Predictive Analysis on Availability of doctors and medicines in government hospitals

A PROJECT REPORT

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in partial fulfillment for the award of the degree of

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PRESIDENCY UNIVERSITY

SCHOOL OF COMPUTER SCIENCE ENGINEERING

CERTIFICATE

This is to certify that the Project report **"Predictive Analysis on Availability of doctors and medicines"** being submitted by "SAHANA REDDY R, DEEPIKA R, LISHA S" bearing roll number(s) "20211CSD00192,20211CSD0064,20211CSD0063" in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering (DATA SCIENCE) is a Bonafide work carried out under my supervision.

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DECLARATION

We hereby declare that the work, which is being presented in the project report entitled PREDICTIVE ANALYSIS ON AVAIABILITY OF DOCTORS AND MEDICINES IN GOVERNMENT in partial fulfillment for the award of Degree of **Bachelor of Technology** in **Computer Science and Engineering (DATA SCIENCE)**, is a record of our own investigations carried under the guidance of **Dr. SRABANA PRAMANIK, ASSISTANT PROFFESSOR (Senior Scale), School of Computer Science Engineering (DATASCIENCE) Presidency University, Bengaluru.**

We have not submitted the matter presented in this report anywhere for the award of any other Degree.

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ABSTRACT

In the modern era where the world is driven by modern technology in almost every field, the Healthcare field is not far behind and is rapidly improving, marked by integration of various algorithm and technology. This abstract will delve into how the predictive analysis will benefit the healthcare industry and how the traditional system can be transformed into an efficient system. This paper will also shed light on how the healthcare system which primarily follows the clinical approach for diagnosis can be digitalized using the appropriate analysis algorithm to ensure the information, availability of doctors and medicines, patient database and other activities. In the system that we developed, users can register with their details, and they will be stored in admin's database.

The users will be able to view various information regarding hospitals and doctors to their best interest. The enhanced utilization of resources, along with measures to minimize fraud and abuse are contributing factors for financial performance and administrative outcome. A proper strategic and efficient healthcare information system of predictive nature amalgamated with tons of useful features running on cutting edge technology affordable by all classes of society will prove to be milestone in the public domain. Overall, the contribution of predictive analysis towards the healthcare system is significant.

Keywords: Predictive analysis, healthcare system, Web application, Medicines and Doctors, Big Data, Database system, patient's data, algorithm and technology, Efficiency.

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CHAPTER 1
INTRODUCTION

In the healthcare system the usage of technical and scientific tools has exponentially increased in the last decade and the related information is being applied in all aspects of our day-to-day life, be it superficially or in depth. The traditional healthcare system when integrated with the modern predictive analytical information and Internet revolutionized the entire healthcare system which linked our health with personal information.

During the peak time when the hospitals are congested, the management of doctors and medicines becomes tricky. Based on patients past and present data, this application will generate a short analysis on various medicines and drugs and which specialists will be required for the patient. This way this system will be able to generate ample amount of data which can further make the system efficient and will make the task of hospital management smooth by running the system in accordance with the inflow of patients.

Analysis on daily workflow, vacation and weekends patterns of doctors can make it easy to get rid of unexpected absences which can benefit the hospital management. This can further hint on when a patient is likely to miss the scheduled appointment with a particular doctor and thus can efficiently inform the patient about a likely missed appointment or to be assigned to different doctors as per patient's wish. This will prevent the hospital administration from having a bad reputation and negative effects on some aspects.

An algorithm based predictive analysis on healthcare databases and records can substantially predict the pattern of diseases as well. Such patterns of diseases are helpful for taking special measures before the spread of diseases. This can be done by making the resources available in due time as goes with the famous quote "Prevention is better than cure". Several research performed by various organizations and universities arrived at the conclusion that the rate of no-shows of patients can be predicted with better accuracy and precision when we maintain proper digitalized records. This indeed deviates from earlier trends when digitalized healthcare records were sidelined or not in use.

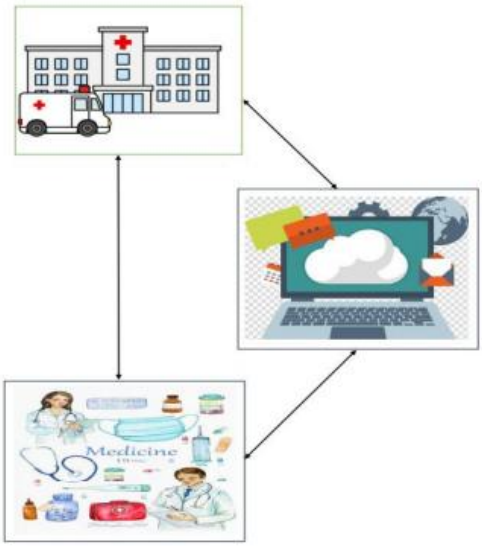


Figure 1. Healthcare Information Technology

Predictive analysis also helps in engaging the patients with proper updates about their health. A more efficient system can also inform them about their future appointments with doctors or when they should visit a doctor. This will also keep the patients updated about when the patients are most prone to certain diseases by tracking their past records. So, the patients can take certain measures in consultation with their doctors. This also enables the patients to track the availability of medicines at the clinic.

CHAPTER 2

LITERATURE SURVEY

2.1 TITLE: Shaikh Karnool Afsa, Khandhakar Nayeem Rejwam, Dada Khalandar "Predictive mechanism for medicines availability in government health centers", publications on ijeat ,2024

Predictive analytics has emerged as a crucial tool in healthcare, addressing issues such as medicine shortages and optimizing resource allocation. By using ML models, healthcare systems can predict patient inflow and disease trends, which helps hospitals maintain adequate stocks of critical medicines. Regression algorithms, as used in this study, are the backbone of predictive systems, correlating historical and real-time patient data to identify patterns and predict future requirements. Big data technologies, like Hive, when integrated with Python libraries like NumPy, Pandas, Scikit-learn, and Matplotlib, enhance the efficiency and accuracy of data processing and analysis. These tools facilitate preprocessing, modeling, and visualization, offering insights that support decision-making. Previous research has demonstrated the efficacy of predictive analytics in various domains, including anticipating infection risks, monitoring communicable diseases, and optimizing hospital readmissions. Studies also highlight the significance of EHRs in holding and analyzing big data to identify relationships in health care data. The incorporation of predictive models with big data analytics has been quite effective in bridging the gaps between resource availability and patient needs. For example, the analysis of real-time data helped to reduce the shortage of medicines during peak periods of disease, thus enabling patients to receive timely treatment and improved outcomes. Moreover, predictive tools help the government and health agencies make data-driven decisions to enhance service delivery and public health infrastructure. This literature underlines the importance of machine learning and big data in transforming healthcare into a proactive and efficient system that can predict and address problems before they become unmanageable. By building on these foundations, the proposed system of this study aims to revolutionize medicine management in government hospitals, ensuring availability during critical times and ultimately improving the quality of care.

2.2 TITLE: M.D Boomija,M.I Almas Banu,k Anu priya "Analysis on medicine and Doctor in government hospital", Publications on ijraset, 2019

The integration of predictive analytics has helped improve the operational efficiency of government hospitals in large measures. Predictive models with the help of historical as well as current patient data help to estimate medicine requirements and optimize the availability of doctors and specialists. The analytics of big data will identify variables influencing resource allocation and develop strategies for improved service delivery. Advanced tools such as R, HTML, and predictive algorithms like Random Forest enable the development of robust models for decision-making. These innovations ensure timely patient care, reduce human effort, and streamline hospital operations. Studies highlight the importance of data analytics in improving healthcare outcomes, identifying patient needs, and enhancing the efficiency of public health systems. The adoption of predictive analytics also helped in the better resources management, fraud reduction as well as improved patient satisfaction owing to timely access to medicines and specialists.

2.3 TITLE: Predictive Analytics on healthcare, www.ijsr.net

This paper delves on the application of predictive analytics into healthcare, which would help develop better quality care at relatively lower costs. It takes into account data mining techniques - classification, association, and clustering - to address all healthcare issues like risk estimation, patient tracking, fraud detection, and so many more. The study encompasses tools such as the Charlson Comorbidity Index estimating health risks and offers a comparative review of existing predictive tools in use. The paper emphasizes transitioning healthcare systems from reactive to proactive approaches, with predictive analytics reducing readmissions and enabling cost-efficient, high-quality care. Challenges include privacy concerns, data integration, and standardization.

2.4 TITLE: Smitha Jhajharia,Seema verma,Manish kumar "Predictive Analytics for better health and disease reduction", publication on predictive analytics today ,2021

Predictive analytics is changing healthcare as it helps assess vast datasets to uncover patterns, predict outcomes, and optimize decision-making processes. Sophisticated techniques, including regression models, data mining, and machine learning, provide insights into patient management and resource allocation. Factors such as age, prematurity, and hemoglobin levels have been shown to be major predictors of ICU stays for pediatric cardiac surgery patients; hence, the necessity for data-driven preoperative planning. Predictive models improve clinical efficiency and save costs by identifying risks and reducing postoperative complications. Fraud detection, marketing, and preventive medicine are other applications of predictive analytics that demonstrate its utility in improving healthcare outcomes. With healthcare organizations digitizing their data, predictive tools allow for customized treatments, better resource allocation, and informed policy decisions that shift the focus toward precision medicine and better patient care

2.5 TITLE: Damien S. E Brokharst,Rogier van de wetering,Ward Ooms,Remko W.Helms "Deploying Predictive Analytics to enhance patient agility and patient value in hospital", publications on Elsevier ,2023

The purpose of this paper is to discuss the role that predictive analytics plays in improving the agility and value of a patient within a hospital system. It discusses the reactionary ability of current hospital capabilities, focusing on the need for an active, predictive approach in healthcare. Predictive analytics enables hospitals to sense patient needs before problems arise, preventing negative trends and better patient outcomes. The research proposal calls for a multi-stakeholder perspective and a comprehensive conceptual framework that integrates biomedical and health service needs. Using predictive analytics, hospitals can enhance evidence-based medical practices, manage capacity, and streamline healthcare pathways. The paper also outlines the potential for an innovation ecosystem that facilitates collaborative data exchange among stakeholders to foster improved healthcare delivery. Future research directions include examining predictive analytics in diverse healthcare settings, exploring related analytics types, and optimizing resource allocation to maximize patient agility and value.

2.6 TITLE: Sharique Ahmad, Priyesh Srivastava Tanish Baqar "Predictive Analytics in medical healthcare: a meta-Analysis", publication on Research gate, 2024

Advanced analytics, predictive and big data analytics, transform the healthcare landscape by enabling data-driven decision-making. Predictive analytics uses historical medical data, statistical models, and machine learning to predict future outcomes, thus being a proactive approach to health care management. Key applications include disease prediction, personalized treatment plans, resource optimization, and fraud detection. For instance, predictive models have been successfully deployed in identifying patients who are at a high risk of readmission or sepsis. This saves costs and ensures better outcomes. Big data analytics, in turn, applies the "4 Vs," which include volume, velocity, variety, and veracity, in extracting actionable insights from a diverse set of datasets like electronic health records and social media. The technologies Hadoop and machine learning provide real-time analytics, hence improving care quality and operational efficiency. Despite the promise, the integration of these technologies is challenged by data privacy, standardization, interoperability, and algorithmic bias, among other ethical issues. Interdisciplinary approaches are suggested to address these problems, including compliance with regulatory frameworks and improving the interpretability of black-box models. The recent advancements that include genomic data integration and telehealth applications highlight the growing role of predictive analytics in precision medicine and remote monitoring. However, there are still challenges such as data fragmentation and organizational resistance to the widespread adoption of this technology. Success stories, such as resource optimization using predictive analytics during the COVID-19 pandemic, highlight the potential for revolutionizing patient care. Future research is focused on improving model transparency, addressing data quality issues, and integrating emerging technologies like IoT and AI to promote holistic, personalized healthcare systems. Predictive and big data analytics are enormous in their promise to innovate, improve patient outcomes, and streamline healthcare delivery with further progress and ethical vigilance.

2.7 TITLE: Mohammed Badawy,Nagy Ramadan and Hesham Ahmed hefny “Healthcare predictive analytics using ML and DL technique: a survey", publications on Springer open,2023

This paper is a thorough review on the integration of ML and DL techniques into predictive healthcare analytics. The author draws attention to the fact that AI is transforming the realm of medical diagnostics with respect to early disease detection and the design of personalized treatment planning. Different types of ML models including linear regression, decision trees, and random forests, besides DL architectures like CNNs and LSTM, are discussed to establish their effectiveness in healthcare prediction. Some of the challenges in using such models include dealing with large, heterogeneous datasets, achieving accuracy, and eliminating biases in the prediction algorithms. The study also delves into supervised, unsupervised, and reinforcement learning models, which can be applied to prognosis, diagnosis, therapy optimization, and enhancement of clinical workflow. Future work is in the refinement of these models to improve scalability, reduce computational complexity, and ensure ethical data governance in healthcare applications.

2.8 TITLE: Wullinarllur Raghupathi and Viju Raghupathi “Big data analytics in. Healthcare: promise and potential”, Publications on Springer 2014

This paper will outline the transformative potential of big data analytics in healthcare through using vast, diverse datasets to glean insights that improve outcomes and reduce costs. The paper defines key concepts such as the "4 Vs" of volume, velocity, variety, and veracity, and describes

frameworks like Hadoop for managing and analyzing healthcare data. Examples of successful applications include disease surveillance, fraud detection, and personalized medicine. Despite its promise, challenges remain in data standardization, privacy, and skill gaps. The paper concludes by advocating for advanced platforms, tools, and policies to realize the full potential of big data in healthcare.

2.9 TITLE: Yichung Wang, Leeann Kung, Choachi Ting "Beyond a technical perspective: understanding big data capabilities in healthcare", publication on ResearchGate,2021

The document is a discussion of the potential strategic applications of big data in the healthcare industry. While previous studies have mostly concentrated on the technological aspects of big data, this paper is based on its strategic implications to bridge the gap between technical capabilities and healthcare management needs.
The authors describe the architecture and functionalities of big data that enable one to process vast quantities of disparate data with various platforms like Hadoop and NoSQL systems. All these are meant to facilitate integrating, transforming, and storing data and help health institutions analyze both structured and unstructured data effectively. Based on such research, a study can point out important

2.10 TITLE: Neeraj, Pradeep Kumar "Predictive analysis on availability of medicines and doctors in government hospitals", publications on ijeat,2020

The literature survey is focused on the applications of predictive analytics and big data technologies in healthcare and related areas. Predictive analytics has been found to have huge potential in improving resource management and decision-making by establishing patterns and trends. Research reveals the integration of structured and unstructured data, thus emphasizing the need to shift from traditional systems towards advanced hybrid models for higher efficiency and performance. The research underlines the transformative role of technology in predictive modeling and its application in healthcare, ensuring data-driven strategies and efficient operation.

CHAPTER 3
RESEARCH GAPS OF EXISTING METHODS

1. Data Quality Problems

Inadequate or Noisy Data:

Incomplete, inconsistent, or noisy datasets are common problems for existing systems, which reduce the reliability and accuracy of predictions. For instance, incomplete stock logs or doctor schedules result in less effective predictive algorithms.

Lack of Standardized Data:

There is no uniform system for the integration of data from various hospitals, which causes inconsistencies and difficulties in aggregating historical data.

2. Model Limitations

Overfitting on Small Datasets:

Random Forest and other machine learning algorithms are prone to overfitting, especially if the datasets are small or have limited diversity. This limits the applicability of the predictions in real-world settings.

Hyperparameter Tuning Constraints:

Current approaches do not fully leverage hyperparameter optimization, which affects the accuracy and flexibility of the models.

3. Lack of Real-Time Updates

Static Models:

Many current methods rely on fixed, pre-trained models, not adaptable to real-time fluctuations such as dynamic physician shift patterns, patient flows or the unexpected availability of a specific medicine.

Data Latency Integration:

Many pipelines that collect and process data are not properly integrated in the predictive systems. There are often lags associated with making decisions.

4. Poor User Interfaces

Console Outputs:

Many predictive systems offer only console-based outputs without intuitive dashboards or visualization tools to support fast decision-making by hospital administrators.

Lack of User Experience:

Current approaches fail to emphasize usability, making them less likely to be used by non-technical personnel and stakeholders in the hospitals.

5. Ethical and Privacy Issues

Risk of Data Privacy:

Gathering and processing patient data raises concerns about privacy and confidentiality, especially in government health facilities.

Bias in the Data and Predictions:

Existing approaches may perpetuate biases from imbalanced datasets like underrepresented rural regions, and the ethical implications of biased resource allocation are also not considered.

6. Limited Consideration of Contextual Factors

Seasonal and Regional Variations:

Models recognize seasonal patterns, such as flu seasons. However, they often fail to account for local or regional variation, such as festivals, political events, or natural disasters that greatly impact resource demands.

Resource Allocation Constraints:

Existing approaches fail to fully optimize predictions for rural or underserved areas where healthcare shortages are more severe.

7. No Feedback Mechanisms

Lack of Continuous Learning:

The current systems lack strong feedback mechanisms that help refine the predictions based on real-world outcomes, thereby reducing their long-term accuracy and effectiveness.

Models are not iteratively updated with new data, which makes the predictions outdated over time.

8. Limited Integration of Advanced Techniques

Underutilization of Deep Learning:

Although techniques like Random Forest and very basic time-series models like ARIMA are used so frequently, deep learning approaches like LSTM and RNN are still far from being exhausted for high complexity and huge scale healthcare prediction.

CHAPTER 4

PROPOSED METHODOLOGY

1. Problem Statement

Predict doctors and medicines availability in health facilities for better patient care and resource utilization. Both short-term (daily/weekly) and long-term (monthly/quarterly) predictions are to be considered.

2. Data Gathering

Checking the availability of doctors and medicines requires a holistic approach, integrating various sources to ensure accuracy, timeliness, and usability of the data.

3. Data Preprocessing

Data Cleaning

Handle missing data, for example, interpolation or imputation for gaps in stock logs.

Remove duplicates or irrelevant records.

Feature Engineering:

Build derived metrics such as daily/weekly inflow average patient or stock turnover rate

Encode categorical variables. Example: medicine types and specialties of doctors

Time Series Structuring:

Prepare data in temporal analysis with trends, seasonality, and irregularity in mind

4. Developing a Predictive Model

Model Selection: Hybrid approach is used combining machine learning, and time-series models are used. For checking availability for doctors, we use some machine language models like Random Forest, Gradient Boosting or neural networks for predicting availability based on roasters, past attendances. Time-series models AIRMA, LSTM models for trends and seasonality.

For medicines inventory models such as Economic Oder Quantity (EOQ) or ABC analysis is used. For demand forecasting linear regression, Prophet, or recurrent neural networks (RNN) for stock depletion prediction.

5. Performance Metrics:

Precision in prediction (Mean Absolute Error, Root Mean Square Error).

6. **Visualization and Reporting:**

Dashboards: Prepare live dashboards with predictive insight for the hospital administrators. Run out of medicines warnings based on a time interval set.

7. Implementation and Deployment:

Software Integration: Model using Python with tools like Pandas, TensorFlow, Scikit-learn,

or R. Deploys models using tools such as Flask, Fast API, or cloud-based ML services, including AWS Sage Maker or Google Cloud AI.

8. Feedback and Iteration

Compare predictions to real-life outcomes to fine-tune your models. Use feedback loops to continually improve the accuracy of the model.

CHAPTER 5

OBJECTIVES

1. Resource Utilization Enhancement

Utilize the prediction of doctor and medicine requirements. This way, it would reduce the shortages of those as one can predict the place and time where and when there is a shortage.

2. Improve Patient Service

Improve patient wait time as the number of doctors will be sufficient.

Medicines: Timely access to required medicines would reduce treatment delays.

3. Enable Proactive Decisions

Enable healthcare administrators to detect shortages or surpluses in advance. This ensures data-driven strategic planning and procurement.

4. Reducing Costs

Minimizes overstocking and understocking of drugs thereby reducing waste and losses on finance. It optimizes staff scheduling to reduce costs related to operations.

5. Enhanced Service Delivery

The same level of doctors and medicine will be available for constant service delivery, enhancing people's trust in the system.

6. Identify Patterns and Trends

Detect trends in healthcare demands with regard to location, outbreaks of diseases, and seasonality. Use historic data to predict future demands well.

7. Emergency Crisis Management Support

Offer analysis at times of crisis - natural calamities or epidemic disease conditions-to allocate resources. Highlight real-time critical gaps for swift response.

CHAPTER 6

SYSTEM DESIGN & IMPLEMENTATION

Predictive analytics is the application of data, statistical algorithm and machine-learning techniques to make predictions about the future of outcomes based on historical data. Predictive models use know results to develop a model that can be used to predict values for different or new data. The modeling results in predictions that represent probability values for different or new data. Predictive analytics is used to forecast trends, enhance performance, to drive decision making, and to predict behavior.

Random Forest Algorithm

A flexible, easy to use machine learning algorithm that produces- even without hyper-parameter tuning time- a great result most of the time. It is one of the most used algorithms in this list, because of its simplicity and the fact that it can be used for any classification and regression tasks. In this post, you are going to learn how the random forest algorithm works and several other important things about it.

Data Ingestion and Preprocessing Layer

Handles data from doctors, medicines, and patient records.
Cleans, preprocesses, and structures data for predictive analytics.

Predictive Models

Machine learning models for predicting doctor availability and medicine demand.

Database Layer

Stores and retrieves structured data for predictions**.**

API Layer

RESTful APIs to serve predictions to external systems or applications.

Deployment

Ensures the system is available for use via Flask and a cloud-based server.
Data Preparation and Preprocessing is a crucial step in any data analysis or machine learning project. It involves transforming raw data into a clean, structured, and usable format to improve the accuracy and efficiency of analytical models. Below are the key stages and techniques involved:

1. Data Collection

Definition: Gathering data from various sources such as databases, APIs, sensors, or user inputs.
Challenges: Inconsistent formats, missing values, and redundant data.
Tools: SQL, Python (pandas, NumPy), web scraping tools (e.g., BeautifulSoup, Scrapy).

2. Data Cleaning

Objective: Remove or correct errors, inconsistencies, or missing information.
Techniques:
Handling Missing Values:

Imputation (mean, median, or mode).
Dropping incomplete rows or columns.
Removing Duplicates: Identifying and eliminating redundant entries.
Outlier Detection: Using statistical methods (e.g., z-score, IQR).
Standardization: Ensuring consistent formats (e.g., dates, units).
Tools: Python libraries like pandas, OpenRefine.

3. Data Transformation
Objective: Convert data into a more suitable format for analysis.
Steps:
Scaling: Normalize or standardize features to bring them into comparable ranges. Tools: pandas, scikit-learn.

4. Data Integration
Objective: Combine data from multiple sources into a unified dataset.
Methods: Merging or joining datasets. Resolving schema differences and key conflicts.
Challenges: Handling overlapping or conflicting data entries.

5. Data Reduction
Objective: Reduce data volume while retaining its integrity.
Techniques: Dimensionality Reduction
Feature Selection:
Removing irrelevant or redundant features.
Sampling: Choosing representative subsets of data.
Benefits: Reduced computational costs and noise in the model.

6. Data Splitting
Objective: Divide data into training, validation, and testing sets.
Best Practices:
Common ratios: 70% training, 15% validation, 15% testing.
Ensure random and stratified splits if necessary.

7. Data Validation
Objective: Ensure the preprocessed data is accurate and consistent.
Methods:
Statistical checks (e.g., mean, variance).
Visualizations (e.g., histograms, scatter plots).
Tools: Matplotlib, Seaborn, Tableau.

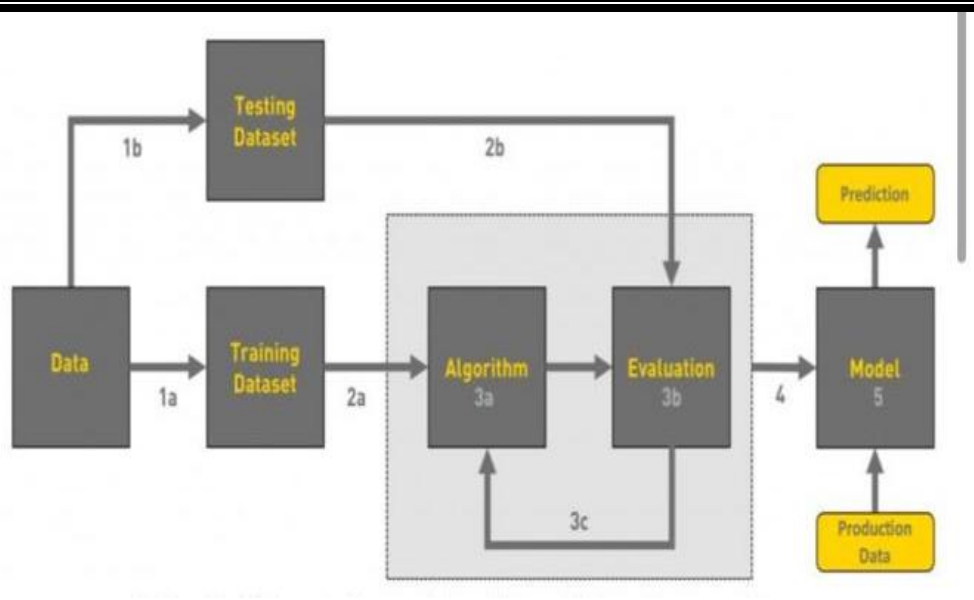


Figure 2. Machine Learning Workflow

CHAPTER-7

TIMELINE FOR EXECUTION OF PROJECT

(GANTT CHART)

Project Timeline:
The timeline for this project is done in several evaluation levels, each focusing on specific factors. These reviews are crucial checkpoints that make certain the undertaking progresses in accordance to plan and meets the required standards

TASK	DURATION
1.Project Initialization	2 weeks
Define objectives and scope	1 week
Form Project team	1 week
2.Data Collection	3 weeks
Gathering hospital Data	1 week
Collect Doctor's Data	1 week
Data cleaning	1 week
3.Predictive model Development	4 weeks
Identify the key variables	1 week
Build Prediction model	1 week
Test and refine model	2 weeks
4.Integration and Analysis	3 weeks
Integrate predictions with hospital systems	2 weeks
Analyze results and generate insights	1 week
5.Reporting and Recommendations	3 weeks
Create a detailed report	2 weeks
Present findings and recommendations	1 week

CHAPTER 8

OUTCOMES

1. Resource Utilization Enhancement

Use the prediction of the requirement of doctors and medicines. This way, it would reduce the shortages of those as one can predict the place and time where and when there is a shortage.

2. Patient Service Enhancement

Enhance patient waiting time as the number of doctors will be adequate.
Medicines: Access to required medicines at the right time would reduce treatment delays.

3. Facilitate Proactive Decisions

Enable healthcare administrators to predict shortages or surpluses beforehand. This gives strategic planning and procurement from data.

4. Costs Saving

The system minimizes overstocking and understocking drugs, hence reducing waste and finance losses. Optimize staff scheduling, thus controlling costs resulting from operations.

5. Service Delivery

The same numbers of doctors and medicine would be available at all times, making constant delivery possible while improving people's confidence in the system. It minimizes peak and seasonal swings.

6. Identify Patterns and Trends

Identify trends in healthcare demands with respect to location, outbreaks of diseases, and seasonality. Predict future demands well with historic data.

7. Emergency Crisis Management Support

Provide analysis at times of crisis - natural calamities or epidemic disease conditions-to allocate resources. Highlight real-time critical gaps for swift response.

CHAPTER 9

RESULTS AND DISCUSSIONS

Predictive analytics in government hospitals has been found to have promising results in improving medicine availability, optimizing doctor schedules, and enhancing healthcare efficiency. The potential for transforming public healthcare delivery is immense, though challenges remain. Future investments in technology and infrastructure will be critical to maximizing these benefits. Since we are entering the patient details based on the history of patient's diagnosis report in government hospitals. Using this application, we can get a patient's history in just one click. So, the processing of information will be faster. Using predictive analysis algorithm through which the patient can know the current location anywhere. Thus, this application reduces human effort and increases. Efficiency of the government hospital. As conclusion, the application of information digging systems for precognizant investigation is a crucial aspect in the field of health because it empowers us to confront ailments before that affect the individual; child, youthful and old people, through foreseeing infections early and keeping burden of the prescriptions. In this paper we applied learning algorithm regression to predict patient's illnesses. Based on patient's historical and current data, system can create a report on what all medicines ought to be accessible in the clinic and in what amount at specific time and area of the emergency clinic. This paper proposes the initial version of research to focus upon the application of predictive analytics to aid in making hospitals agile, and valuable to the patient. A comprehensive research proposal, offered by this paper as an attempt, has designed to comprehensively look at that particular problem by incorporating an integrated, all-round approach due to its coherent conceptual model instead of taking up mere isolated points, by adding a multi-stakeholder perspective other than showing favoritism toward unilateral stands and integrate-grates biomedical as well as health service needs and demands. The findings that will be generated by conducting this initial research proposal could support multiple internal and external stakeholders (e.g., hospital patients, healthcare professionals) in their endeavors to harness the power of predictive analytics in a manner that enhances patient agility and patient value in hospitals and subsequently bridges the identified gap in scientific literature. The proposal is also meant to be a conceptual framework for future research and an initial point of departure for further refinement, improvement, elaboration, and discussion.

CHAPTER 10

CONCLUSION

Predictive analysis is revolutionizing healthcare by using data-driven insights to optimize resources and enhance service delivery. In government hospitals, where resource constraints and operational challenges often prevail, predictive analytics has the potential to transform the way medicines and doctors are managed, ensuring better outcomes for patients while increasing the efficiency of the system.

Improving Medicine Supply Chains

The most prominent utility of predictive analytics is the enhancement of medicine distribution supply chains through predictive models that evaluate historical data against seasonal trends, patient demographics, etc. Thus, it makes pretty accurate predictions with respect to required medicines and ultimately reduces the overstocking and stock out, keeping available the required life-saving drugs whenever needed and decreases wastage thereby reducing cost at the same time. For example, predictive tools can be used to predict an increase in demand for certain drugs during flu seasons or outbreaks, thus enabling hospitals to prepare ahead of time. This not only ensures patient satisfaction but also increases public confidence in government healthcare systems.

Enhancing Doctor Availability

Doctor availability is another critical area where predictive analytics can have a huge impact. Detailed scheduling data and trends in patient influx help hospitals optimize the resource allocation. For instance, based on historical patterns, predictive models might advise additional doctors be scheduled at peak hours or special days when patient footfall is higher. The system can recommend reduced staffing during low-influx periods which supports better utilization of human resources. Such dynamic scheduling ensures that patients receive timely care without unnecessary delays while reducing the risk of overburdening healthcare providers.

Proactive Health Management

Predictive analytics also supports proactive health management by identifying patterns in-patient admissions and forecasting surges in demand. This capability allows hospitals to strategically allocate resources, such as beds, equipment, and staff, to handle increased patient loads effectively. For instance, during seasonal outbreaks or natural disasters, predictive tools help hospitals prepare for an influx of patients, reduce wait times, and ensure adequate resources are available. Moreover, early detection of trends, such as a rising number of cases for a specific condition, enables public health authorities to initiate preventive measures and awareness campaigns.

Decreasing Costs and Increasing Efficiency

Operational inefficiencies and wastage are prevalent in government hospitals. Predictive analytics solves this problem by providing accurate forecasts for procurement and workforce management. The alignment of resource allocation with actual demand will save the hospitals a lot of unnecessary expenditures. For example, ordering the exact quantity of medicines needed and scheduling staff based on demand trends minimizes waste and improves cost efficiency, freeing up funds that can be reinvested in other critical areas.

Building Strong Public Health Outcomes

Ultimately, predictive analytics strengthens public health outcomes by bridging gaps in medicine availability and doctor accessibility. Timely treatment, reduced wait times, and uninterrupted medicine supply foster trust in the public healthcare system. When patients consistently receive the care, they need without undue delays, the overall quality of healthcare improves, leading to better health indicators at the community and national levels.

Challenges and the Way Forward

The benefits of predictive analytics are very promising, but to be able to successfully implement it is quite challenging. Data collection systems that are robust, technological infrastructure, and personnel must be at the required levels in order to make predictions into actionable. Supporting policies and sufficient funding will ensure its easy integration into existing health frameworks.

REFERENCES

[1]. Predictive mechanism for medicines availability in government health centers, www.ijeat.org
[2]. Analysis on medicine and Doctor in government hospital, www.ijraset.com
[3]. Predictive Analytics on healthcare, www.ijsr.net
[4]. Predictive Analytics for better health and disease reduction, www.predictive analytics today.com
[5]. Deploying Predictive Analytics to enhance patient agility and patient value in hospital, www.elsevier.com
[6]. Predictive Analytics in medical healthcare: a meta-Analysis, www.Research gate.com
[7]. Healthcare predictive analytics using ML and DL technique: a survey, Springer open
[8]. Big data analytics in. Healthcare: promise and potential, Springer
[9]. Beyond a technical perspective: understanding big data capabilities in healthcare, ResearchGate
[10]. Predictive analysis on availability of medicines and doctors in government hospitals, www.ijemh.com

APPENDIX-A

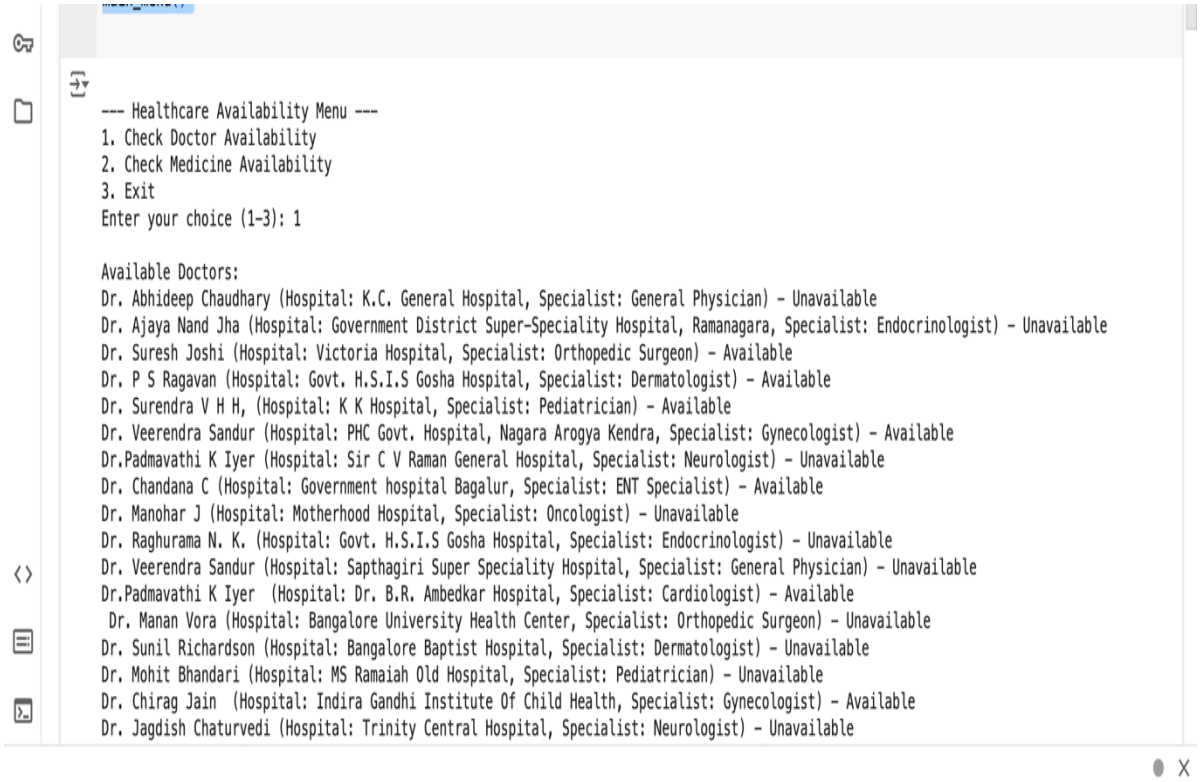
PSUEDOCODE

```
# Function to check availability of doctors with predictions
def check_doctor_availability():
print("\nAvailable Doctors:")
for doctor, details in doctors.items():
# Prepare input for prediction
doctor_row = pd.DataFrame([{
"Doctors": label_encoders['Doctors'].transform([doctor])[0],
"Hospitals": label_encoders['Hospitals'].transform([details['hospital']])[0],
"Specialist": label_encoders['Specialist'].transform([details['specialist']])[0]
}])
prediction = doctor_model.predict(doctor_row)[0]
status = "Available" if prediction == 1 else "Unavailable"
print(f"{doctor} (Hospital: {details['hospital']}, Specialist: {details['specialist']}) - {status}")

# Function to check availability of medicines with predictions
def check_medicine_availability():
print("\nAvailable Medicines:")
for medicine, details in medicines.items():
# Prepare input for prediction
med_row = pd.DataFrame([{
"Medicines": label_encoders['Medicines'].transform([medicine])[0],
"Stock Quantity": details['stock'],
"Price": details['Price'] # Changed 'price' to 'Price' to match the training data
}])
prediction = medicine_model.predict(med_row)[0]
status = "Available" if prediction > 0.5 else "Unavailable"
print(f"{medicine}: {status} (Stock: {details['stock']}, Price: {details['Price']})")
def main_menu():
while True:
print("\n--- Healthcare Availability Menu ---")
print("1. Check Doctor Availability")
print("2. Check Medicine Availability")
print("3. Exit")

choice = input("Enter your choice (1-3): ")

if choice == "1":
```

```
            check_doctor_availability()
        elif choice == "2":
            check_medicine_availability()
        elif choice == "3":
            print("Exiting...")
            break
        else:
            print("Invalid choice. Please try again.")

# Run the main menu
main_menu()
```

APPENDIX-B

SCREENSHOTS



```
--- Healthcare Availability Menu ---
1. Check Doctor Availability
2. Check Medicine Availability
3. Exit
Enter your choice (1-3): 1

Available Doctors:
Dr. Abhideep Chaudhary (Hospital: K.C. General Hospital, Specialist: General Physician) - Unavailable
Dr. Ajaya Nand Jha (Hospital: Government District Super-Speciality Hospital, Ramanagara, Specialist: Endocrinologist) - Unavailable
Dr. Suresh Joshi (Hospital: Victoria Hospital, Specialist: Orthopedic Surgeon) - Available
Dr. P S Ragavan (Hospital: Govt. H.S.I.S Gosha Hospital, Specialist: Dermatologist) - Available
Dr. Surendra V H H, (Hospital: K K Hospital, Specialist: Pediatrician) - Available
Dr. Veerendra Sandur (Hospital: PHC Govt. Hospital, Nagara Arogya Kendra, Specialist: Gynecologist) - Available
Dr.Padmavathi K Iyer (Hospital: Sir C V Raman General Hospital, Specialist: Neurologist) - Unavailable
Dr. Chandana C (Hospital: Government hospital Bagalur, Specialist: ENT Specialist) - Available
Dr. Manohar J (Hospital: Motherhood Hospital, Specialist: Oncologist) - Unavailable
Dr. Raghurama N. K. (Hospital: Govt. H.S.I.S Gosha Hospital, Specialist: Endocrinologist) - Unavailable
Dr. Veerendra Sandur (Hospital: Sapthagiri Super Speciality Hospital, Specialist: General Physician) - Unavailable
Dr.Padmavathi K Iyer  (Hospital: Dr. B.R. Ambedkar Hospital, Specialist: Cardiologist) - Available
 Dr. Manan Vora (Hospital: Bangalore University Health Center, Specialist: Orthopedic Surgeon) - Unavailable
Dr. Sunil Richardson (Hospital: Bangalore Baptist Hospital, Specialist: Dermatologist) - Unavailable
Dr. Mohit Bhandari (Hospital: MS Ramaiah Old Hospital, Specialist: Pediatrician) - Unavailable
Dr. Chirag Jain  (Hospital: Indira Gandhi Institute Of Child Health, Specialist: Gynecologist) - Available
Dr. Jagdish Chaturvedi (Hospital: Trinity Central Hospital, Specialist: Neurologist) - Unavailable
```

```
--- Healthcare Availability Menu ---
1. Check Doctor Availability
2. Check Medicine Availability
3. Exit
Enter your choice (1-3): 1

Available Doctors:
Dr. Abhideep Chaudhary (Hospital: K.C. General Hospital, Specialist: General Physician) - Unavailable
Dr. Ajaya Nand Jha (Hospital: Government District Super-Speciality Hospital, Ramanagara, Specialist: Endocrinologist) - Unavailable
Dr. Suresh Joshi (Hospital: Victoria Hospital, Specialist: Orthopedic Surgeon) - Available
Dr. P S Ragavan (Hospital: Govt. H.S.I.S Gosha Hospital, Specialist: Dermatologist) - Available
Dr. Surendra V H H, (Hospital: K K Hospital, Specialist: Pediatrician) - Available
Dr. Veerendra Sandur (Hospital: PHC Govt. Hospital, Nagara Arogya Kendra, Specialist: Gynecologist) - Available
Dr.Padmavathi K Iyer (Hospital: Sir C V Raman General Hospital, Specialist: Neurologist) - Unavailable
Dr. Chandana C (Hospital: Government hospital Bagalur, Specialist: ENT Specialist) - Available
Dr. Manohar J (Hospital: Motherhood Hospital, Specialist: Oncologist) - Unavailable
Dr. Raghurama N. K. (Hospital: Govt. H.S.I.S Gosha Hospital, Specialist: Endocrinologist) - Unavailable
Dr. Veerendra Sandur (Hospital: Sapthagiri Super Speciality Hospital, Specialist: General Physician) - Unavailable
Dr.Padmavathi K Iyer  (Hospital: Dr. B.R. Ambedkar Hospital, Specialist: Cardiologist) - Available
 Dr. Manan Vora (Hospital: Bangalore University Health Center, Specialist: Orthopedic Surgeon) - Unavailable
Dr. Sunil Richardson (Hospital: Bangalore Baptist Hospital, Specialist: Dermatologist) - Unavailable
Dr. Mohit Bhandari (Hospital: MS Ramaiah Old Hospital, Specialist: Pediatrician) - Unavailable
Dr. Chirag Jain  (Hospital: Indira Gandhi Institute Of Child Health, Specialist: Gynecologist) - Available
Dr. Jagdish Chaturvedi (Hospital: Trinity Central Hospital, Specialist: Neurologist) - Unavailable
```

APPENDIX-C

ENCLOSURES

ACCEPTANCE LETTER

07/01/2025, 17:17 tijer.org/tijer/AD.php?r_id=156016

Print Acceptance

Paper id: TIJER_156016 – Acceptance Notification and Review Result.
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Your Paper Accepted Complete Below Process and Publish it.
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Unique Contents:	**85% (Out of 100)**	**Paper Accepted:**	**Accepted**	**Overall Assessment (Comments):**	**Reviewer Comment store in Online RMS system**
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PRIMARY SOURCES

1	Ashwini Tuppad, Shantala Devi Patil. "Data Pre-processing Issues in Medical Data Classification", 2023 International Conference on Network, Multimedia and Information Technology (NMITCON), 2023 Publication	1%
2	Inam Ullah Khan, Mariya Ouaissa, Mariyam Ouaissa, Muhammad Fayaz, Rehmat Ullah. "Artificial Intelligence for Intelligent Systems - Fundamentals, Challenges, and Applications", CRC Press, 2024 Publication	1%
3	essay.utwente.nl Internet Source	1%
4	Kiran Chaudhary, Mansaf Alam. "Big Data Analytics - Applications in Business and Marketing", CRC Press, 2021 Publication	<1%
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Predictive Analysis Based on Availability of Doctors and Medicines in Government Hospitals

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Abstract

In today's technology-driven world, healthcare is rapidly evolving with the integration of predictive analytics and advanced algorithms. This paper explores how predictive analytics can transform traditional healthcare systems into more efficient, data-driven frameworks. By leveraging digital tools, health care can move beyond the traditional clinical approach, providing easier access to information on doctors, medicines, and patient records. Our system allows users to register and access hospital information, optimizing resources while minimizing fraud and inefficiencies. A robust, predictive healthcare information system, affordable and accessible, can serve as a crucial advancement for public health. In government hospitals, treatment is provided based on the patient's diagnosis with all patient data-past and present stored in the cloud. Our system enables users to register their details, which are stored in an admin database. Using predictive algorithms, users can view hospital locations and obtain information on doctors, medicines, and specialist availability, helping patients access comprehensive details about government hospitals.

Keywords: Predictive analysis, healthcare system, data-driven framework, efficiency, patient's database, algorithm technology, patient's diagnosis.

INTRODUCTION

The decade has seen an increase in the use of technology and research tools in

medicine. The integration of predictive analytics and digital data into traditional healthcare systems are chan ging the way medical information is linked to personal information. It will be difficult to manage doctors an d medicines during busy times; leaving. Predictive algorithms can also identify patients at risk for certain dis eases, allowing doctors to take preventive measures in consultation. Tracking drug products and disease patt erns allows hospitals to prepare for potential outbreaks based on the principle that "prevention is better than cure." Enter price. This approach improves overall patient care and efficiency by keeping patients engaged, updated on their health status, and informed about upcoming appointments. Systems that use patient data ca n predict medication needs at any location. They can also predict doctor needs based on patient admission, t ype of illness, and historical trends. This helps manage doctor availability to include busy hours, weekends, and holidays, reducing the likelihood that patients won't be able to get to the doctors they need. Predictive a nalytics can help solve this problem by analyzing big data from patient histories, clinical outcomes, and clini cal trials to predict what doctors and nurses need. Predictive analytics helps predict treatment response, infec tion risk, admission rates, and more by uncovering patterns and relationships that may not be immediately ap parent. By digitizing and analyzing medical records, especially using AI, major organizations can provide be tter, more useful information to the public.

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2.LITERATURE SURVEY

1. TITLE: Shaikh Kamool Afsa, Khandhakar Nayeem Rejwam, Dada Khalandar "Predictive mechanism for medicines availability in government health centers", publications on ijeat ,2024

Predictive analytics has emerged as a crucial tool in healthcare, addressing issues such as medicine shortages and optimizing resource allocation. By using ML models, healthcare systems can predict patient inflow and disease trends, which helps hospitals maintain adequate stocks of critical medicines. Regression algorithms, as used in this study, are the backbone of predictive systems, correlating historical and real-time patient data to identify patterns and predict future requirements. Big data technologies, like Hive, when integrated with Python libraries like NumPy, Pandas, Scikit-learn, and Matplotlib, enhance the efficiency and accuracy of data processing and analysis. These tools facilitate preprocessing, modeling, and visualization, offering insights that support decision-making. Previous research has demonstrated the efficacy of predictive analytics in various domains, including anticipating infection risks, monitoring communicable diseases, and optimizing hospital readmissions. Studies also highlight the significance of EHRs in holding and analyzing big data to

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identify relationships in health care data. The incorporation of predictive models with big data analytics has been quite effective in bridging the gaps between resource availability and patient needs. For example, the analysis of real-time data helped to reduce the shortage of medicines during peak periods of disease, thus enabling patients to receive timely treatment and improved outcomes. Moreover, predictive tools help the government and health agencies make data-driven decisions to enhance service delivery and public health infrastructure. This literature underlines the importance of machine learning and big data in transforming healthcare into a proactive and efficient system that can predict and address problems before they become unmanageable. By building on these foundations, the proposed system of this study aims to revolutionize medicine management in government hospitals, ensuring availability during critical times and ultimately improving the quality of care.

2.TITLE: M.D Boomija,M.I Almas Banu,k Anu priya "Analysis on medicine and Doctor in government hospital", Publications on ijraset, 2019

The integration of predictive analytics has helped improve the operational efficiency of government hospitals in large measures. Predictive models with the help of historical as well as current patient data help to estimate medicine requirements and optimize the availability of doctors and specialists. The analytics of big data will identify variables influencing resource allocation and develop strategies for improved service delivery. Advanced tools such as R, HTML, and predictive algorithms like Random Forest enable the development of robust models for decision-making. These innovations ensure timely patient care, reduce human effort, and streamline hospital operations. Studies highlight the importance of data analytics in improving healthcare outcomes, identifying patient needs, and enhancing the efficiency of public health systems. The adoption of predictive analytics also helped in the better resources management, fraud reduction as well as improved patient satisfaction owing to timely access to medicines and specialists.

3. TITLE: Predictive Analytics on healthcare, www.ijsr.net

This paper delves on the application of predictive analytics into healthcare, which would help develop better quality care at relatively lower costs. It takes into account data mining techniques - classification, association, and clustering - to address all healthcare issues like risk estimation, patient tracking, fraud detection, and so many more. The study encompasses tools such as the Charlson Comorbidity Index estimating health risks and offers a comparative review of existing predictive tools in use. The paper emphasizes transitioning healthcare systems from reactive to proactive approaches, with predictive analytics reducing readmissions and enabling cost-efficient, high-quality care. Challenges include privacy concerns, data integration, and standardization.

4. TITLE: Smitha Jhajharia,Seema verma,Manish kumar "Predictive Analytics for better health and disease reduction", publication on predictive analytics today ,2021

Predictive analytics is changing healthcare as it helps assess vast datasets to uncover patterns, predict outcomes, and optimize decision-making processes. Sophisticated techniques, including regression models, data mining, and machine learning, provide insights into patient management and resource allocation. Factors such as age, prematurity, and hemoglobin levels have been shown to be major predictors of ICU stays for pediatric cardiac surgery patients; hence, the necessity for data-driven preoperative planning. Predictive models improve clinical efficiency and save costs by identifying risks and reducing postoperative complications. Fraud detection, marketing, and preventive medicine are other applications of predictive analytics that demonstrate its utility in improving healthcare outcomes. With healthcare organizations digitizing their data, predictive tools allow for customized treatments, better resource allocation, and informed policy decisions that shift the focus toward precision medicine and better patient care

5.TITLE: Damien S. E Brokharst,Rogier van de wetering,Ward Ooms,Remko W.Helms "Deploying Predictive Analytics to enhance patient agility and patient value in hospital", publications on Elsevier ,2023

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The purpose of this paper is to discuss the role that predictive analytics plays in improving the agility and value of a patient within a hospital system. It discusses the reactionary ability of current hospital capabilities, focusing on the need for an active, predictive approach in healthcare. Predictive analytics enables hospitals to sense patient needs before problems arise, preventing negative trends and better patient outcomes. The research proposal calls for a multi-stakeholder perspective and a comprehensive conceptual framework that integrates biomedical and health service needs. Using predictive analytics, hospitals can enhance evidencebased medical practices, manage capacity, and streamline healthcare pathways. The paper also outlines the potential for an innovation ecosystem that facilitates collaborative data exchange among stakeholders to foster improved healthcare delivery. Future research directions include examining predictive analytics in diverse healthcare settings, exploring related analytics types, and optimizing resource allocation to maximize patient agility and value.

6.TITLE: Sharique Ahmad, Priyesh Srivastava Tanish Baqar "Predictive Analytics in medical healthcare: a meta-Analysis", publication on Research gate, 2024

Advanced analytics, predictive and big data analytics, transform the healthcare landscape by enabling datadriven decision-making. Predictive analytics uses historical medical data, statistical models, and machine learning to predict future outcomes, thus being a proactive approach to health care management. Key applications include disease prediction, personalized treatment plans, resource optimization, and fraud detection. For instance, predictive models have been successfully deployed in identifying patients who are at a high risk of readmission or sepsis. This saves costs and ensures better outcomes. Big data analytics, in turn, applies the "4 Vs," which include volume, velocity, variety, and veracity, in extracting actionable insights from a diverse set of datasets like electronic health records and social media. The technologies Hadoop and machine learning provide real-time analytics, hence improving care quality and operational efficiency. Despite the promise, the integration of these technologies is challenged by data privacy, standardization, interoperability, and algorithmic bias, among other ethical issues. Interdisciplinary approaches are suggested to address these problems, including compliance with regulatory frameworks and improving the interpretability of black-box models. The recent advancements that include genomic data integration and telehealth applications highlight the growing role of predictive analytics in precision medicine and remote monitoring.

However, there are still challenges such as data fragmentation and organizational resistance to the widespread adoption of this technology. Success stories, such as resource optimization using predictive analytics during the COVID-19 pandemic, highlight the potential for revolutionizing patient care. Future research is focused on improving model transparency, addressing data quality issues, and integrating emerging technologies like IoT and AI to promote holistic, personalized healthcare systems. Predictive and big data analytics are enormous in their promise to innovate, improve patient outcomes, and streamline healthcare delivery with further progress and ethical vigilance.

7.TITLE: Mohammed Badawy,Nagy Ramadan and Hesham Ahmed hefny "Healthcare predictive analytics using ML and DL technique: a survey", publications on Springer open,2023

This paper is a thorough review on the integration of ML and DL techniques into predictive healthcare analytics. The author draws attention to the fact that AI is transforming the realm of medical diagnostics with respect to early disease detection and the design of personalized treatment planning. Different types of ML models including linear regression, decision trees, and random forests, besides DL architectures like CNNs and LSTM, are discussed to establish their effectiveness in healthcare prediction. Some of the challenges in using such models include dealing with large, heterogeneous datasets, achieving accuracy, and eliminating biases in the prediction algorithms. The study also delves into supervised, unsupervised, and reinforcement learning models, which can be applied to prognosis, diagnosis, therapy optimization, and enhancement of clinical workflow. Future work is in the refinement of these models to improve scalability, reduce computational complexity, and ensure ethical data governance in healthcare applications.

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8.TITLE: Wullinarlhur Raghupathi and Viju Raghupathi "Big data analytics in. Healthcare: promise and potential", Publications on Springer 2014

This paper will outline the transformative potential of big data analytics in healthcare through using vast, diverse datasets to glean insights that improve outcomes and reduce costs. The paper defines key concepts such as the "4 Vs" of volume, velocity, variety, and veracity, and describes frameworks like Hadoop for managing and analyzing healthcare data. Examples of successful applications include disease surveillance, fraud detection, and personalized medicine. Despite its promise, challenges remain in data standardization, privacy, and skill gaps. The paper concludes by advocating for advanced platforms, tools, and policies to realize the full potential of big data in healthcare.

9.TITLE: Yichung Wang, Leeann Kung, Choachi Ting "Beyond a technical perspective: understanding big data capabilities in healthcare", publication on ResearchGate,2021

The document is a discussion of the potential strategic applications of big data in the healthcare industry. While previous studies have mostly concentrated on the technological aspects of big data, this paper is based on its strategic implications to bridge the gap between technical capabilities and healthcare management needs.

The authors describe the architecture and functionalities of big data that enable one to process vast quantities of disparate data with various platforms like Hadoop and NoSQL systems. All these are meant to facilitate integrating, transforming, and storing data and help health institutions analyze both structured and unstructured data effectively. Based on such research, a study can point out important

10.TITLE: Neeraj ,Pradeep kumar "Predictive analysis on availability of medicines and doctors in government hospitals", publications on ijeat,2020

The literature survey is focused on the applications of predictive analytics and big data technologies in healthcare and related areas. Predictive analytics has been found to have huge potential in improving resource management and decision-making by establishing patterns and trends. Research reveals the integration of structured and unstructured data, thus emphasizing the need to shift from traditional systems towards advanced hybrid models for higher efficiency and performance. The research underlines the transformative role of technology in predictive modeling and its application in healthcare, ensuring data-driven strategies and efficient operation

3. PROPOSED METHODS

1. Problem Statement: Predict doctors and medicines availability in health facilities for better patient care and resource utilization. Both short-term (daily/weekly) and long-term (monthly/quarterly) predictions are to be considered.
2. Data Gathering: Checking the availability of doctors and medicines requires a holistic approach, integrating various sources to ensure accuracy, timeliness, and usability of the data.
3. Data Preprocessing Data Cleaning:

Handle missing data.For example, interpolation or imputation for gaps in stock logs.

Remove duplicates or irrelevant records.

Feature Engineering:

Build derived metrics such as daily/weekly inflow average patient or stock turnover rate

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Encode categorical variables. Example: medicine types and specialties of doctors Time

Series Structuring:

Prepare data in temporal analysis with trends, seasonality, and irregularity in mind

4. Developing a Predictive Model

Model Selection: Hybrid approach is used combining machine learning, and time-series models are used. For checking availability for doctors, we use some machine language models like Random Forest, Gradient Boosting or neural networks for predicting availability based on roasters, past attendances. Time-series models AIRMA, LSTM models for trends and seasonality.

For medicines inventory models such as Economic Oder Quantity (EOQ) or ABC analysis is used. For demand forecasting linear regression, Prophet, or recurrent neural networks (RNN) for stock depletion prediction.

5. Performance Metrics:

Precision in prediction (Mean Absolute Error, Root Mean Square Error).

6. Visualization and Reporting:

Dashboards: Prepare live dashboards with predictive insight for the hospital administrators. Run out of medicines warnings based on a time interval set.

7. Implementation and Deployment:

Software Integration: Model using Python with tools like Pandas, TensorFlow, Scikit-learn, or R. Deploys models using tools such as Flask, Fast API, or cloud-based ML services, including AWS Sage Maker or Google Cloud AI.

8. Feedback and Iteration

Compare predictions to real-life outcomes to fine-tune your models. Use feedback loops to continually improve the accuracy of the model.

4. BACKGROUND WORKS

A. Machine Learning

The AI model is just piece of code; a designer or information researcher makes it truly to getting ready with information like this one, in case you give refuse to the model, you will get rubbish automatically, for example prepared model will give false or incorrect expectations.

Python Libraries utilized:

i. Pandas ii.

Numpy iii. Label

Encoder iv.

Random

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v. Matplotlib vi.

Linear Regression

i. Pandas

Pandas is a very powerful Python library for data science. It provides data structures such as Data Frame, Series, etc. to efficiently work with and manage structured data. The following list explains the importance of using Pandas.

Import and export data in the desired formats such as CSV, Excel, JSON, etc.

Clean, transform, and analyze data.

Handle missing values and perform operations such as grouping, merging, etc.

ii. Numpy

NumPy, or Numerical Python, is a basic library in numerical computing support for Python.

•Managing large, multi-dimensional arrays and matrices of numeric data.

•Mathematical functions for operations like linear algebra, statistics, and much more.

• High-performance operations on arrays, much faster than Python lists.

iii. Label Encoder

Label Encoder is a feature of the scikit-learn library that converts categorical data, such as strings or labels, into numeric form. It is used when preprocessing data for machine learning models. For example:

•The labels ["dog", "cat", "bird"] could be encoded as [2, 1, 0].

•It helps machine learning algorithms process categorical data effectively.

iv. Random

The random module in Python provides functions to generate random numbers or perform random operations.

It is used for:
• Random integer, floating-point number, or sequence generation.
• Random samples are drawn from lists or ranges.
• Shuffling of data, which is used in splitting of datasets into training and testing. v. Matplotlib

Matplotlib is a prominent Python library for data visualization. It helps the user in creating static, animated, as well as interactive visualizations like:

•Line plots, bar graphs, scatter plots, histograms, etc.

• Chart customizations with titles, axes, labels, and legends

•Visual interpretation of data insights in a legible manner vi.

Linear Regression

Linear Regression is used as a statistical technique with the help of machine learning that models the relationship between an independent and dependent variable in nature. It assumes about the following:

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•A linear relationship with variables.

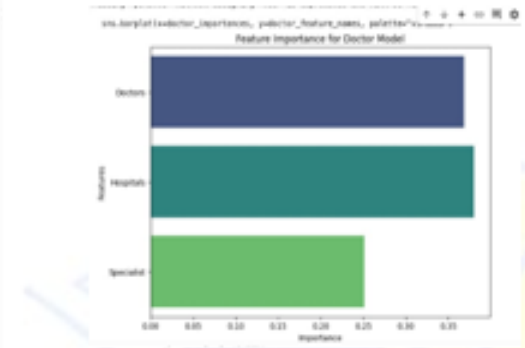
• The objective is to identify the best-fitting line that will minimize the differences between predicted and actual values. It is commonly used in predicting continuous outcomes such as prices, scores, or trends.

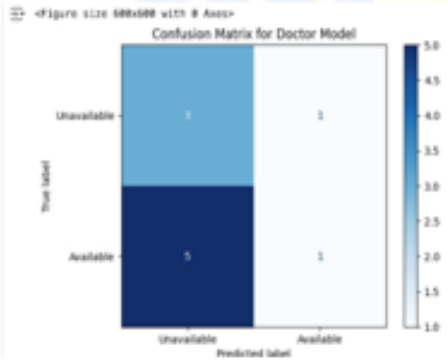
5.OUTCOMES

The actual predictions (the availability of doctors and medicines) depend on the random data, the trained models, and the input dataset. The Random Forest models are trained based on the available data, but since the availability labels are randomly generated for demonstration, the predictions might not necessarily reflect real-world logic.

The models use the trained data and predictions are based on the features of doctors and medicines. However, since some of the feature creation steps have elements of random assignment, predictions seem inconsistent or arbitrary at some points.

When the user interacts with the menu, they will see a list of doctors and medicines, based on machine learning models, along with predicted availability. The predictions are driven by the features in the dataset: doctor data, hospital, specialist, stock quantity, etc.





Pseudocode:

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OUTPUT:

6. DRAWBACKS

Data Quality: The model will be abstinent with the practicum data; however, incomplete or noisy data discharges the accuracy of the model and randoms in labelling during the practicum do not appear to have a trend in real time.

Model Limitations: Random Forest models suffer from overfitting on small datasets, random forest, however, hyperparameter tuning is limited hence, the performance of the model.

No Real-Time Updates: A static-based model does not keep pace with dynamic fluctuations of doctor-time schedules and medicines running out.

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User Experience: Console-based output does not offer user-friendly interfaces and visualization tools for decision-making.

Ethics implications: Data privacy risks and the biases of biases in the data result in equipoise inequities in predictions.

7. CONCLUSION

Predictive analysis of medicines and doctors in government hospitals is a very transformative approach with great implications. Using data-driven insights, predictive models can help enhance medicine supply chains through predicting medicine demand based on historical data, seasonal trends, and patient demographics. This reduces the instances of stockouts and overstocking to ensure that patients have access to drugs whenever needed.

Improve Doctor Availability: Using scheduling data and patient influx trends, predictive analytics can optimize resource allocation, with enough doctors available during peak times, but not so many during lowinflux periods.

Assist in Proactive Health Management: Predictive tools will identify patterns in patient admissions, predict surges in demand, and enable hospitals to strategically allocate resources, thereby reducing wait times and improving care delivery.

Reduce Costs and Inefficiencies: Precise predictions will assist hospitals to optimize procurement and workforce to cut unnecessary wastages that reduce operational efficiencies.

Build Strong Public Health Outcomes: Closing gaps regarding medicine availability and doctors on the ground actually leads to care that is well improved while cutting wait time and assuring that treatments can be timely served.

In conclusion, the integration of predictive analytics in government hospitals is a step toward smarter healthcare management. It not only resolves logistical challenges but also strengthens the trust and efficiency of public healthcare systems. However, successful implementation requires robust data collection systems, trained personnel, and supportive policies to maximize its benefits.

8.REFERENCE

1. Shaikh Karnool Afsa, Khandhakar Nayeem Rejwam, Dada Khalandar "Predictive mechanism for medicines availability in government health centers", publications on ijeat ,2024

2.M.D Boomija,M.I Almas Banu,k Anu priya "Analysis on medicine and Doctor in government hospital", Publications on ijraset, 2019

3.Predictive Analytics on healthcare, www.ijsr.net

4.Smitha Jhajharia,Seema verma,Manish kumar "Predictive Analytics for better health and disease reduction", publication on predictive analytics today ,2021

5.Damien S. E Brokharst,Rogier van de wetering,Ward Ooms,Remko W.Helms "Deploying Predictive Analytics to enhance patient agility and patient value in hospital", publications on Elsevier ,2023

6. Sharique Ahmad, Priyesh Srivastava Tanish Baqar "Predictive Analytics in medical healthcare: a metaAnalysis", publication on Research gate, 2024

7.Mohammed Badawy,Nagy Ramadan and Hesham Ahmed hefny "Healthcare predictive analytics using ML and DL technique: a survey", publications on Springer open,2023

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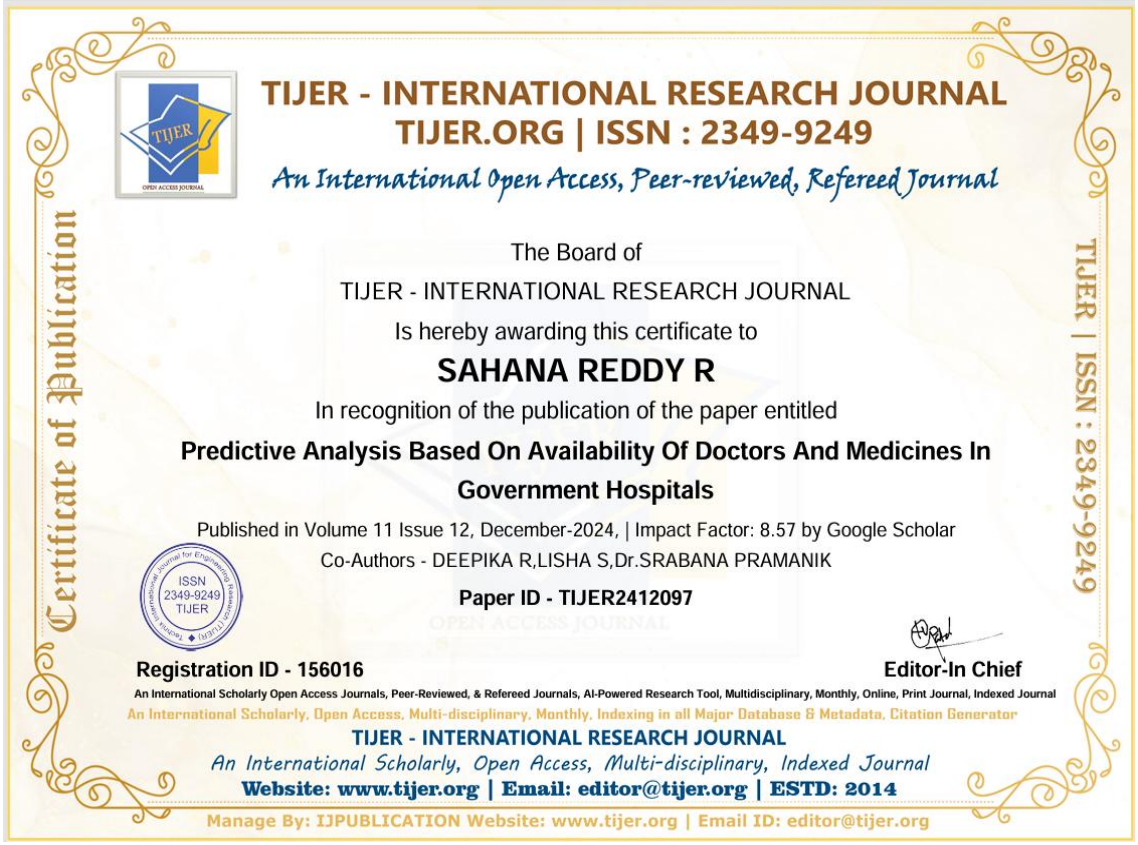
8.Wullinarllur Raghupathi and Viju Raghupathi "Big data analytics in. Healthcare: promise and potential", Publications on Springer 2014

9.Yichung Wang, Leeann Kung, Choachi Ting "Beyond a technical perspective: understanding big data capabilities in healthcare", publication on ResearchGate,2021

10. Neeraj ,Pradeep kumar "Predictive analysis on availability of medicines and doctors in government hospitals", publications on ijeat,2020

11. Guanhua Lee, Sijia Wang,Lian Leng "Leveraging on Predictive Analytics to Manage Clinic No-Show and Improve Accessibility of Care", publications on IEEE,2017

12. Mimoh Oiha,Dr Kirti Mathur "Proposed Application of Big Data Analytics in Healthcare at Maharaja Yashwantrao Hospital", Publications on IEEE,2016



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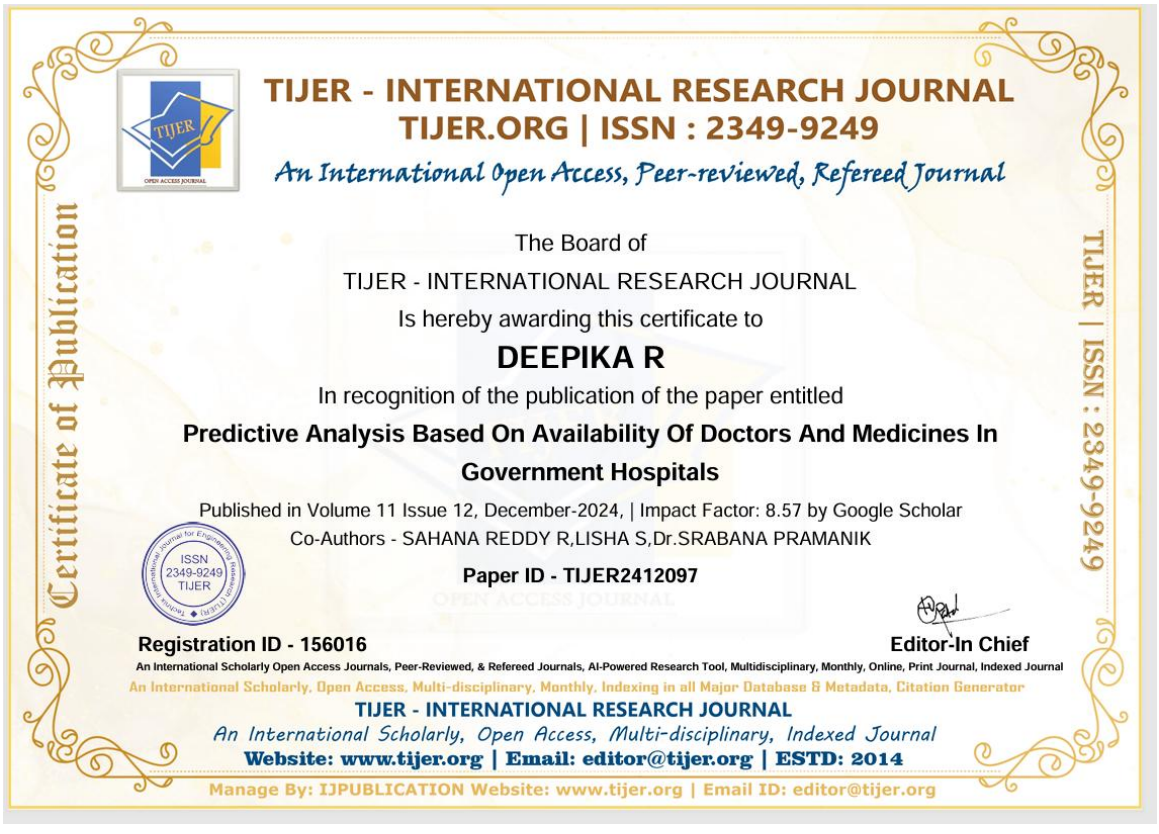

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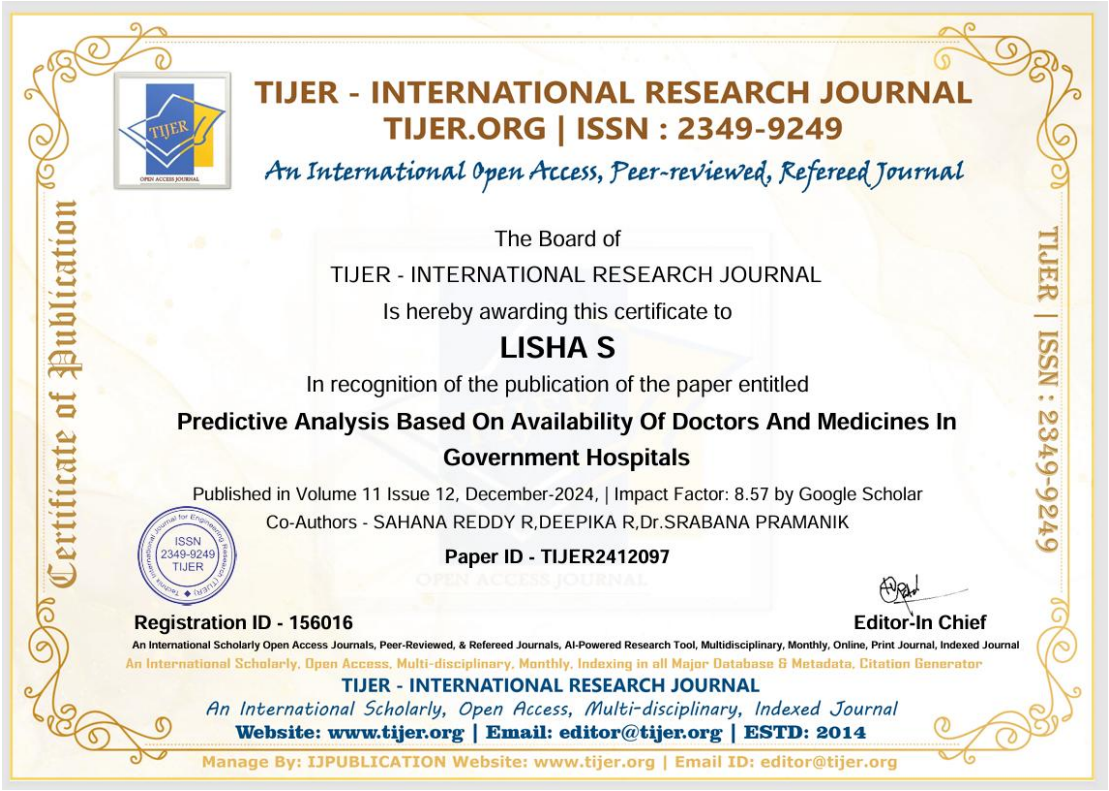

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Sustainable Development Goals(SDG)

SDG 3: Good Health and Well-being

Predictive analytics directly improves public health outcomes by ensuring availability of medicines and healthcare professionals, reduced wait times, and timely treatments. Such brings in better health and well-being for all.

SDG 10: Reduced Inequalities

Predictive models help bridge gaps in healthcare access, especially in underserved populations in remote or low-income areas, by providing equitable distribution of medicines and health services.

SDG 17: Partnerships for the Goals

Implementation of successful predictive analytics thus requires the synergy of governments, technology providers, healthcare institutions, and policymakers. Shared knowledge and innovative ideas lead towards sustainable development through such collaborations.