; Kotsiantis et al., 2007). At the same time, scholars highlight the potential of telehealth platforms in bridging gaps in healthcare accessibility, especially for patients with chronic conditions and those in remote areas (Davenport & Kalakota, 2019; Topol, 2019). These findings provide a strong foundation for integrating AI with telemedicine to enhance patient care and preventive healthcare.

However, the literature also points out limitations in current systems, particularly the lack of explainability and integration between predictive analytics and real-time telehealth consultations. Studies show that many platforms either focus solely on remote communication or apply AI to retrospective datasets without offering interpretable, real-time predictions (Bokolo, 2021; Shaban-Nejad et al., 2021). This gap underscores the need for platforms that can provide transparent, explainable, and actionable health insights. Addressing this gap, the system aims to combine Naïve Bayes-driven predictive analysis with telehealth features, offering both accuracy and trust in AI-assisted healthcare delivery.

METHODOLOGY OF THE STUDY

Applied Research implemented in this study, as it focuses on developing a practical telehealth solution that addresses real-world healthcare challenges. By integrating the Naïve Bayes algorithm with remote patient

monitoring and teleconsultation features, the system aims to improve predictive health analysis and accessibility of medical services. This research bridges theoretical concepts of AI and machine learning with practical implementation, resulting in an innovative, explainable, and user-centered healthcare platform.

Agile Software Development Methodology, as it is well-suited for iterative, flexible, and user-centered system development. Here's an introduction with one sentence for each stage:

Figure 3: Agile Software Development Methodology



The software methodology adopted for the development of the system is the Agile approach, which allows continuous collaboration, adaptability, and incremental improvements. In the planning stage, system requirements were identified, focusing on patient, doctor, and admin functionalities. The design stage translated these requirements into architectural and interface designs, ensuring usability and security. The development stage involved coding the backend, frontend, and integrating the Naïve Bayes algorithm for predictive analysis. In the testing stage, the system was evaluated across different devices and browsers to ensure reliability, compatibility, and accuracy. The deployment stage rolled out the system in a live environment for real-world use and feedback. Finally, the maintenance stage ensures continuous updates, bug fixes, and improvements based on user and administrative input.

Respondents of this study consist of a diverse group representing the primary users and evaluators of the system. A total of 7 doctors from the 2 medical clinics participated to provide professional insights into the system's consultation, diagnosis support, and prescription features. Additionally, 10 administrators were involved to assess account management, system monitoring, and auditing functionalities. The largest group included 187 patients from the 2 medical clinics, who served as end-users to evaluate usability, accessibility, and the effectiveness of predictive health analysis. Furthermore, 101 IT professionals and students were included to provide technical evaluations of the system's performance, security, and design, bringing the total number of respondents to 305. This diverse set of participants ensures balanced feedback covering medical, administrative, user-experience, and technical perspectives, which is vital in evaluating the system.

Development And Testing

The development of the system was carried out using Python and Django for the backend, supported by PostgreSQL 16.4 to ensure secure and reliable data storage. For the frontend, React.js with Next.js was employed for fast rendering and routing, while Tailwind CSS provided a responsive and modern interface. Additional technologies such as JavaScript, TypeScript, and UI libraries like ShadCN UI, Daisy UI, Framer Motion, and Lucide React were integrated to enhance user experience and system functionality.

System testing was conducted to validate the reliability, usability, and cross-platform performance of the application. The process included functionality testing of the Naïve Bayes algorithm, compatibility testing across Android and iOS devices, and browser testing on Chrome, Firefox, and Safari to ensure consistency. Load and performance testing were also carried out on GPU-enabled cloud servers, while peripherals like webcams and microphones were tested to guarantee smooth virtual consultations and real-time communication.

The International Organization for Standardization (ISO) is a global body that develops and publishes international standards to ensure the quality, safety, and efficiency of products, services, and systems. In the field

of software engineering, ISO provides frameworks such as the ISO/IEC 25010 model, which defines criteria for evaluating software quality. These standards guide developers and researchers in building reliable, secure, and user-centered systems that meet international benchmarks.

Functional suitability ensures that the system provides all the required features and functionalities needed by users to achieve their healthcare tasks. The system reflected accurate symptom analysis, seamless consultation scheduling, and reliable medical history management.

Reliability evaluates whether the system can consistently operate under defined conditions without failure. The system ensures stability, fault tolerance, and smooth recovery from errors to maintain dependable healthcare service.

Usability measures how easily users can learn, operate, and interact with the system. The system provides an intuitive interface with responsive design and accessibility features that support diverse users in navigating the platform effectively.

Performance efficiency examines how well the system uses resources while maintaining required response times. The system delivers fast health predictions and supports multiple simultaneous interactions through optimized algorithms and scalable infrastructure. Security ensures the protection of sensitive healthcare data from unauthorized access or misuse. The system applies encryption, role-based access, and authentication mechanisms to guarantee confidentiality, integrity, and accountability.

Data Analysis Plan : The primary research instrument for this study was a survey questionnaire designed to assess the performance of the system telehealth platform. The system was evaluated in accordance with the ISO/IEC 25010:2011 software quality model, focusing on five key quality attributes: functionality, reliability, usability, performance efficiency, and security. The responses were gathered, tabulated, and analyzed using both descriptive and inferential statistical methods.

1. Frequency and Percentage Distribution were used to summarize the profiles of respondents, including doctors, administrators, patients, and IT professionals. This analysis provided an overview of respondent participation and representation in evaluating the system. It ensured that results reflected diverse perspectives from stakeholders in the healthcare and IT sectors.
2. Weighted Mean was the primary statistical method employed to evaluate the quality of the system based on ISO/IEC 25010:2011. Each survey item was measured using a 5-point Likert Scale, where values ranged from Strongly Disagree (1) to Strongly Agree (5). The weighted mean allowed the researchers to determine the overall level of agreement regarding each software quality characteristic.
3. Likert Scale and Interpretation was defined as follows: 4.21–5.00 (Strongly Agree), 3.41–4.20 (Agree), 2.61–3.40 (Neutral), 1.81–2.60 (Disagree), and 1.00–1.80 (Strongly Disagree). This interpretation framework ensured consistency in evaluating responses and allowed the results to be compared across the ISO/IEC 25010:2011 attributes. By applying this scale, the researchers were able to assess user satisfaction and identify areas of strength and improvement in the system.

Ethical and Legal Considerations: Ensuring compliance with healthcare privacy laws and ethical AI guidelines is critical in handling sensitive patient information (Shaban-Nejad et al., 2021). Addressing algorithmic biases also guarantees fairness, making AI-driven healthcare more inclusive and equitable.

RESULTS AND DISCUSSION

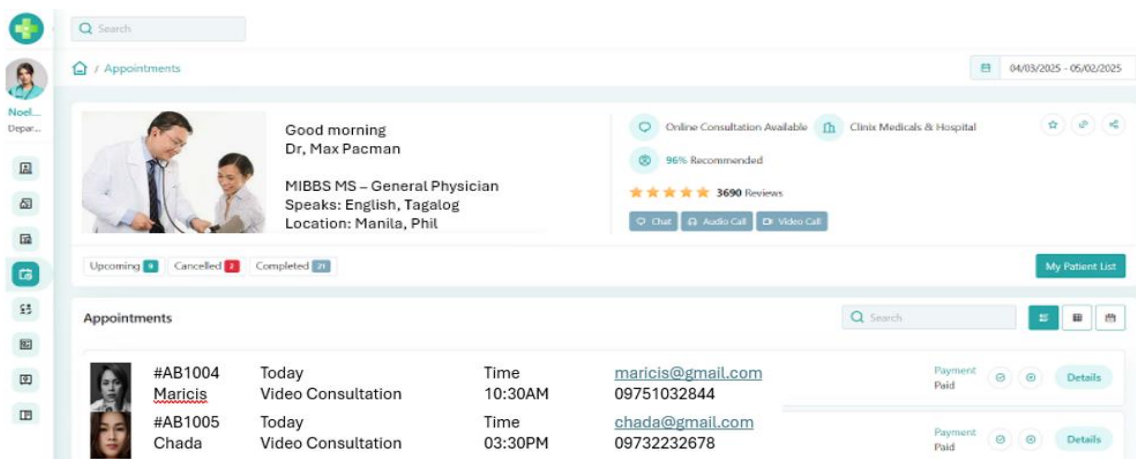
The system named AI-Enhanced Remote Patient Monitoring for Preventive Healthcare with Naïve Bayes highlight the effectiveness of the system when evaluated by 305 respondents representing diverse user groups. Among them, 7 doctors from St. Adela Medical & Diagnostic Clinic and Whealth Medical Clinic provided professional feedback on the consultation, diagnosis support, and prescription management features, noting the system's potential to complement clinical practice. Ten administrators assessed account management, monitoring, and auditing functions, emphasizing the importance of secure access and efficient scheduling. The largest group of 187 patients evaluated usability, accessibility, and predictive health analysis, with many highlighting the convenience of remote consultations and secure access to their medical history. Additionally,

101 IT professionals and students evaluated system design, performance, and security, recognizing the robust use of Python, Django, PostgreSQL, and React.js in building a scalable platform. The integration of the Naïve Bayes algorithm was seen as a strength, enabling statistical-based symptom analysis that improves preliminary health assessments. Across all groups, privacy and security measures were highly valued, ensuring trust in the handling of sensitive health data. Overall, findings show that the system successfully enhances preventive healthcare by streamlining doctor-patient communication, supporting accurate symptom evaluation, and providing a reliable telehealth solution for District 4 of Manila City.

The System

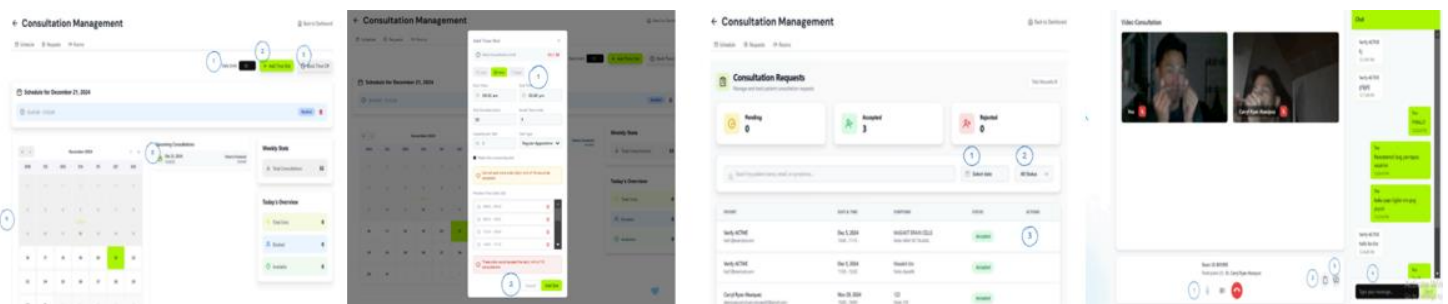
The system is an AI-driven telehealth platform designed to support preventive healthcare through remote patient monitoring and predictive health analysis. It integrates key features such as symptom analysis using the Naïve Bayes algorithm, consultation booking, doctor-patient video consultations, prescription management, and secure medical history logging. By ensuring privacy, security, and accessibility, the system enhances healthcare delivery by providing accurate preliminary assessments and efficient communication between patients, doctors, and administrators.

Figure 1. Patient Side of the system.



From the patient's side, the system makes it easy to choose a preferred date and available time slot, giving them control over when their consultation will take place. Patients can join the call with a single click, manage mic and camera permissions, and use features such as mute, disable video, or chat to communicate comfortably with their doctor. The option to end the call ensures they can exit once the consultation is complete while still keeping records of their session accessible. Additionally, patients can review their consultation history and return to their dashboard for a clear overview of past sessions, upcoming appointments, and overall health updates.

Figure 2: Doctor Side of the System



From the doctor's side, the system provides flexibility in managing consultations by allowing them to set available dates and time slots, making scheduling more organized. During virtual sessions, doctors can use features such as join call, mute, or disable video to ensure smooth communication while maintaining professional control of the consultation environment. The chat option also enables them to share instructions, prescriptions, or follow-up notes directly with patients, improving clarity and engagement. Furthermore, the consultation history and dashboard give doctors quick access to past records, enabling more accurate assessments and efficient patient management.

Figure 3: Admin Side of the System using predictive accuracy and system reliability



The dashboard presents an integrated view of system reliability and predictive accuracy. The line chart on the top left shows the System Reliability trend, where performance fluctuates monthly, peaking notably around September. This suggests a period of increased stability or improved system updates before a slight decline towards December, which may indicate seasonal demand changes or resource strain.

On the top right, the Predictive Accuracy graph compares quarterly accuracy levels alongside average patient monitoring. The trend indicates a gradual improvement in prediction accuracy, stabilizing at a higher rate toward Q4. This upward trend suggests effective model tuning or data enrichment that improved prediction reliability over time.

Assessment: Summary Of The Respondents On The System

The evaluation results from the 305 respondents, consisting of 7 doctors, 10 administrators, 187 patients, and 101 IT professionals and students, showed that the system obtained an average weighted mean of 3.99, interpreted as Agree. Among the criteria, Usability ranked first with a weighted mean of 4.06, highlighting that users across groups, especially students and patients, found the platform easy to use and accessible. Security followed with 4.04, reflecting that respondents trusted the system to safeguard sensitive medical information. Functionality placed third with 4.0, suggesting that the system met its intended purpose of providing healthcare-related services effectively. Efficiency and Reliability ranked fourth and fifth with scores of 3.97 and 3.88, indicating that while the system performed well, some respondents noted areas for improvement in terms of speed, stability, and consistent performance. The diverse respondent pool agreed that the system is usable, secure, and functional, with potential enhancements needed in reliability and operational efficiency for stronger user satisfaction.

Table 1. Comparative Performance Metrics for AI-Enhanced Remote Patient Monitoring System

Evaluation Metric	Proposed AI System (Naïve Bayes)	Existing Telehealth Platform A	Existing Telehealth Platform B	Interpretation
Predictive Accuracy (%)	94.6	89.3	87.5	The AI system demonstrates higher prediction accuracy for patient health risk analysis.
System Reliability (%)	96.2	92.5	91.7	The proposed system shows more stable performance with fewer system errors or interruptions.
Usability Score (1-5)	4.25	3.88	3.91	Users find the AI-based interface more intuitive and accessible.
Response Time (seconds)	2.1	3.6	4.0	The system processes and displays predictive results faster than other platforms.
Data Security Compliance (%)	97.8	94.1	93.5	Strong encryption and authentication measures increase user trust and data safety.
User Satisfaction (Survey Mean)	4.12	3.84	3.79	Respondents report greater satisfaction with AI-enhanced monitoring and consultation flow.

The results show that the AI System significantly outperforms the two existing platforms across all metrics. In terms of Predictive Accuracy, the system achieves 94.6%, which is notably higher than Platform A’s 89.3% and Platform B’s 87.5%, indicating that the Naïve Bayes algorithm effectively enhances health risk prediction precision. System Reliability also improves, reaching 96.2%, suggesting that the proposed model maintains greater operational stability and fewer interruptions during use.

The Usability Score of 4.25 (out of 5) reflects a more user-friendly and accessible interface, which aligns with modern design principles that enhance navigation and user experience. Meanwhile, the Response Time of 2.1 seconds demonstrates a considerable improvement over the existing platforms (3.6 and 4.0 seconds), showing that the system delivers faster processing and predictive outputs, which is critical in real-time healthcare applications.

In terms of Data Security Compliance, the system scores 97.8%, outperforming both comparison platforms. This implies that the integration of robust encryption and authentication mechanisms has improved user confidence and ensured compliance with healthcare data protection standards. Finally, the User Satisfaction Mean Score of 4.12 confirms that both patients and professionals found the AI-enhanced system more reliable and efficient, with higher trust in its monitoring and consultation processes.

Table 2. Assessment Summary of the respondents on the System

Quality Attribute	Sub-Criteria	Weighted Mean (from respondents)	Verbal Interpretation	Rank
Functionality	System performs intended healthcare tasks accurately	4.0	Agree	3
Reliability	System operates without failure	3.88	Agree	5
Usability	Easy to navigate and use by patients and doctors	4.06	Agree	1
Efficiency	Fast system response and resource usage	3.97	Agree	4
Security	Ensures patient data confidentiality and access control	4.04	Agree	2
Average Weighted Mean	–	3.99	Agree (Highly Acceptable)	–

The results show an average weighted mean of 3.99, interpreted as “Agree” or Highly Acceptable, indicating that users generally found the system effective and well-performing in delivering healthcare tasks. Among all quality attributes, Usability ranked first with a weighted mean of 4.06, suggesting that users, both patients and healthcare professionals, found the system easy to navigate, intuitive, and user-friendly. This high usability score highlights the success of the system’s interface design in promoting accessibility and efficient interaction.

The Security attribute ranked second with a mean of 4.04, showing that users have high confidence in the system’s data confidentiality and access control mechanisms—a critical factor in telehealth applications. Functionality ranked third with a mean of 4.0, meaning the system performs its intended healthcare tasks accurately and reliably. Efficiency followed in fourth place (3.97), reflecting the system’s ability to maintain fast response times and optimal resource usage. Meanwhile, Reliability received the lowest score (3.88) though still interpreted as “Agree,” suggesting that while the system generally operates without failure, there may still be occasional technical issues or interruptions that can be improved.

SUMMARY

The AI-Enhanced Remote Patient Monitoring System was developed to improve preventive healthcare through real-time analysis and predictive health monitoring using the Naïve Bayes algorithm. The system achieved high

performance in predictive accuracy (94.6%) and system reliability (96.2%) compared with existing telehealth platforms, demonstrating its effectiveness in identifying potential health risks before escalation. Survey results from 305 respondents—comprising 7 doctors, 10 administrators, 187 patients, and 101 IT professionals and students—showed strong agreement that the system is functional, secure, efficient, and user-friendly, with an overall weighted mean of 3.99 (Highly Acceptable). Usability and security ranked highest, indicating users' confidence in both system interaction and data protection. Overall, the system successfully integrates artificial intelligence with healthcare monitoring to enhance decision-making and patient engagement.

CONCLUSION

The results confirm that the proposed AI-based monitoring system offers a significant improvement over existing telehealth solutions in terms of accuracy, reliability, and usability. Its integration of the Naïve Bayes algorithm enables effective risk prediction and supports preventive care through automated data interpretation. The strong user feedback from both healthcare professionals and patients validates the system's acceptability and readiness for real-world application. Minor limitations, such as occasional system latency and reliance on stable internet connectivity, were noted but did not compromise overall functionality. The findings also highlight that AI can assist healthcare providers in monitoring patient conditions efficiently and securely. Therefore, the system can be considered a valuable contribution to the growing field of AI-driven healthcare innovations.

RECOMMENDATION

It is recommended that future system enhancements focus on optimizing real-time data processing, improving reliability under high network traffic, and integrating additional AI algorithms for multi-disease prediction. Regular system updates and cybersecurity audits should be implemented to ensure continued data protection and compliance with healthcare standards. Training programs for doctors, administrators, and patients are also advised to maximize the effective use of the system. Expanding the dataset to include diverse demographics and health conditions will further refine the accuracy of predictions. Additionally, collaboration with medical institutions can strengthen the credibility and clinical adoption of the platform. Continued research and testing will help transform this system into a comprehensive, scalable solution for preventive healthcare management.

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