

Medical Billing System using Machine Learning

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Abstract: *Medical Billing System project aims to develop a comprehensive and efficient software solution for managing the billing and invoicing processes in a healthcare organization. The system will streamline the administrative tasks related to patient billing, insurance claims, and financial management, ultimately improving the efficiency and accuracy of the billing process. By integrating patient information management, the system will store and manage relevant patient details, including personal information, medical history, insurance coverage, and contact details. Appointment scheduling capabilities will facilitate the efficient management of patient appointments. The Medical Billing System project will develop a user friendly and feature-rich software solution that automates and streamlines the billing and invoicing processes in a healthcare organization. By enhancing accuracy, efficiency, and financial management, the system aims to improve overall operational effectiveness, reduce administrative burdens, and enhance the financial viability of healthcare providers.*

Keywords: Medical assistance, web services, distributed processing, access control, Hospital, Information System, Integration, Pharmacy

I. INTRODUCTION

Medicine prediction and scientific billing device utility is an critical technological advancement inside the healthcare industry. This software combines predictive analytics with scientific billing to enhance patient effects and streamline the billing system.

The drugs prediction aspect of the application utilizes artificial intelligence and gadget studying algorithms to expect the simplest medicinal drugs for sufferers primarily based on their medical records, signs, and different factors. This allows healthcare experts make extra informed choices about treatment options and improves affected person consequences.

Then again, the medical billing device software simplifies the billing system by way of automating the generation of clinical payments and insurance claims. This reduces the administrative burden on healthcare companies and minimizes billing mistakes, ensuring that patients are as it should be billed for the offerings they acquire.

Together, those two elements of the software provide a complete answer for healthcare companies to enhance patient care and streamline administrative procedures

II. LITERATURE SURVEY

In the paper [1], Performing a detailed examination of the viability of implementing the hospital-pharmacy management system (HPMS) in the setting of the hospitals in the United Arab Emirates (UAE) is required to complete an intensive feasibility study. The technological, financial, operational, and organisational components of the system may be assessed in order to assess its feasibility and possible advantages Conducting polls of medical professionals, hospital IT directors, and end users: In order to get their ideas, feedback, and perspectives on the proposed HPMS, several stakeholders, including doctors, hospital IT managers, and end users, will be surveyed. This approach aids in gathering feedback and real-world insights from important stakeholders who will be directly impacted by the system. Limited scope: The availability and depth of pertinent literature on a given topic may be a restriction of literature reviews. Finding current and thorough literature on a subject as quickly moving as healthcare and technology may be difficult. Lack of real-world validation: Feasibility studies may be founded on hypotheses and projections and may not accurately reflect the intricacies and nuances of real-world implementation. The results of the feasibility study may not reflect the real results and benefits of the suggested HPMS.

In the paper[2], Qualitative research, more especially descriptive research, is the methodology employed in this paper. The author analyses the state of the Indonesian digital market, highlighting the benefits and drawbacks of technology in business, and offers a solution to the problems faced in remote communities by creating an e-payment system that makes use of SMS technology, the internet, and social media. Limited coverage: SMS technology has coverage restrictions, even if it can be a solution for places with spotty internet access. SMS might not be a practical solution for all locations because it is not always accessible in Indonesia's remotest districts. The viability of an SMS-based electronic payment system hinges on the accessibility and dependability of mobile network coverage in outlying places. The proposed solution might not perform well in locations with inadequate or nonexistent mobile network coverage.

In the paper [3] The design and implementation of a civil affairs real-time medical aid system is the technique employed in the study to address the issues with the current medical help system. By enabling persons in need to promptly cancel their medical assistance accounts at specific medical facilities without having to pay for the aid component of the medical expenses, the system seeks to increase the effectiveness, transparency, and convenience of medical support. Depending on the situation, the civil affairs department may be able to offer the required advance cash, and each person would only be responsible for covering their own portion of the costs.

In the paper [4] The study discusses the development of web-based medication search and informational systems using data management and processing approaches. It also emphasises the need for smarter conclusions and suggestions, such as taking into account contraindications and addressing concerns with fatigue or knowledge gaps among chemists.

The paper's approach seems to be vague and inadequately defined. The study acknowledges the creation of expert systems for the Kazakhstani pharmaceutical market, but it doesn't go into detail on the process that went into their creation. It is therefore challenging to evaluate the approach's advantages and disadvantages. This methodology has some drawbacks, including a lack of transparency, a lack of rigour, a lack of generalizability, a lack of inventiveness, and a lack of discussion of ethical issues. It focusses more on RAID architecture and have high project requirements.

In the paper [5] Systems for pharmacy administration and medical billing can employ fuzzy logic to make decisions and analyse large amounts of data. Examples include determining possible drug interactions, making a diagnosis of a condition, looking at billing information, and improving inventory management. Understanding the system needs and context is crucial for implementing fuzzy logic, and more investigation and validation may be required.

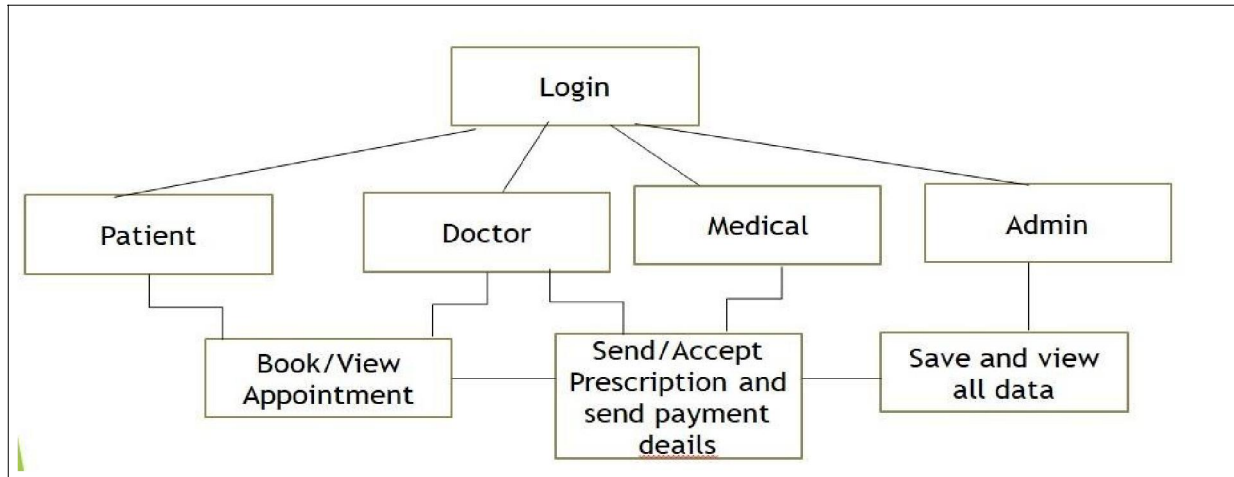
Inventory management: By examining sales information, trends, and seasonality, fuzzy logic can be utilised to optimise inventory management. These inputs can be represented by fuzzy sets, and the system can employ relevance criteria to find the best reorder points, stock levels, and pricing schemes. It's critical to have a thorough understanding of the particular requirements and constraints before implementing fuzzy logic in pharmacy management or medical billing systems.

In the paper [6] A combination of literature review and research methodology is used in the paper's methodology. The writers did a survey of the literature to determine the difficulties and problems with the current pharmacy management system. They looked at pertinent articles on inventory theory, information technology, and pharmaceutical management. Based on this study of the literature, the authors created a research technique that uses observation to ascertain user needs and an entity-relationship diagram (ERD) model to specify the data and relationships in the pharmacy management system. This methodology does have several drawbacks, though, including a dearth of empirical data, a constrained scope, subjectivity, a lack of comparisons, generalizability, and technical viability. It's crucial to review research methodology objectively in order to determine its advantages, disadvantages.

In this paper [7] The methodology used in the paper "Multi Model Implementation on General Medicine Prediction with Quantum Neural Networks" includes data gathering, data pre-processing, model development using a combination of classical machine learning models and quantum neural networks, model evaluation using various performance metrics, and result interpretation. Although the suggested method aims to increase the predictive accuracy of models used in general medicine, its drawbacks—such as the requirement for a sizable dataset and the limitations of current quantum computing hardware—are also explored.

In the paper [8] An automated system to manage medication stocks in hospitals, The methodology used in the paper involves data collection, system design, algorithm development, system implementation, and system evaluation. The authors collected data on medication stocks, usage, and orders from a hospital pharmacy, designed an automated system to manage medication stocks, and developed an algorithm using a combination of economic order quantity (EOQ) and

reorder point (ROP) models to optimize inventory management. The system was implemented in the hospital pharmacy, and its performance was evaluated using several metrics. The algorithm used is a modified version of the EOQ and ROP models to optimize medication inventory management



III. METHODOLOGY

Admin

In this module the Admin has to log in by using valid user name and password. After login successful he can do some operations such as View All Users and Authorize,

View and Authorize Users

In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

View Charts Results

View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.

User

In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful he has to login by using authorized user name and password Once Login is successful user will do some operations

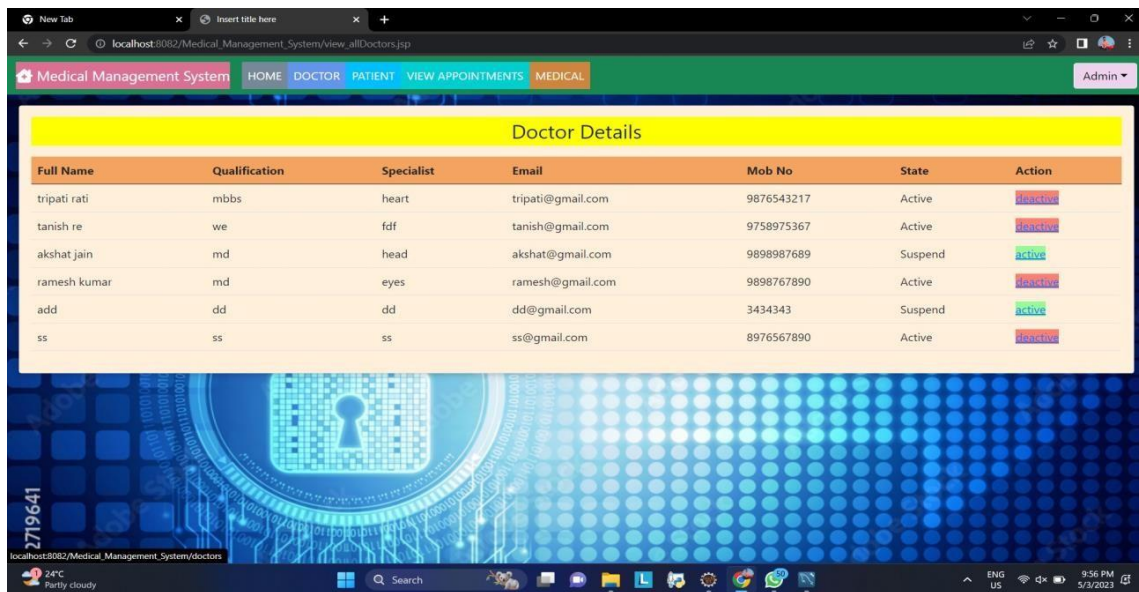
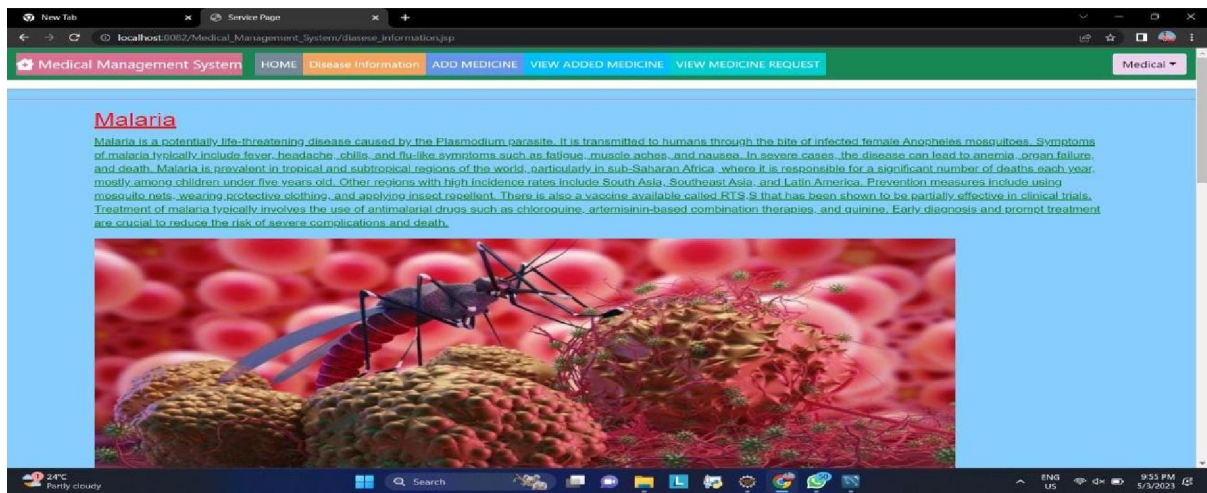
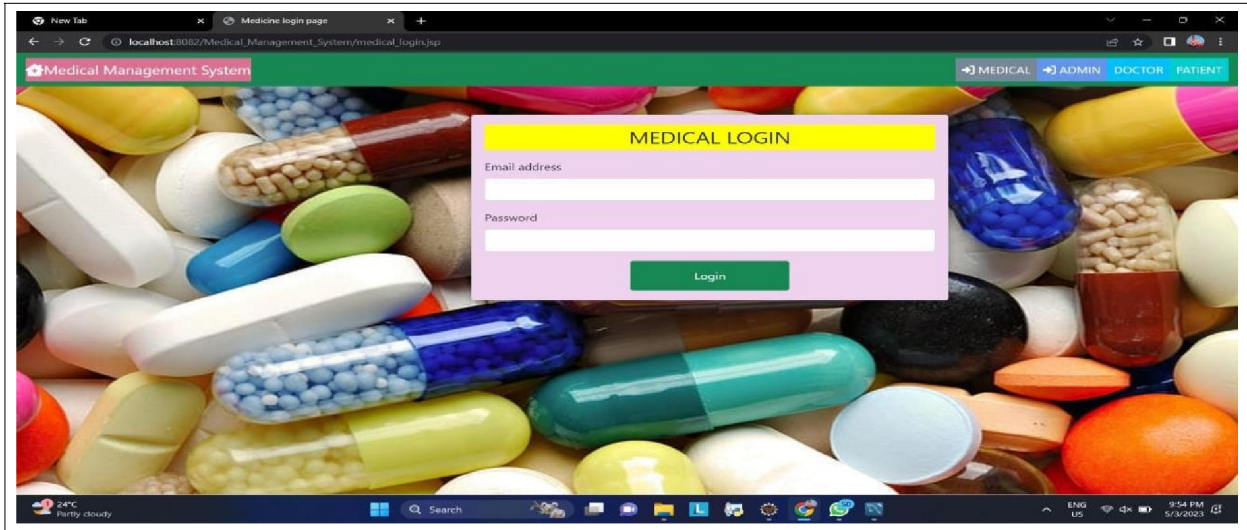
End User

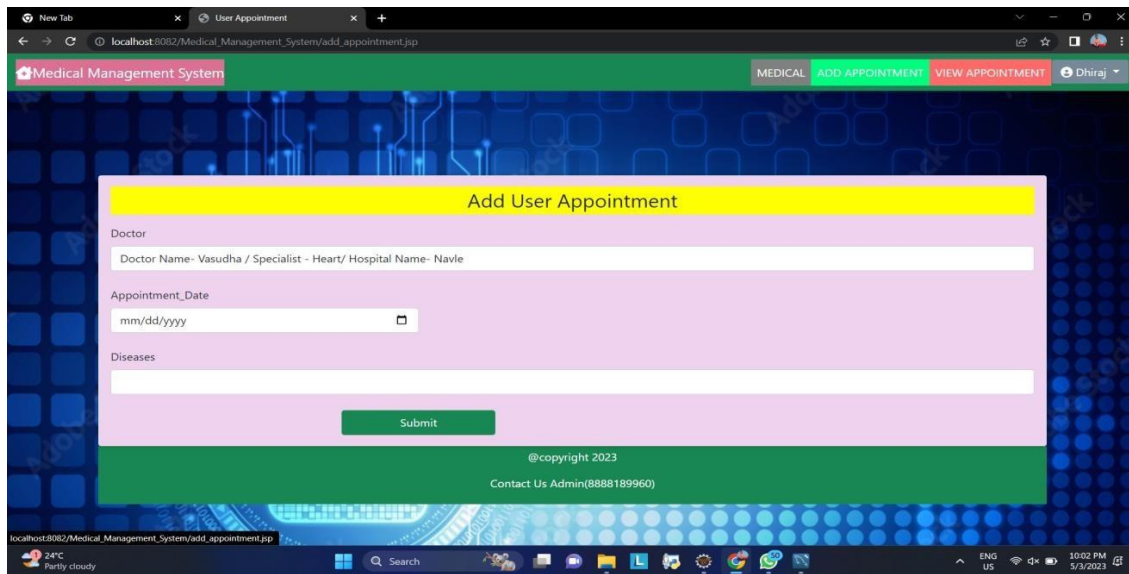
In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password.

Key Features of our Medical Management System

<div style="background-color: #e8f5e9; padding: 5px; margin-bottom: 5px;"> <p>Appointment Scheduling:</p> <p>A medical management system may include a feature for scheduling patient appointments. This feature can be used to manage appointments, send reminders to patients, and keep track of availability for healthcare providers.</p> </div> <div style="background-color: #e8f5e9; padding: 5px;"> <p>Compliance and Security:</p> <p>A medical management system should include features to ensure compliance with healthcare regulations and maintain the security and privacy of patient information. This may include HIPAA compliance, data encryption, and access controls.</p> </div>	<div style="background-color: #e8f5e9; padding: 5px; margin-bottom: 5px;"> <p>Prescription Management:</p> <p>our systems can also manage prescriptions by providing a platform for doctors to electronically prescribe medications and track patient medication history. it can help reduce errors and improve patient safety.</p> </div> <div style="background-color: #e8f5e9; padding: 5px;"> <p>Patient Portal:</p> <p>Our system provide high-quality patient care, prioritizing patient safety and satisfaction. A patient portal is a feature that allows patients to access their medical records, communicate with healthcare providers, and schedule appointments online.</p> </div>
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IV. ALGORITHMS

We introduce a simple yet effective Iterated Local Search (ILS) algorithm that works well in real-world problem instances and improves the state-of-the-art results. This algorithm is an extension of ILS proposed by Gunawan et al. for solving the OPTW. In a nutshell, our algorithm constructs an initial feasible solution via a greedy heuristic. The initial solution is further improved by Iterated Local Search (ILS).

The algorithm is briefly described in the following sub-sections. We still include some explanations which are taken from the original paper so the readers can have a better understanding.

V. FUTURE SCOPE

Future medical billing systems may focus on enhancing patient engagement by providing self-service portals or mobile apps. These platforms can enable patients to view and manage their bills, make payments online, and access their billing history and insurance information, promoting transparency and convenience.

VI. CONCLUSIONS

All of the studies discussed in this review concentrated on the implementation of different systems to enhance the delivery of healthcare. The majority of these studies used a mixed-methods research design, and each work highlighted the constraints of the systems under study. In multiple articles, the significance of comprehending the precise specifications and context of the system being developed was emphasised, and the shortcomings of each paper's methodology were also discussed. Overall, the papers acknowledge the need for more rigorous and open research in this area while offering insightful information on the difficulties and prospects for advancing healthcare through technology. Each paper's methodology is critiqued for its shortcomings, particularly those related to transparency, empirical data, generalizability, and technical feasibility.

REFERENCES

- [1]. A design thinking framework and design patterns for hospital pharmacy management. International Journal of Healthcare Management. "W. Chanpuypetch, D. Kritchanchai." In 2020.
- [2]. Factors influencing acceptance of robotics in hospital pharmacy: a longitudinal study using the extended technology acceptance model International Journal of Pharmacy Practice. "Hogan, G. Grant, F. Kelly, J. O'Hare." In 2020
- [3]. Using Intelligent systems in Pharmacy Sagdoldanova Aiym Department of Information Systems Management Kazakh-British Technical University Almaty, Kazakhstan "2016"

- [4]. E-Payment System Using SMS Gateway and Line Application Emir Husni School of Electrical Engineering and Informatics Institut Teknologi Bandung Bandung, Indonesia “2018 International Conference on Information and Communication Technology for the Muslim World”
- [5]. Hospital-Pharmacy Management System: A UAE Case Study A. Khelifi, D. Ahmed, R. Salem, N. Ali “World Academy of Science, Engineering and Technology International Journal of Computer and Information Engineering Vol:7, No:11, 2013”
- [6]. DENG Zhenrong, HUANG Wenming, Liu Chuangxue, Li Yang, Li Renhua School of Computer Science and Engineering Guilin University of Electronic Technology Guilin, China “In 2017”
- [7]. Muhammad Bagus Andra Department of Computer Science and Kumamoto University Kumamoto, Japan “Automatic Lecture Video Content Summarization with Attention-based Recurrent Neural Network.
- [8]. Gleison Brito, Andre Hora , Marco Tulia Valente, Romain Robbes ,On the use of replacement messages in API deprecation: An empirical study, The Journal Of System and Software, 2018.
- [9]. W. Chanpuyetch, D. Kritchanchai. (2020). A design thinking framework and design patterns for hospital pharmacy management. International Journal of Healthcare Management
- [10]. Expert pharmacy for drug interactions and diagnoses [Electronic resource]-
https://prezi.com/_7zujyc8wkyz/expert-pharmacyfor-drug-interactions-and-diagnoses/