VIVEKANAND EDUCATION SOCIETY'S
INSTITUTE OF TECHNOLOGY
(An Autonomous Institute Affiliated to University of Mumbai)

Department of Computer Engineering

Project Report on

Health Insurance Claim Using AI

In partial fulfillment of the Fourth Year, Bachelor of Engineering (B.E.) Degree in Computer Engineering at the University of Mumbai Academic Year 2023-24

Submitted by

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(2023-24)

VIVEKANAND EDUCATION SOCIETY'S INSTITUTE OF TECHNOLOGY
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Certificate

This is to certify that ***Neeta Narang, Sahil Dodeja, Gunjan Chhaproo, Rahul Fatnani*** of Fourth Year Computer Engineering studying under the University of Mumbai have satisfactorily completed the project on "***HEALTH INSURANCE CLAIM USING AI***" as a part of their coursework of PROJECT-II for Semester-VIII under the guidance of their mentor ***Dr. Prashant Kanade*** in the year 2023-24 .

This project report entitled ***HEALTH INSURANCE CLAIM USING AI*** by ***Neeta Narang, Sahil Dodeja, Gunjan Chhaproo, Rahul Fatnani*** is approved for the degree of **B.E Computer Engineering**

Programme Outcomes	Grade
PO1,PO2,PO3,PO4,PO5,PO6,PO7 , PO8, PO9, PO10, PO11, PO12 PSO1, PSO2	

Date:

Project Guide: Dr.Prashant Kanade

Project Report Approval
For
B. E (Computer Engineering)

This thesis/dissertation/project report entitled ***AI for Health Insurance Claim Using AI*** by ***Neeta Narang , Sahil Dodeja, Gunjan Chhaproo, Rahul Fatnani*** is approved for the degree of ***B.E Computer Engineering***.

Internal Examiner

External Examiner

Head of the Department

Principal

Date: 12/04/24

Place: VESIT,Chembur

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Date:

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We wish to express our profound thanks to all those who helped us in gathering information about the project. Our families too have provided moral support and encouragement several times.

Computer Engineering Department
COURSE OUTCOMES FOR B.E PROJECT

Learners will be to,

Course Outcome	Description of the Course Outcome
CO 1	Able to apply the relevant engineering concepts, knowledge and skills towards the project.
CO2	Able to identify, formulate and interpret the various relevant research papers and to determine the problem.
CO 3	Able to apply the engineering concepts towards designing solutions for the problem.
CO 4	Able to interpret the data and datasets to be utilized.
CO 5	Able to create, select and apply appropriate technologies, techniques, resources and tools for the project.
CO 6	Able to apply ethical, professional policies and principles towards societal, environmental, safety and cultural benefit.
CO 7	Able to function effectively as an individual, and as a member of a team, allocating roles with clear lines of responsibility and accountability.
CO 8	Able to write effective reports, design documents and make effective presentations.
CO 9	Able to apply engineering and management principles to the project as a team member.
CO 10	Able to apply the project domain knowledge to sharpen one's competency.
CO 11	Able to develop professional, presentational, balanced and structured approach towards project development.
CO 12	Able to adopt skills, languages, environment and platforms for creating innovative solutions for the project.

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Abstract

Health insurance claims processing is a critical aspect of healthcare administration, yet it often involves labor-intensive manual tasks prone to errors and delays. Leveraging artificial intelligence (AI) presents a promising solution to streamline and enhance this process. This abstract explores the application of AI in health insurance claim processing, highlighting its potential benefits and challenges.

AI technologies, including natural language processing (NLP), machine learning (ML), and computer vision, can automate various stages of claim processing, from data extraction and validation to decision-making and fraud detection. NLP algorithms can parse unstructured claim documents, extracting pertinent information such as patient demographics, diagnoses, procedures, and provider details with high accuracy. ML models trained on historical claim data can analyze patterns, predict claim outcomes, and prioritize claims for review based on risk factors.

By automating routine tasks and flagging potentially fraudulent claims, AI can significantly reduce processing times, improve efficiency, and lower administrative costs for insurance providers. Moreover, AI-driven analytics can offer insights into claim trends, utilization patterns, and provider performance, enabling better decision-making and resource allocation.

However, integrating AI into health insurance claim processing presents challenges related to data privacy, regulatory compliance, and algorithmic bias. Ensuring robust data security measures, adherence to regulatory standards such as HIPAA, and continuous monitoring of algorithmic fairness are essential to mitigate these risks.

In conclusion, AI holds immense potential to revolutionize health insurance claim processing, offering opportunities for greater efficiency, accuracy, and insights. However, successful implementation requires careful consideration of ethical, legal, and technical considerations to realize its full benefits while mitigating potential risks.

Chapter 1: Introduction

1.1. Introduction:

In the ever-evolving landscape of the healthcare industry, the efficient and accurate processing of health insurance claims stands as a critical pillar. Health insurance providers, policyholders, and healthcare institutions all rely on a seamless and reliable claims processing system. However, traditional methods have often fallen short, leading to delays, errors, and increased costs. To address these challenges and usher in a new era of efficiency and effectiveness, we introduce the project "Health Insurance Claim Using AI." This project represents a groundbreaking initiative that leverages the capabilities of Artificial Intelligence (AI) to transform the way health insurance claims are assessed and processed. AI, with its wide-ranging applications in natural language processing (NLP), machine learning (ML), and computer vision, has the potential to revolutionize the insurance industry's approach to claims management. By incorporating AI-driven solutions into this vital aspect of healthcare administration, we aim to not only expedite claims processing but also enhance its accuracy, reduce operational expenses, and provide an improved experience for both insurers and policyholders. The significance of this project cannot be overstated, as it addresses numerous pain points prevalent in the current claims processing ecosystem. From lengthy document reviews to the detection of fraudulent activities, the project "Health Insurance Claim Using AI" is poised to bring about transformative changes. In the following sections, we will delve into the key components and benefits of this project, showcasing how AI technologies are poised to reshape the health insurance landscape, making it more efficient, reliable, and customer-centric.

1.2 Motivation:

The motivation behind the "Health Insurance Claim Using AI" project is rooted in several critical factors that collectively drive the need for a transformative approach to health insurance claims processing.

1. **Operational Inefficiencies:** Traditional health insurance claims processing methods are often labor-intensive and time-consuming, involving manual data entry and document reviews. These inefficiencies result in delays in claim approvals, leading to frustration among policyholders and increased administrative costs for insurance providers.

2. **Error Reduction:** Human errors in claims assessment can have significant financial implications for both insurers and policyholders. AI technologies can significantly reduce such errors by automating tasks and performing data validation checks with high precision.

3. **Fraud Detection:** Fraudulent claims represent a substantial financial burden on the insurance industry. AI's capability to detect patterns of fraud, anomalies, and inconsistencies can help insurance companies

proactively identify and prevent fraudulent activities, saving them substantial sums of money.

4. Customer Experience: In an era where customer experience is paramount, delays and errors in claims processing can lead to policyholder dissatisfaction and attrition. By expediting the claims process and minimizing claim denials through AI-driven accuracy, insurers can significantly improve customer satisfaction and retention rates.

5. Cost Optimization: The healthcare industry faces ongoing cost pressures, and insurers are continually seeking ways to reduce operational expenses. Implementing AI in claims processing can lead to substantial cost savings by automating routine tasks and reducing the need for manual intervention.

1.3 Problem Definition:

The traditional system is plagued by manual processes, delays, errors, and a lack of effective fraud detection mechanisms, all of which lead to dissatisfaction among policyholders, increased operational costs for insurance providers, and a lack of agility in adapting to evolving healthcare landscapes Key Problem Areas

1. Manual Processes: Manual data entry and document reviews are prevalent, leading to inefficiencies and errors.

2. Processing Delays: Claims processing is often slow, resulting in delays for policyholders in receiving reimbursements or approvals.

3. High Administrative Costs: Extensive paperwork and manual tasks contribute to elevated administrative expenses for insurers.

4. Fraud Vulnerability : The system is susceptible to fraudulent claims, which are challenging to detect manually.

5. Limited Data Analysis: The existing system lacks advanced data analysis capabilities, hindering insights into claim trends and cost patterns.

6. Customer Dissatisfaction: Lengthy processing times, claim denials, and errors lead to customer dissatisfaction and attrition.

7. Inconsistent Decision-Making: Human decision-making in claims assessment can vary, resulting in inconsistent outcomes. 8. Regulatory Compliance Challenges: Adhering to evolving healthcare regulations can be complex and resource-intensive.

1.4 Existing Systems:

The existing system of health insurance claims processing operates on traditional manual methods, relying heavily on human intervention for data entry, documentation reviews, and processing. This manual approach often leads to inefficiencies and delays in claim processing, as well as a higher likelihood of errors due to human factors. Additionally, the lack of advanced data analytics capabilities limits insurers'

ability to gain valuable insights from claim data for improved decision-making and cost management. Overall, the current system's reliance on manual processes and limited technological integration highlights the need for innovation and improvement in health insurance claims processing.

1.5 Lacuna of the Existing System:

The existing system of health insurance claims processing is associated with several drawbacks and challenges, which underscore the need for innovation and improvement. Some of the significant drawbacks of the existing system include:

1. Manual Data Entry: Much of the claims processing in the current system relies on manual data entry, which is time-consuming and error-prone. Human errors in data input can lead to claim denials, delays, and disputes.

2. Delays in Processing: Claims processing in the traditional system can be slow, with numerous administrative steps and documentation reviews. Policyholders often experience delays in receiving reimbursements or approvals for medical expenses.

3. Fraud Vulnerability: The existing system is vulnerable to fraudulent claims, which can be challenging to detect using manual methods. Fraudulent activities not only lead to financial losses for insurers but also impact the overall integrity of the insurance system.

4. Limited Data Analysis: Traditional systems often lack the capability to perform in-depth data analysis. This means missed opportunities for insurers to gain insights into claim trends, cost patterns, and potential areas for cost reduction.

5. Customer Dissatisfaction: Lengthy processing times, claim denials, and errors contribute to customer dissatisfaction. Negative experiences can lead to policyholder attrition and damage the reputation of insurance companies.

1.6 Relevance of the Project:

The project's relevance stems from its aim to address critical issues within the current health insurance claims processing system. By leveraging AI technologies, it seeks to streamline processes, reduce errors, and enhance transparency. This not only improves outcomes for policyholders by ensuring timely access to healthcare services but also provides insurers with valuable insights for better decision-making. Furthermore, the project aligns with industry trends towards digital transformation, contributing to innovation in the healthcare sector. Overall, it promises a more efficient, transparent, and customer-centric approach to insurance claims processing.

1.7 Summary:

In this introductory chapter, we have outlined the foundational aspects of our project. We began by discussing the motivation behind the project, highlighting the need for innovation and improvement in the realm of health insurance claim processing. Subsequently, we defined the problem statement, identifying the inefficiencies and challenges present in the existing system. By exploring the shortcomings of the current system and the lacuna it presents, we underscored the necessity for a more effective solution. Finally, we elucidated the relevance of our project, emphasizing its potential to address the identified issues and significantly impact the health insurance domain

Chapter 2: Literature Survey

A. Brief overview of Literature Survey :

The literature survey on the application of artificial intelligence (AI) in health insurance claim processing reveals a growing body of research exploring various aspects of this field. Researchers have investigated the potential of AI technologies, such as natural language processing (NLP), machine learning (ML), and computer vision, to automate and optimize different stages of the claim processing workflow.

2.1 Related Work:

2.1.1 Health Insurance Claim Automation Using Artificial Intelligence

Keshav Kaushik, Akashdeep Bhardwaj, Ashutosh Dhar Dwivedi, and Rajani Singh (2022) address how AI and ML are revolutionizing the health insurance sector by predicting insurance premiums with a significant accuracy rate of 92.72%. Employing a dataset with over 1300 entries across seven categories, their study underscores the potency of AI in enhancing the precision and efficiency of health insurance services, showcasing a pivotal advancement in policy formulation and customer service enhancement.

2.1.2 Combining the Power of Artificial Intelligence with the Richness of Healthcare Claims Data: Opportunities and Challenge

David Thesmar, David Sraer, and Lisa Pinheiro (2019) delve into the synergy of AI and healthcare claims data highlighting the transformative potential of AI in mining complex patterns from vast datasets. Their research identifies AI's capability to refine insurance claim processing and reduce bias in retrospective studies, pointing towards an era where AI could herald proactive and personalized healthcare services.

2.1.3 AI-Empowered Healthcare Insurance Fraud Detection: An Analysis, Architecture, and Future Prospects

Khyati Kapadiya and Usha Patel present a novel approach combining AI and blockchain technology to address fraud in health insurance. Their comprehensive survey and case study on the use of healthcare wearable devices for fraud detection propose a secure, transparent system aimed at mitigating fraud and enhancing the trustworthiness of health insurance claims.

2.1.4 The International Journal of Innovative Technology and Exploring Engineering (IJITEE)

Discusses the evolution of data's role in the insurance industry, emphasizing the transition from manual processes to digital era solutions. This paper articulates how machine learning can significantly contribute to personalized product offerings, improved risk assessment, and enhanced fraud detection,

highlighting the crucial role of advanced analytics in the future of insurance.

2.1.5 Insurance Claim Analysis Using Traditional Machine Learning Algorithms

B. K. Saraswat, A. Singhal, S. Agarwal, and A. Singh (2023) offers insight into the application of machine learning for health insurance claim predictions. Addressing a critical need within organizations to streamline insurance eligibility and fraud detection processes, their work exemplifies the practical benefits of AI in optimizing resource allocation and decision-making in healthcare insurance.

Each of these studies contributes to the understanding and application of AI and ML in the health insurance domain, from enhancing the accuracy of premium predictions to fortifying the defenses against fraud, thereby marking significant strides towards more efficient, personalized, and secure healthcare services.

2.2 Inference Drawn :

The collective body of research underscores the transformative potential of artificial intelligence (AI) and machine learning (ML) in the healthcare insurance domain. These technologies are reshaping how health insurance premiums are predicted, claims are processed, and fraud is detected. The integration of AI with healthcare data, including claims and patient information, is enabling more personalized, efficient, and secure insurance services. This evolution points towards a future where insurance processes are more data-driven, transparent, and tailored to individual needs, significantly improving the policyholder's experience and the insurer's operational efficiency.

2.3 Limitations :

The research highlights the significant strides made in leveraging AI and ML to revolutionize healthcare insurance processes, including premium prediction, claims processing, and fraud detection. However, amidst these advancements, critical limitations persist. One such challenge is ensuring robust data privacy and security measures, particularly given the sensitive nature of healthcare data. The potential for breaches or misuse of personal health information remains a significant concern, necessitating stringent safeguards and regulatory compliance to protect individuals' privacy and maintain trust in the insurance system.

Moreover, biases inherent in AI and ML models pose a substantial risk to fair and equitable insurance practices. These biases, often derived from historical data, can perpetuate disparities and lead to discriminatory outcomes in premium pricing or claim assessments. Addressing these biases requires careful model design and ongoing monitoring to identify and mitigate any unfairness. Additionally, the complexity of integrating diverse datasets from various sources presents another challenge. Inconsistent data quality,

missing values, and compatibility issues can hinder the effectiveness and reliability of AI-driven systems, necessitating robust data management strategies and interoperability standards.

Despite these challenges, the research underscores the transformative potential of AI in enhancing the efficiency, personalization, and transparency of healthcare insurance services. By addressing these limitations through collaborative efforts among stakeholders, policymakers, and technologists, the industry can unlock the full benefits of AI while ensuring fairness, privacy, and trust in the insurance ecosystem.

2.4 Comparison with the Existing Systems:

Aspect	Our System	Existing System
User Interface	Intuitive and user-friendly interface for claim submission and tracking.	Interface may vary; some systems may lack user-friendly features.
Claim Processing Speed	Utilizes AI algorithms for faster claim verification and adjudication.	Processing speed may vary; manual processing can lead to delays
Accuracy of Claim Adjudication	AI-driven algorithms enhance accuracy and reduce errors in claim adjudication. .	Manual processes may be prone to errors and inconsistencies.
Final Report for Agent Assistance	Generates comprehensive final reports summarizing assessment results for easy agent assistance.	Lack of standardized final reports; agents may need to manually compile information.

2.5 Summary:

At the conclusion of Chapter 2: Literature Survey, we have undertaken a comprehensive exploration of existing research within the field relevant to our project. We began by presenting an abstract encapsulating the primary themes and insights drawn from the surveyed literature. Throughout the chapter, we meticulously examined various research papers, analyzing their methodologies, findings, and implications. Additionally, we conducted a comparative analysis between our proposed system and the existing systems documented in the literature, highlighting areas of convergence and divergence. By juxtaposing our approach with existing methodologies, we were able to identify unique improvements.

3. Proposed Design

3.1 Block diagram of the system

Beginning with user authentication, claimants submit documents, as depicted in Figure 3.1, with text extraction techniques used to gather relevant data. The system then distinguishes between claim types; valid ones proceed to payment processing, while Figure 3.1 illustrates the pathway, invalid claims undergo additional validation processes

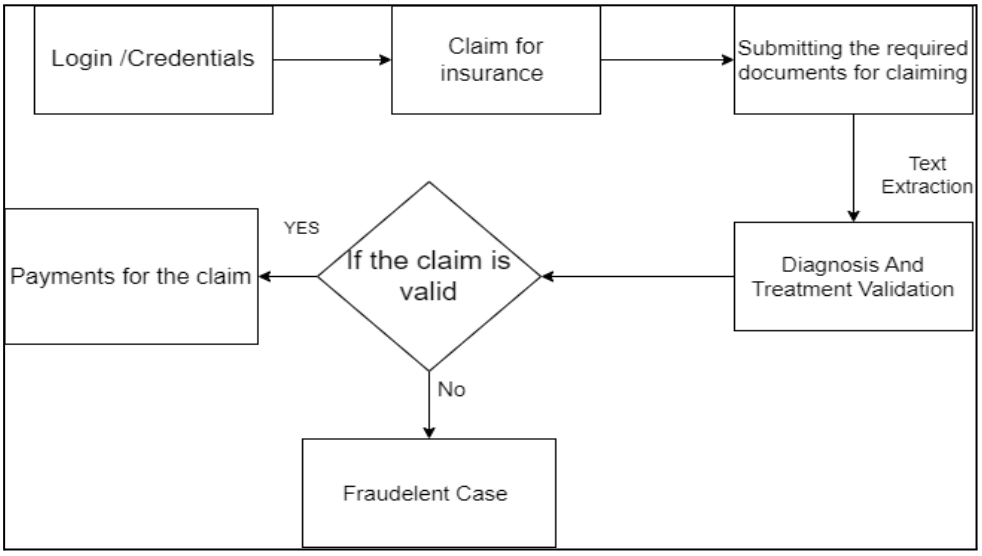


Fig 3.1.1: Block Diagram

3.2 Modular diagram of the system

The diagram illustrates a modular healthcare insurance system comprising user interaction, data processing, and fraud detection components (Figure 3.2). Users interact with the system through a User Interface, initiating prescription and claims submissions. Backend processing involves Prescription and Claims Subsystems, which validate and store data in respective databases.

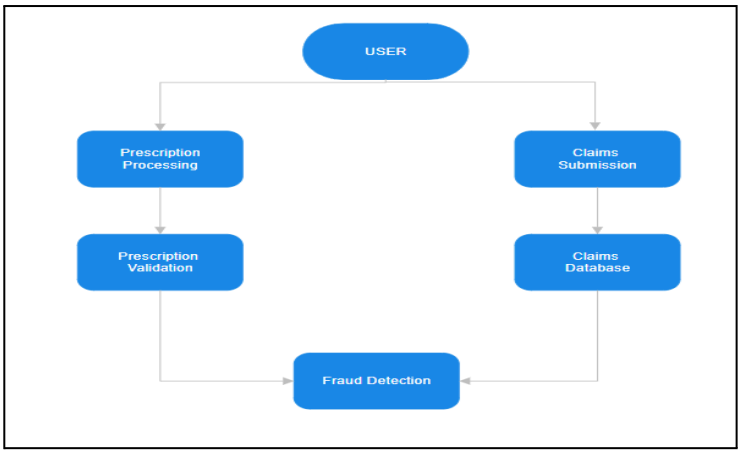


Fig 3.2.1: Block Diagram

3.3 Detailed Design

DFD Level 0 depicts the core functionalities of the healthcare insurance system. It showcases user interaction via a User Interface, managed by a Controller/Application Logic, and encompasses Prescription Processing, Validation & Alert Generation, and Claims Submission components. These facilitate efficient prescription management and claims processing for users like doctors and patients.

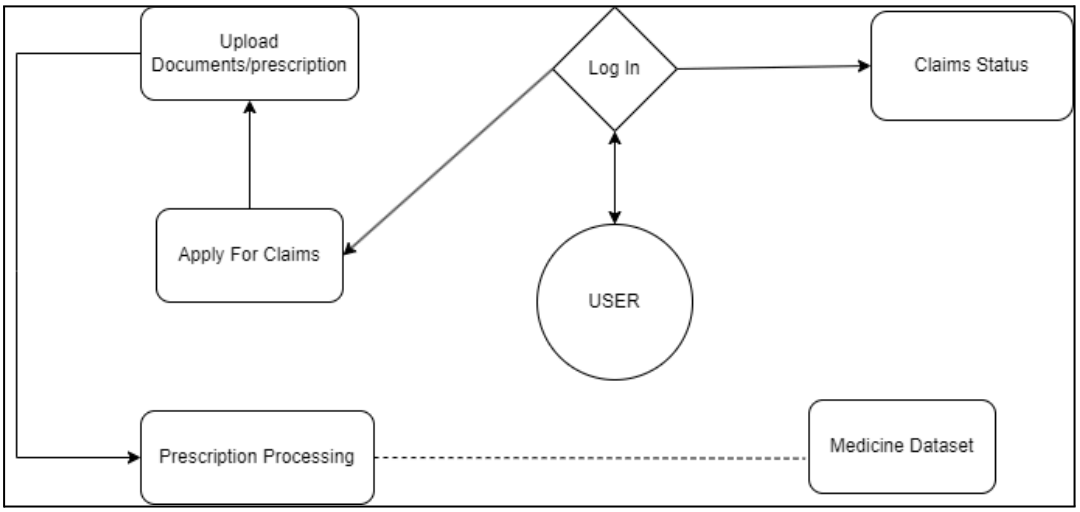


Fig 3.3.1: Detailed Design

3.4 Project Scheduling & Tracking using Timeline / Gantt Chart

The Gantt chart of our project where we worked for the whole semester to create this model is shown in a timeline pattern. It is the most important part to think and design the planning of your topic and so we planned our work like the gantt chart shown.

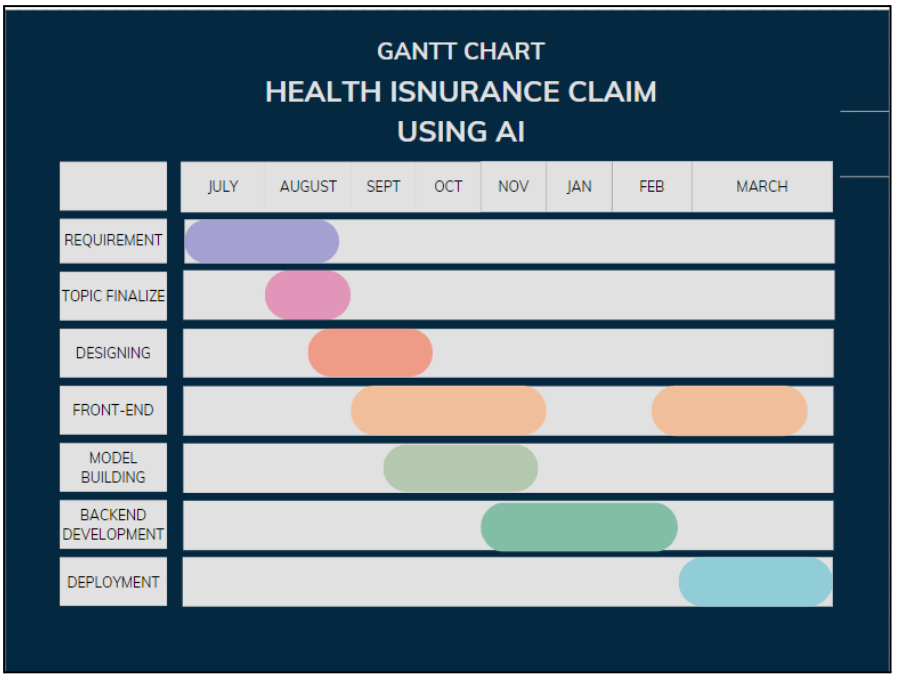


Fig 3.4.1 : Gantt chart

3.5 Summary:

Chapter 3 provides an overview of the system's architecture using block diagrams, Data Flow Diagrams (DFDs), and modular diagrams. These visual representations offer a concise summary of the system's components, interactions, and structure, facilitating understanding and analysis.

Chapter 4: Requirement Gathering for the Proposed System

In this chapter we are going to discuss the resources we have used and how we analyzed what the user actually needs and what we can provide. We will also discuss the functional and non-functional requirements and finally the software and hardware used.

4.1 Requirement Gathering:

The Requirement Gathering is a process of requirements discovery or generating list of requirements or collecting as many requirements as possible by end users. It is also called as requirements elicitation or requirement capture.

1. Identify the relevant stakeholders:

- Policyholders seeking health insurance coverage.
- Healthcare providers such as hospitals, clinics, and pharmacies.
- Insurers responsible for assessing claims and managing risk.
- Regulatory bodies overseeing insurance regulations.

2. Establish project goals and objectives:

- Improve claims processing speed and accuracy.
- Enhance fraud detection capabilities.
- Increase automation to reduce manual intervention.
- Enhance overall efficiency and effectiveness of the insurance system.

3. Elicit requirements from stakeholders:

- Conduct surveys or interviews with policyholders to understand their expectations regarding claim submission and reimbursement.
- Gather insights from healthcare providers on common claim submission errors, documentation requirements, and integration preferences.
- Engage with insurers to understand their goals for claims processing and risk management.
- Collaborate with regulatory bodies to ensure compliance with insurance regulations.

4. Document the requirements:

- Capture gathered information in a structured format, such as a requirements document or user stories.
- Ensure alignment between stakeholder expectations and project deliverables.

5. Confirm the requirements:

- Validate the documented requirements with stakeholders to ensure accuracy, completeness, and feasibility.
- Conduct review sessions or walkthroughs to address any discrepancies or misunderstandings.

6. Prioritize the requirements:

- Rank requirements based on their importance, urgency, and impact on project goals.
- Allocate resources effectively and focus on addressing critical requirements first to maximize value delivery.

By following these steps, the requirements gathering process for health insurance claims using AI can ensure successful implementation and alignment with stakeholder needs and objectives.

Table 4.1.1 Requirements of the System

USE CASE	DESCRIPTION
Register and Login	Policyholders, healthcare providers, and insurance representatives.
Submit Claim	Policyholders submit their health insurance claims.
Claim Verification	Jobseeker search and apply for one or more than on job according to their qualification
Real-time Claim Status Updates	Policyholders receive updates on their claim status and processing timelines
Adjudication with Policyholder Feedback	During the adjudication process, if the submitted medicines or treatments don't match the coverage policy, the system prompts a text box to provide the policyholder with an opportunity to explain or provide additional information.
Issuance of Final Claim Report	Upon completion of the adjudication process, the system generates and issues a final claim report to the policyholder.
Downloading the report	The final claim report can be downloaded by the user in pdf format.
Agent Assistance Based on Report Insights	Insurance agents utilize the insights provided in the final claim report to assist policyholders with any follow-up actions or inquiries

4.2 Functional Requirements:

In developing the health insurance claim processing system, it is imperative to clearly define its functional requirements to ensure that it meets the needs and expectations of its stakeholders.. These requirements encompass a range of features and capabilities, including document submission, data preprocessing, feature extraction, insurance validity assessment, and report generation. By articulating these functional requirements, stakeholders can align on the desired behaviors and capabilities of the system, guiding its design, development, and implementation process.

- **Document Submission**
    1. Users should be able to submit health insurance documents through a user-friendly interface.
    2. The system should support various document formats, including PDFs, images, and scanned documents.
- **Document Preprocessing**
    1. The system must perform OCR (Optical Character Recognition) to extract textual information from submitted documents.
    2. Data preprocessing techniques should be applied to clean and normalize the extracted text.
- **Feature Extraction**
    1. Relevant features such as policy numbers, patient details, and insurance provider information should be extracted from the documents.
- **Insurance Validity Assessment**
    1. The core functionality of the system is to assess the validity of insurance documents based on extracted features.
    2. The system should classify documents as either valid or invalid with associated confidence scores.
- **PDF Final Report Download**
    1. Feature that allows users to download a PDF final report summarizing the assessment results of their submitted insurance documents.
    2. This report will include the validity status of the documents and associated confidence scores. Users can access and save this report for their records or further reference.

4.3 Non Functional Requirements

- **Performance**
    1. **Response Time:** The system should provide quick responses, with a maximum response time of X seconds for document assessment.

2. **Scalability:** The system must handle increasing loads gracefully and efficiently, supporting a large number of concurrent users and document submissions.

- **Reliability**
  1. **Availability:** The system should aim for high availability, with downtime limited to scheduled maintenance periods.
  2. **Fault Tolerance:** It should be resilient to hardware failures, network issues, and other common disruptions.

- **Security**
  1. **Data Encryption:** Sensitive data should be encrypted both in transit and at rest.
  2. **Authentication and Authorization:** The system must implement robust user authentication and authorization mechanisms to ensure data access control.
  3. **Data Privacy:** Compliance with data privacy regulations, such as GDPR or HIPAA, should be maintained for health insurance information.

- **Usability**
  1. **User Interface:** The user interface should be intuitive and user-friendly, requiring minimal training for users to operate effectively.
  2. **Accessibility:** The system should be accessible to users with disabilities, complying with relevant accessibility standards.

4.4 Hardware, Software, Technology and Tools Utilized:

A. Hardware Requirements

- Processor: Intel i3 or AMD equivalent
- Disk Space: 4GB
- RAM: 8GB

B. Software Requirements:

- Frontend: Angular
- Database: SQL Server
- Backend: Spring Boot, Python

C. Techniques:

- **Python:-** Python is a high-level, general-purpose programming language. Its design

philosophy emphasizes code readability with the use of significant indentation.

- **Angular:-** Angular is a TypeScript-based open-source front-end web application framework. Developed and maintained by Google, it's designed for building dynamic, single-page web applications (SPAs) and progressive web applications (PWAs). Angular provides a comprehensive set of tools and features for building robust, scalable, and maintainable applications, including a powerful component-based architecture, dependency injection, routing, forms handling, and state management.

- **SQL Server:-** SQL Server is a relational database management system (RDBMS) developed by Microsoft. It is a comprehensive database platform designed for storing, retrieving, and managing structured data. SQL Server supports various data storage and querying capabilities, including support for transactions, stored procedures, triggers, views, and functions. It also offers advanced features such as in-memory processing, high availability, and robust security mechanisms. SQL Server is widely used in enterprise environments for mission-critical applications and data-driven decision-making processes.

- **Spring Boot:-** Spring Boot is a Java-based open-source framework that simplifies the development and deployment of Spring-based applications. It streamlines the process by providing conventions and starter dependencies, reducing the need for manual configuration. With features like auto-configuration and embedded servlet containers, Spring Boot enables rapid development and easy deployment of production-grade applications. Developers can focus on writing business logic while Spring Boot takes care of the underlying infrastructure.

D. Tools:

- **PyCharm:-**PyCharm is a powerful Python IDE developed by JetBrains. It offers a comprehensive set of features for Python development, including intelligent code completion, syntax highlighting, refactoring tools, and built-in version control integration. PyCharm also supports various frameworks and libraries commonly used in Python development, such as Django, Flask, and NumPy. With its user-friendly interface and extensive customization options, PyCharm is suitable for both beginners and experienced Python developers.
- **IntelliJ:-** IntelliJ IDEA is an integrated development environment (IDE) developed by JetBrains. It provides support for multiple programming languages, including Java, Kotlin,

Groovy, and Scala. IntelliJ IDEA offers a wide range of features for software development, such as intelligent code completion, refactoring tools, version control integration, and built-in testing support. It also includes advanced productivity features like code inspections, code navigation, and code generation. With its robust set of tools and customizable interface, IntelliJ IDEA is a popular choice among developers for building Java-based applications.

4.5 Constraints:

- **Handwritten Document Verification Limitation:**
    1. Handwritten documents pose challenges for automated verification due to variability and complexity.
    2. The system may encounter difficulties in accurately extracting and processing information from handwritten documents.
    3. Manual verification or additional validation steps may be necessary for handwritten documents.

- **Time Constraints for Verification:**
    1. Verification processes must adhere to predefined time constraints to ensure timely processing of claims.
    2. Delays in verification can result in prolonged claim processing times and impact customer satisfaction.
    3. Efficient workflows and automated validation mechanisms should be implemented to expedite verification within allotted timeframes.

- **Dynamic Adaptability Requirements:**
    1. The system should be designed with flexibility to accommodate changing needs and requirements over time.
    2. New features, functionalities, or integrations may need to be added to address evolving business needs, regulatory changes, or technological advancements.
    3. Agile development methodologies and modular architecture can facilitate seamless integration of new functionalities as needed.

- **Resource Constraints:**
    1. Constraints related to budgetary limitations, hardware resources, and technological infrastructure may impact system development and implementation.

2. Resource allocation should be optimized to balance performance requirements with cost considerations.
3. Leveraging cloud-based services or outsourcing certain components may mitigate resource constraints and enhance system scalability.

4.6 Summary:

In Chapter 4, we meticulously documented the requirements gathering process, detailing the hardware and software prerequisites essential for the successful implementation of our project. We began by elucidating the specific requirements derived from stakeholder inputs, user feedback, and industry standards, ensuring alignment with project objectives. Additionally, we outlined the hardware specifications necessary to support our system's functionalities, including considerations for scalability, performance, and reliability. Furthermore, we identified the software components essential for the development, deployment, and operation of our project, leveraging industry-leading tools and technologies to enhance efficiency and effectiveness. Throughout the chapter, we discussed various techniques employed for requirement elicitation, such as interviews, surveys, and brainstorming sessions, facilitating a comprehensive understanding of user needs and system functionalities. By meticulously documenting the hardware and software requirements, as well as the tools and techniques employed, Chapter 3 lays the groundwork for the subsequent phases of our project, ensuring a well-defined roadmap for implementation.

Chapter 5: Implementation of the Proposed System

5.1 Methodology:

The Health Insurance Claim Processing System project aims to develop an advanced platform that automates and streamlines the process of handling health insurance claims. This system leverages cutting-edge technologies, including Artificial Intelligence (AI), to enhance efficiency, accuracy, and user experience throughout the claims processing lifecycle. At its core, the system facilitates the submission, verification, adjudication, and reporting of health insurance claims. Users, including policyholders, healthcare providers, and insurance company representatives, interact with the system through a user-friendly interface accessible via web.

Here's an expansion of the process of validating user credentials and submitting a claim

1. **User Authentication:**
   The user initiates the claim submission process by accessing the system's interface through a web or mobile application. The system prompts the user to authenticate their identity by providing credentials such as username and password.

2. **Credential Validation:**
   Upon receiving the user's credentials, the system validates them against stored user data in the authentication database. If the credentials are valid, the user is granted access to the claim submission interface. Otherwise, an error message is displayed, indicating invalid credentials.

3. **Claim Submission Initiation:**
   Once authenticated, the user navigates to the claim submission section of the interface to initiate the process. The system presents the user with a form or wizard-like interface to enter the necessary details and documentation related to the claim.

4. **Data Entry:**
   The user fills out the required fields in the claim submission form, including personal information, policy details, medical history, and details of the treatment or services rendered.

5. **Document Upload:**
   Along with the form, the user has the option to upload supporting documents such as medical reports, bills, prescriptions, and any other relevant documentation related to the claim. The system supports various document formats, including PDFs, images, and scanned documents.

6. **Submission Confirmation:**

   The system provides a confirmation message to the user, indicating that the claim has been successfully submitted. Additionally, the user may receive an email or notification confirming the submission and providing a reference number or tracking ID for future inquiries.

7. **Post-Submission Actions:**

   After submitting the claim, the user may have the option to track the claim status, review submitted documents, or make amendments if necessary. The system allows users to access and manage their submitted claims through their account dashboard, providing transparency and control over the claims process.

5.2 Algorithms and Flowcharts for the respective modules developed:

We have mainly used two algorithms for our project:

5.2.1. PDF to Image Conversion using OpenCV (cv2):

Converting PDF documents to image format is a crucial step in extracting text through OCR (Optical Character Recognition). The process begins with reading the PDF file using a library such as PyPDF2, enabling the extraction of individual pages. Subsequently, each page is processed to convert it into an image format, typically PNG or JPEG, using the OpenCV (cv2) library in Python. This conversion facilitates further processing of the document, as images are more amenable to OCR algorithms. The algorithm iterates through each page, converts it to an image, and saves it to a designated folder. This process ensures that each page of the PDF document is accurately represented as an image, laying the foundation for subsequent text extraction.

5.2.2. Optical Character Recognition (OCR) using Pytesseract:

After converting PDF pages to images, the next step involves extracting text from these images through OCR. Pytesseract, a widely-used OCR tool, facilitates this process by accurately recognizing text within images. Initially, the image file is read using OpenCV (cv2), after which it may undergo preprocessing steps to enhance OCR accuracy, such as resizing, noise reduction, or thresholding. The preprocessed image is then passed to the Pytesseract library, which performs OCR to extract the text. Optionally, the extracted text may undergo post-processing steps, such as noise removal or format correction, to refine the output. Finally, the extracted text is outputted for further analysis or processing. This comprehensive process of OCR ensures the accurate extraction of text from PDF images, enabling efficient handling and interpretation of textual information within documents.

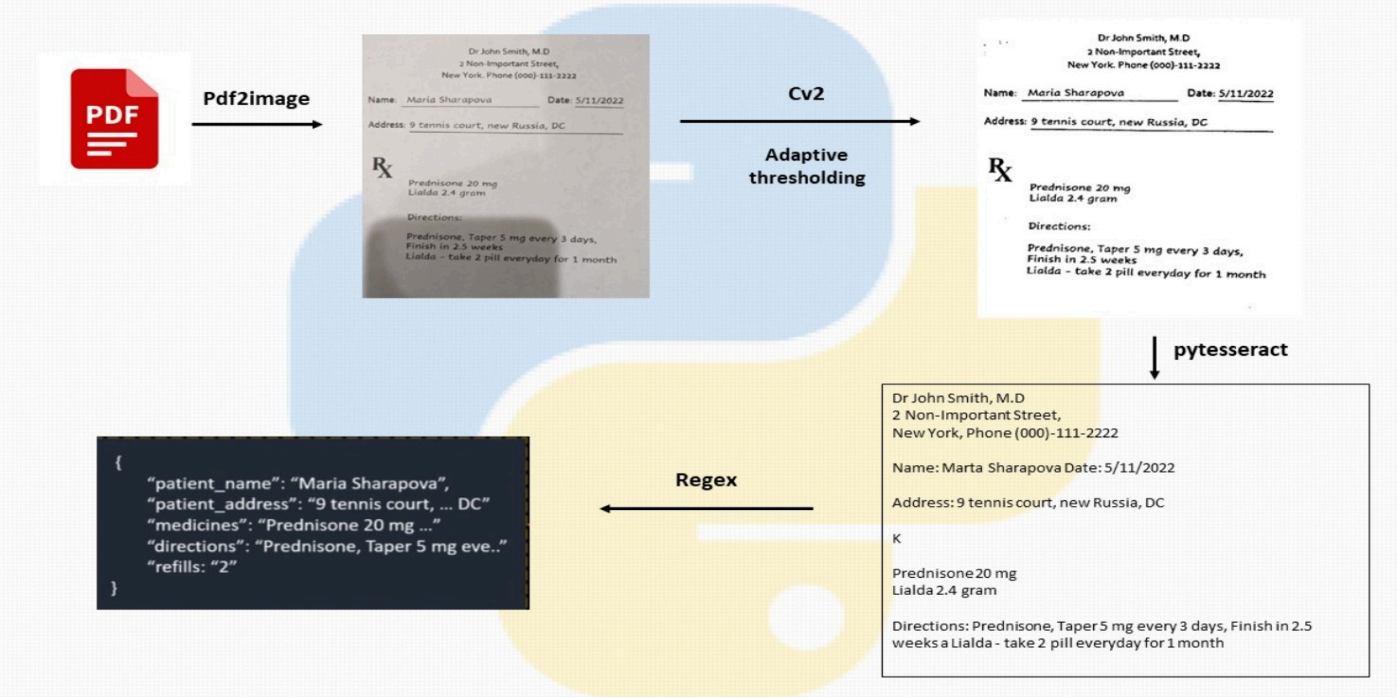


Fig 5.1.1: Flowchart of Pytesseract model

5.3 Datasets source and utilization:

The datasets utilized in this project were sourced through consultations with medical professionals, primarily focusing on three distinct types of patient conditions: fractures, fractures with high blood pressure (BP), and fractures with high blood pressure and elevated blood sugar levels (BP and sugar).

1. Data Collection Process:

The data collection process involved collaborating with medical experts, including orthopedic surgeons, physicians, and healthcare providers.Patient data pertaining to the identified conditions, including demographics, medical history, diagnostic reports, and treatment outcomes, was collected.

2. Fracture Dataset:

The fracture dataset comprises information related to patients diagnosed with fractures, including the type and location of fractures, severity, treatment protocols, and recovery outcomes.

3.Fracture with High Blood Pressure (BP) Dataset:

The fracture with high blood pressure dataset extends the fracture dataset by incorporating additional data on patients with concurrent high blood pressure conditions.

It includes information on blood pressure measurements, hypertension diagnosis, medication usage, and management strategies for patients with fractures and hypertension.

4. Fracture with High Blood Pressure and Elevated Blood Sugar (BP and Sugar) Dataset:

The fracture with high blood pressure and elevated blood sugar dataset further augments the existing datasets by integrating data on patients with comorbid conditions of high blood pressure and elevated blood sugar levels.This dataset encompasses data on blood glucose levels, diabetes diagnosis, glycemic control measures, and treatment regimens for patients with fractures, hypertension, and diabetes.

5. Utilization of Datasets:

The collected datasets serve as valuable resources for various applications, including clinical research, predictive modeling, and healthcare analytics. The datasets enable the development of predictive models for assessing fracture risk, optimizing treatment strategies, and improving patient outcomes in individuals with concurrent medical conditions such as hypertension and diabetes. Furthermore, the datasets support evidence-based decision-making and clinical interventions by providing insights into the complex interplay between fractures and comorbidities, guiding personalized patient care and management plans.

5.4 Summary :

Chapter 5 delves into the intricacies of data collection and preprocessing within the context of implementing AI in health insurance claim processing. It emphasizes the critical role of high-quality data in the success of AI-driven systems. The chapter outlines methodologies for gathering and preprocessing the extensive datasets required for effective claim processing, while also addressing concerns related to data privacy and security. Through meticulous data management practices, the system ensures the integrity and reliability of information, laying a solid foundation for the AI algorithms to operate efficiently.

Chapter 6: Testing of the Proposed System

6.1 Introduction:

Software testing is the sequence of activities that happen during software testing. By employing a sane software testing life cycle, an organization ends up with a quality strategy more likely to produce better results. Why is this so important, though? It all boils down to customer satisfaction. Presenting a perfect product to the customer is the end goal of every organization.

Nothing puts off customers more than bug-filled user experience. So when enterprises realized this, they began to include testing as a mandatory part of the SDLC. Since then, testing has become an integral part of every organization.

Project Testing Phase means a group of activities designated for investigating and examining progress of a given project to provide stakeholders with information about actual levels of performance and quality of the project. It is an attempt to get an independent view of the project to allow stakeholders to evaluate and understand potential risks of project failure or mismatch. The purpose of the testing phase is to evaluate and test declared requirements, features, and expectations regarding the project prior to its delivery in order to ensure the project matches initial requirements stated in specification documents.

6.2 Types of tests Considered:

A. Pre testing phase

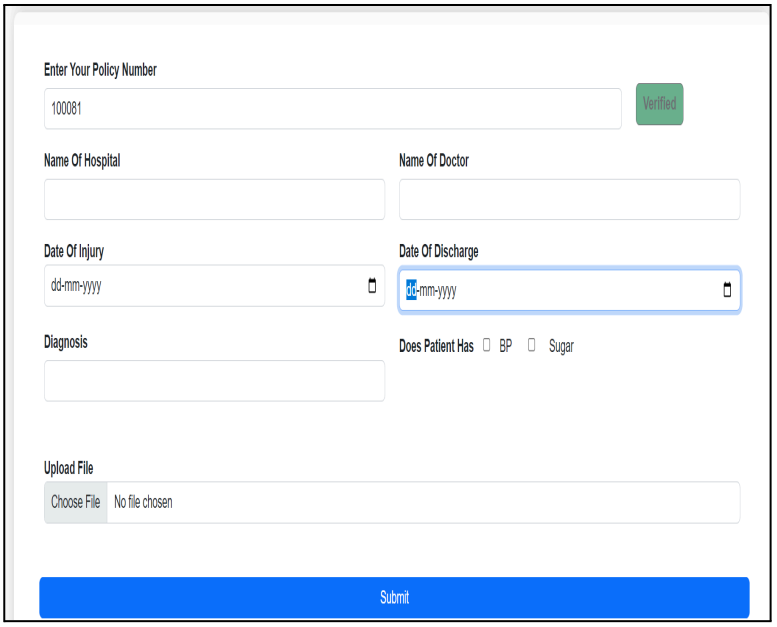
During the design and implementation stages of the AI-driven health insurance claim system, researchers developed a questionnaire aimed at pre-testing the underlying concepts of the recommendation system. Pre-test questions were crafted to gather insights into consumers' perceptions regarding making healthy choices within the insurance claim process, and the potential impact of AI-driven features on their decision-making. Ten participants provided feedback on their experiences with the system, which was utilized to refine its structure, features, and functionality in preparation for the beta-testing phase.

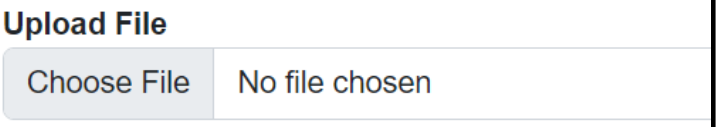
B. Beta-Testing Phase

In the beta-testing phase, the AI-powered system was evaluated by ten users following a predetermined protocol. Each user was tasked with interacting with the system to submit a health insurance claim, simulating real-world usage scenarios. Trained evaluators then conducted interviews with the participants, utilizing established guidelines for assessing the system's usability and effectiveness. Following the beta test, in-depth interviews were conducted to gather qualitative data on user experiences and perceptions, which were analyzed using standard qualitative methods. The feedback obtained from this process informed final adjustments to the system, focusing on optimizing features such as user interface layout, accessibility of information, and ease of claim submission. These adjustments aimed to enhance user

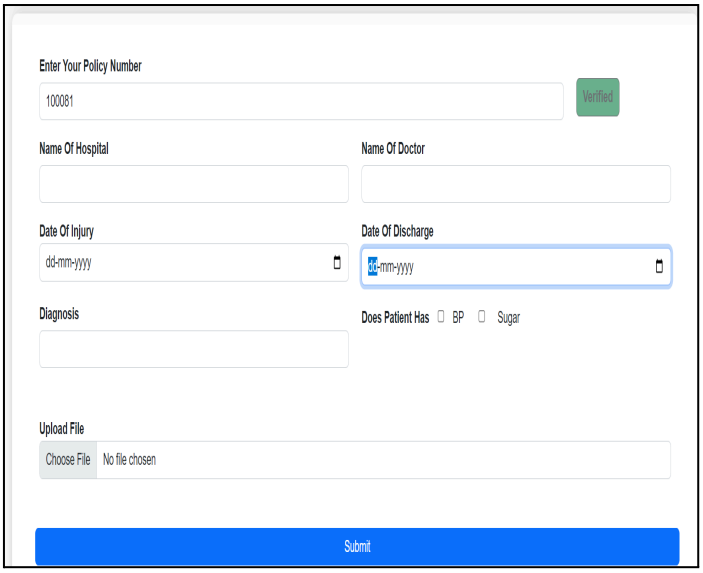
satisfaction and streamline the health insurance claim process through AI-driven capabilities.

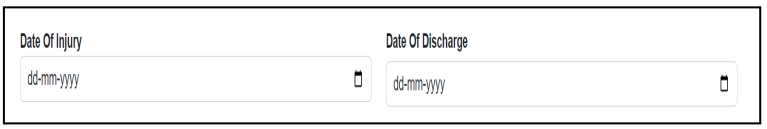
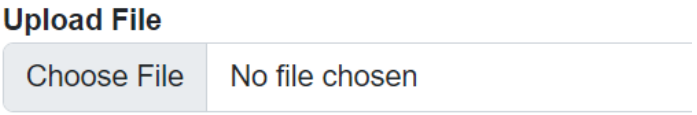
6.3 Various test case scenarios considered:

	Test Cases
Case 1: Basic Claim Submission: Test submitting a standard health insurance claim with all required information accurately filled out.	
Case 2: Test submitting multiple claims for the same patient and condition.	
Case 3: The input field for 'injury and discharge' should only accept proper valid values where the date/month/year should be greater.	

Case 4: If the user can select files from their devices and upload them to the system.	
Case 5: Test submitting multiple claims for the same patient and condition.	

6.4 Inference drawn from the test cases:

	Test Cases
Case 1: This test ensures that a standard health insurance claim can be successfully submitted with all required information accurately filled out. It verifies the core functionality of the claim submission process.	
Case 2 : These tests focus on ensuring that the system can detect and flag duplicate claims submitted for the same patient and condition. It helps prevent redundant processing and potential fraud.	

Case 3: This test validates the input field for 'injury and discharge,' ensuring that it only accepts proper valid values where the date/month/year should be greater. It aims to maintain data integrity and accuracy.	
Case 4: This test verifies whether users can select files from their devices and successfully upload them to the system. It ensures that the file upload functionality works as expected and that uploaded files are properly processed and stored.	
Case 5: These tests focus on ensuring that the system can detect and flag duplicate claims submitted for the same patient and condition. It helps prevent redundant processing and potential fraud.	

6.5 Summary:

Chapter 6 discusses the comprehensive testing conducted on the health insurance claim system. Various test cases were executed to validate different functionalities. These tests included basic claim submission to ensure accurate data entry, duplicate claim detection to prevent fraud, and validation of input fields to maintain data integrity. Additionally, file upload functionality was thoroughly tested to ensure seamless integration with user devices. Through rigorous testing, the system's reliability, accuracy, and user-friendliness were evaluated, paving the way for its successful implementation in real-world scenarios. Overall, the testing process played a crucial role in identifying and addressing potential issues, ensuring the system's readiness for deployment and delivering a seamless user experience.

Chapter 7: Results and Discussions

7.1 Screenshot of Use Interface(UI) for the system:

Figure 7.1.1: The landing page screenshot provides users with an initial interface view, offering a glimpse into the system's layout and design. It showcase features such as claim processing real-time status updates and overall report generation.

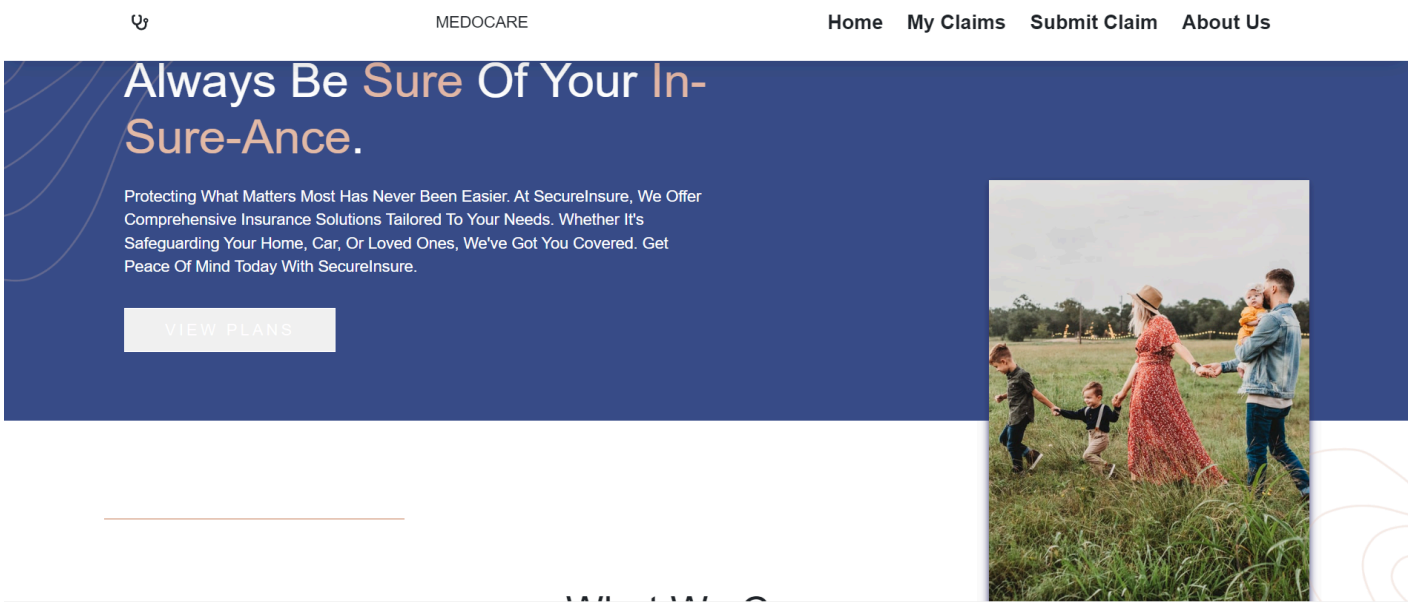


Fig 7.1.1: Screenshot for Landing page

Figure 7.1.2: The login page screenshot serves as the entry point for authorized users, providing a secure gateway to access system functionalities.

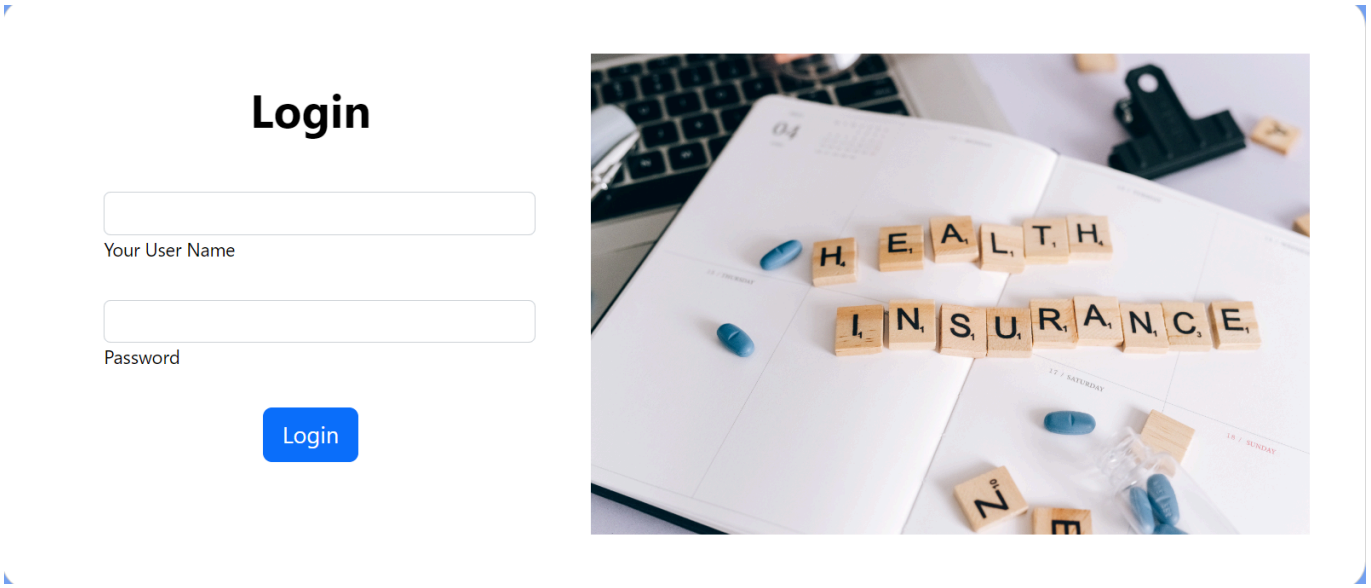


Fig 7.1.2: Screenshot for Login page

Figure 7.1.3: The tracking status page screenshot enables users to monitor the progress of their submitted claims, offering transparency and visibility into claim processing.

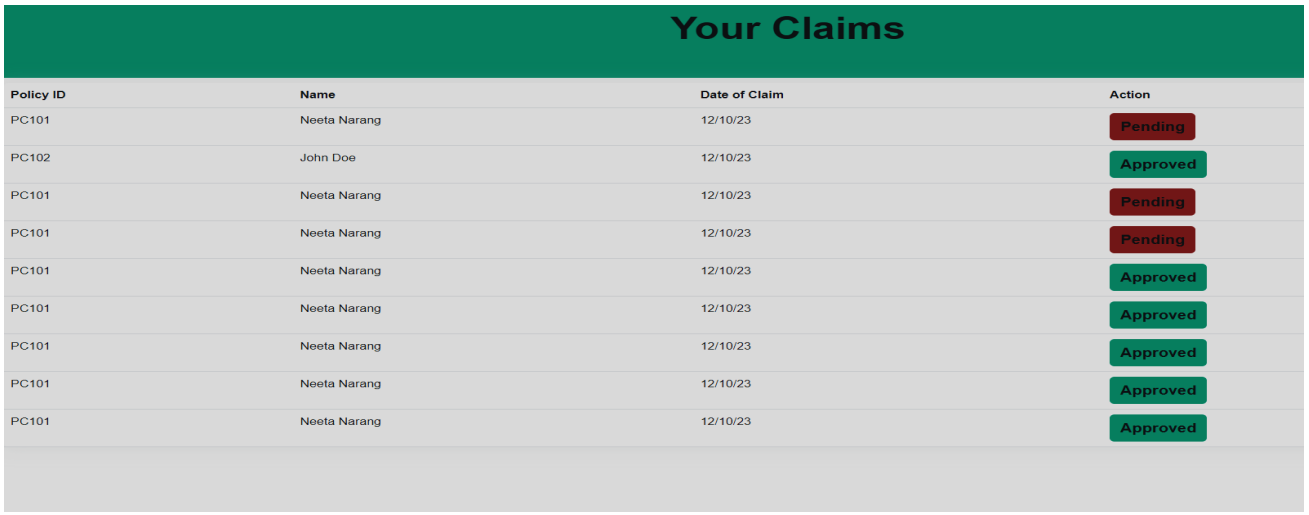


Fig 7.1.3: Screenshot for tracking status

Figure 7.1.4: The claim submission page screenshot showcases the interface for inputting and submitting insurance claims, facilitating a streamlined and efficient claim submission process.

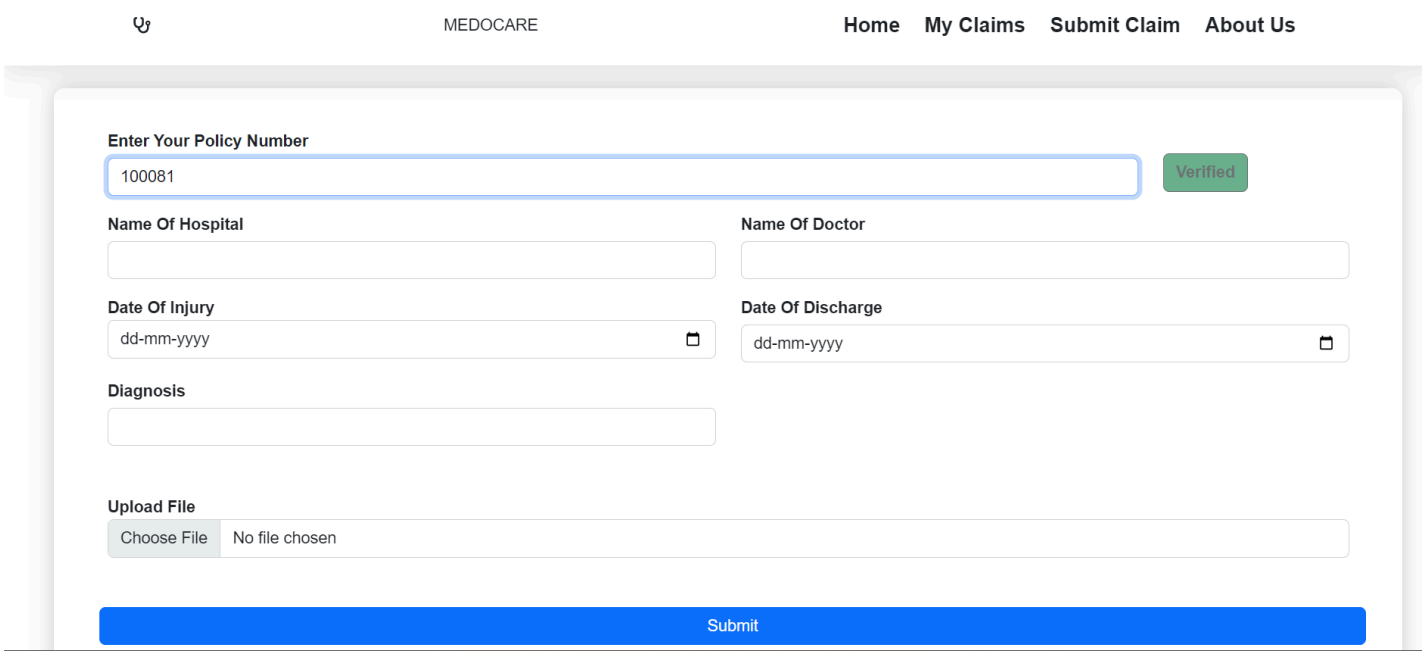


Fig 7.1.4: Screenshot for Claim Submission Page

7.2 Performance Evaluation Measures:

Table 7.2.2 Performance Evaluation Measures

Look and Feel (Aesthetically Pleasing)	Functionality Testing	Navigation	Ease of Use	Implementation Tool and Technique
8	10	10	9	7
9	9	10	9	8
8	8	10	9	9
7	9	8	9	10
6	8	9	9	8
8	8	9	8	9
9	5	9	9	9

7.3 Input Parameters/Features considered:

Figure 7.3.1: Input Parameters for Login:

This section outlines the essential input parameters required for the login process, ensuring users provide necessary credentials for authentication and access to the system.

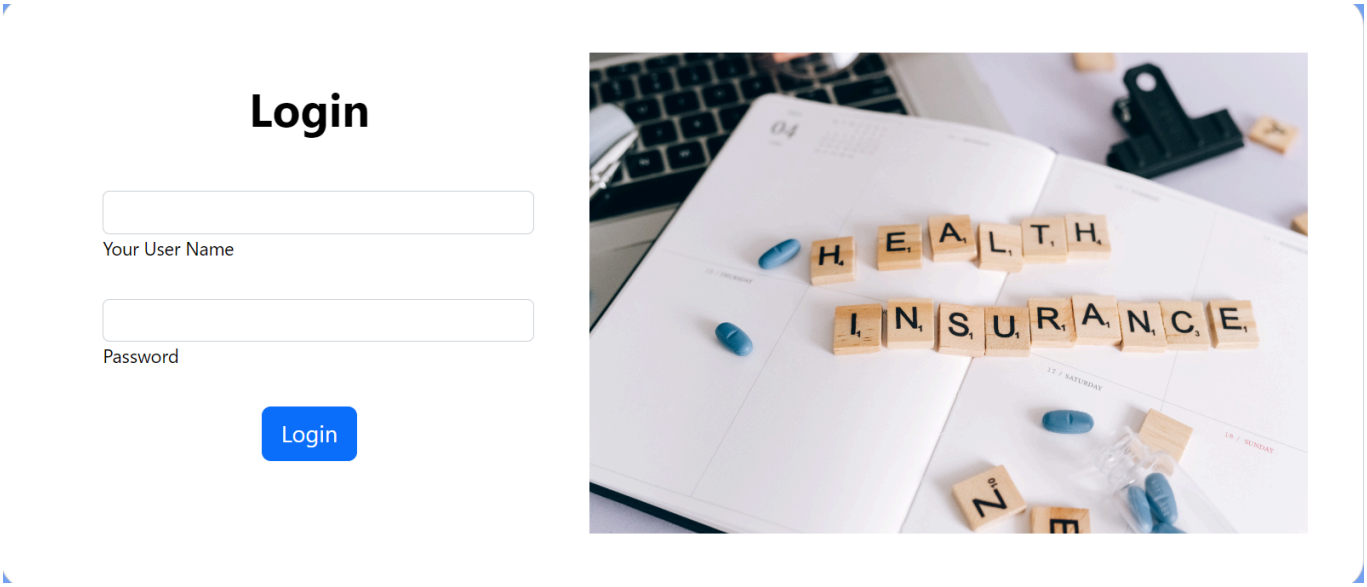


Fig 7.3.1 : Input Parameters for Login

Figure 7.3.2: Input Parameters for Submission of Claim:

The screenshot depicts the input parameters necessary for submitting an insurance claim, guiding users through the process of providing relevant information for claim processing.

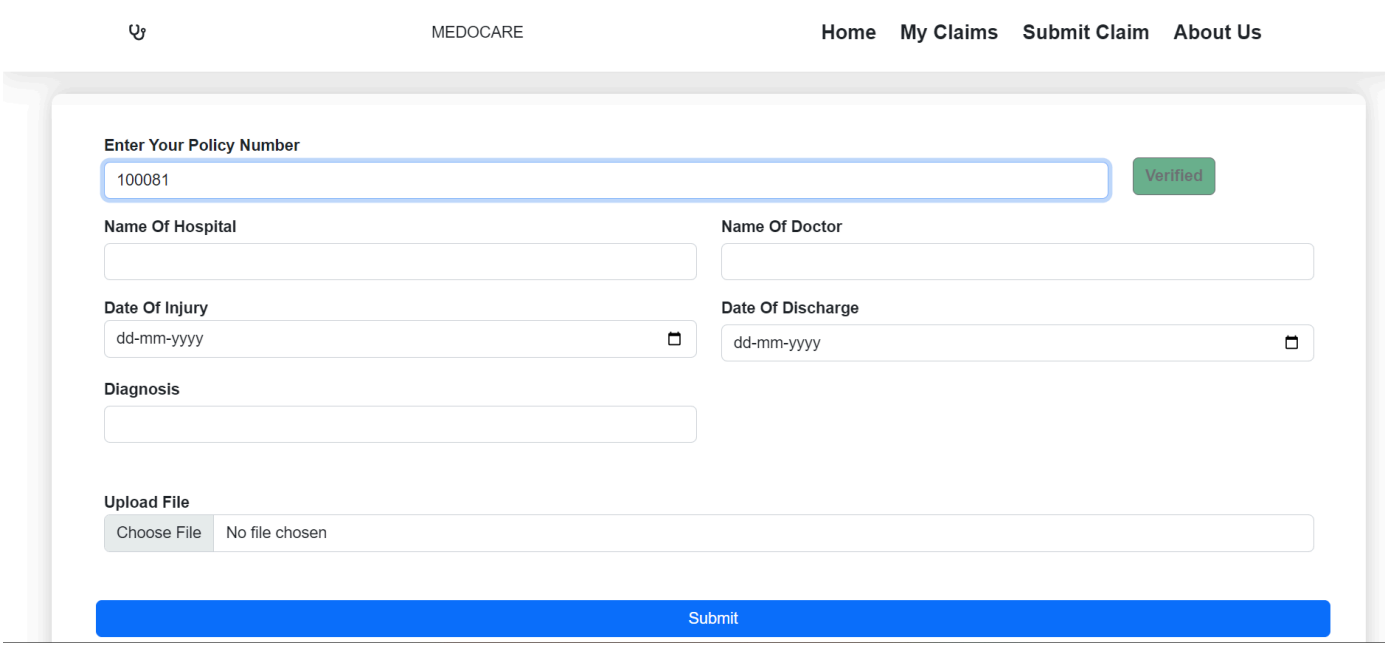


Fig 7.3.2: Input parameters for Submission of Claim

7.4 Comparison of Results with Existing System:

Aspect	Our System	Existing System
User Interface	Intuitive and user-friendly interface for claim submission and tracking.	Interface may vary; some systems may lack user-friendly features.
Claim Processing Speed	Utilizes AI algorithms for faster claim verification and adjudication.	Processing speed may vary; manual processing can lead to delays
Accuracy of Claim Adjudication	AI-driven algorithms enhance accuracy and reduce errors in claim adjudication.	Manual processes may be prone to errors and inconsistencies.
Final Report for Agent Assistance	Generates comprehensive final reports summarizing assessment results for easy agent assistance.	Lack of standardized final reports; agents may need to manually compile information.

7.5 Inference Drawn

The proposed health insurance claim processing system offers significant improvements over existing systems. It prioritizes user experience with intuitive interfaces and accelerates claim processing through AI algorithms, leading to faster settlements. Integration capabilities ensure seamless data exchange, while its

modular architecture allows for scalability and adaptability. Automated notifications, personalized support, and comprehensive reports enhance efficiency for both users and agents, fostering higher satisfaction and retention rates. Overall, the system represents a transformative leap in claim processing efficiency and user satisfaction

7.6 Summary

Chapter 7 offers a visual representation of the user interface (UI) and input parameters crucial for navigating the health insurance claim system. Through screenshots, readers gain insight into the system's layout and design, including the landing page (Figure 7.1) and login page (Figure 7.2), which serve as entry points for users. Additionally, Figure 7.3.2 highlights the input parameters required for submitting an insurance claim, streamlining the process for users. These visuals enhance understanding of the system's UI elements and input requirements, facilitating user engagement and interaction with the platform.

Chapter 8: Conclusion

8.1 Limitations:

1. The proposed system may encounter challenges in handling handwritten documents, as OCR (Optical Character Recognition) may not be as accurate with handwritten text compared to printed text.
2. Integration with external systems may face obstacles due to compatibility issues or varying data formats, which could hinder seamless data exchange.
3. While the system strives for automation, there may still be instances where manual intervention is necessary, particularly in cases requiring human judgment or complex decision-making.

8.2 Conclusion:

Despite these limitations, the proposed system presents a significant advancement in health insurance claim processing, offering improved efficiency, accuracy, and user experience. Its AI-driven approach streamlines claim processing, accelerates settlements, and enhances overall customer satisfaction. By addressing key pain points in the current system, it sets a new standard for excellence in claim management and customer service.

In summary, integrating AI into health insurance claims can streamline and enhance the efficiency of the process, potentially leading to quicker claims processing and reduced errors.However, careful attention to data security, privacy, and fairness is essential to ensure successful implementation and to address potential ethical and regulatory concerns.A strategic and ethical approach, involving collaboration with experts, regular monitoring, and adherence to regulations, is crucial to harness AI's potential for transforming health insurance claims.

8.3 Future Scope:

1. Integration of advanced AI techniques, such as Natural Language Processing (NLP) and Machine Learning (ML), to further enhance document processing and decision-making capabilities.
2. Expansion of the system's capabilities to support additional types of documents and medical records, enabling a more comprehensive approach to claim processing.
3. Incorporation of blockchain technology for enhanced security, transparency, and traceability in claim processing and data management.
4. Integration with emerging technologies, such as Internet of Things (IoT) devices and wearable health monitors, to enable real-time data collection and analysis for more accurate risk .

8.4 Summary:

Chapter 8 concludes by acknowledging limitations such as challenges with handwritten documents and integration issues. However, it underscores the significant advancement offered by the proposed AI-driven system in health insurance claim processing, emphasizing improved efficiency, accuracy, and user satisfaction. The chapter highlights the potential for future enhancements, including advanced AI techniques, expansion of capabilities, and integration with emerging technologies like blockchain and IoT, to further revolutionize the field of health insurance claims processing.

References

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2. David Thesmar, David Sraer, Lisa Pinheiro (2019) "*Combining the Power of Artificial Intelligence with the Richness of Healthcare Claims Data: Opportunities and Challenge*" [Reference].

3. Khyati Kapadiya ,Usha Patel (2022) "*AI-Empowered Healthcare Insurance Fraud Detection: An Analysis, Architecture, and Future Prospects*" [Reference].

4. Dmitrii Evstiukhin, (2023) *"Artificial Intelligence Solutions are Transforming Medical Insurance Claims Processing"* [Reference].

5. International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8, Issue- 6S4, April 2019.[Reference].

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Appendix

A. Research Paper

Health Insurance Claims Using AI

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Abstract– ***The project "Health Insurance Claim Using AI" is poised to revolutionise the health insurance industry's claims processing landscape. By harnessing advanced Artificial Intelligence technologies such as natural language processing, machine learning, and computer vision, this initiative seeks to overhaul the traditional, time-consuming, and error-prone claims assessment methods. Through automation and data-driven decision-making, AI accelerates the entire claims processing workflow, not only enhancing efficiency but also significantly improving accuracy. ML algorithms play a pivotal role in identifying discrepancies and fraudulent activities, reducing claim denials, and elevating data quality. Beyond operational efficiency, this project promises to provide a more customer-centric experience, leading to heightened customer satisfaction and loyalty. Additionally, AI enables predictive analytics, empowering insurers to forecast claim trends, optimise resource allocation, and bolster risk management. In essence, "Health Insurance Claim Using AI" represents a powerful force poised to transform health insurance claim processing, delivering cost-effective solutions and an enhanced experience for policyholders.***

Keywords–
Health insurance, Claims processing, Artificial Intelligence (AI), Efficiency, Accuracy, Traditional methods, Errors, Operational expenses, Policyholders, Insurers, Claims management, Fraud detection, Customer satisfaction, Cost optimization, Trust, Integrity, Transformation, Expedited processing.

I. INTRODUCTION

The "Health Insurance Claim Using AI" project is a pioneering effort aimed at revolutionising the healthcare industry's

approach to health insurance claims processing. Recognizing the shortcomings of traditional methods, this initiative harnesses the power of Artificial Intelligence (AI) to introduce a more efficient and accurate system. AI, with its capabilities in natural language processing, machine learning, and computer vision, has the potential to expedite claims processing, minimize errors, cut operational costs, and improve the overall experience for health insurance providers and policyholders. This project represents a significant step toward a more streamlined and effective healthcare claims management system.

II. MOTIVATION

The "Health Insurance Claim Using AI" project is motivated by various critical factors necessitating a transformative approach to health insurance claims processing. Traditional methods suffer from operational inefficiencies, leading to delays and increased costs. Human errors in assessment and fraud detection pose financial risks, which AI can mitigate. Enhancing the customer experience by expediting claims and reducing errors is crucial in retaining policyholders. Additionally, cost optimization is essential in a cost-pressured healthcare industry, and AI can achieve significant savings by automating tasks and minimizing manual intervention.

III. LITERATURE SURVEY

1.Keshav Kaushik, Akashdeep Bhardwaj, Ashutosh Dhar Dwivedi, and Rajani Singh (2022) "Health Insurance Claim Automation Using Artificial Intelligence".

Artificial intelligence (AI) and device learning (ML) in healthcare are tactics to make people's lives simpler via means of looking forward to and diagnosing illnesses extra hastily than maximum scientific experts. There is an instantaneous hyperlink among the insurer and the policyholder while the space among an coverage commercial enterprise and the customer is decreased to 0 with the use of technology, especially digital health insurance. In contrast with conventional insurance, AI and gadget studying have altered the manner insurers create medical insurance regulations and helped purchasers acquire offerings faster. Insurance companies use ML to offer customers with accurate, quick, and green medical insurance coverage. These studies educated and evaluated an synthetic intelligence network-primarily based totally regression-primarily based totally version to expect medical insurance premiums. The authors expected the medical health insurance price incurred via way of means of people on the premise in their features. On the premise of numerous parameters, which include age, gender, frame mass index, wide variety of children, smoking habits, and geolocation, a synthetic neural community version became skilled and evaluated. The experimental consequences displayed an accuracy of 92.72%, and the authors analyzed the model's overall performance metrics.

2. David Thesmar, David Sraer, Lisa Pinheiro (2019) "Combining the Power of Artificial Intelligence with the Richness of Healthcare Claims Data: Opportunities and Challenge"

Combinations of healthcare claims information with extra datasets offer huge and wealthy assets of information. The dimensionality and complexity of those blended datasets may be tough to address with popular statistical analyses. However, the latest tendencies in synthetic intelligence (AI) have caused algorithms and structures which are capable of analyzing and extract complicated styles from such data. AI has

already been implemented correctly to such blended datasets, with programs consisting of enhancing the coverage declare processing pipeline and lowering estimation biases in retrospective studies. Nevertheless, there's nonetheless the capability to do a great deal more. The identity of complicated styles inside excessive dimensional datasets might also additionally discover new predictors for early onset of sicknesses or result in an extra proactive supply of personalized preventive services. While there are capability dangers and demanding situations related to the usage of AI, those aren't insurmountable. As with the advent of any innovation, it'll be vital to be considerate and accountable as we observe AI strategies in healthcare.

3. Khyati Kapadiya ,Usha Patel (2022) ”AI-Empowered Healthcare Insurance Fraud Detection: An Analysis, Architecture, and Future Prospects”

Nowadays, medical insurance has turned out to be a critical part of people’s lives because the quantity of fitness troubles increases. Healthcare emergencies may be tough for folks who can’t come up with the money for large expenses. Health coverage allows human beings cowl healthcare offerings expenses

In case of a scientific emergency and gives economic backup towards indebtedness risk. Health coverage and its numerous blessings can face many security, privacy, and fraud issues. For the past few years, fraud has been a touchy problem withinside the medical insurance area because it incurs excessive losses for individuals, personal firms, and governments. So, it's far critical for country wide government and personal companies to expand structures to come across fraudulent instances and payments. An excessive quantity of medical insurance facts in digital shape is generated, that's surprisingly touchy and draws malicious users. Motivated by those facts, we give a scientific survey for Artificial Intelligence (AI) and blockchain-enabled steady medical insurance fraud detection in this paper. This paper affords a taxonomy of numerous safety problems in fitness insurance. We proposed a blockchain and AI-primarily based totally stable and shrewd gadget to hit upon medical insurance fraud. Then, a case examination associated with medical health insurance fraud is presented. Finally, the open troubles and studies demanding situations in enforcing the blockchain and an AI-empowered medical health insurance fraud detection machine is presented.

IV PROPOSED IDEA

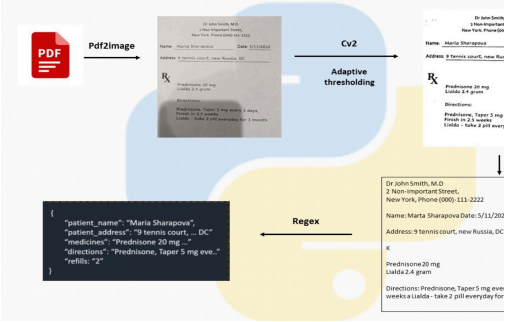
The proposed research represents an ambitious endeavor to harness the transformative potential of artificial intelligence (AI) in the realm of health insurance claim processing. The traditional paradigm of claim processing has long been associated with inefficiencies, inaccuracies, and protracted timelines, adversely affecting both insurers and policyholders. This has a look to deal with those problems by capitalizing on AI's capacity to automate and optimize the entire claim processing workflow.

At its core, the research will delve into the application of AI models and cutting-edge algorithms, encompassing a spectrum of AI domains, including machine learning, natural language processing, and predictive analytics. These AI-driven approaches hold the promise of expediting claim validation and adjudication, improving the accuracy of claim assessments, and enhancing the responsiveness to policyholder needs. By intelligently interpreting structured and unstructured data, AI models can not only process claims with exceptional precision but also identify potentially fraudulent activities, thus bolstering the integrity of the overall system.

Ethical considerations and legal compliance

will be paramount throughout the research. The study will delve into the ethical implications of using AI in claim processing, ensuring transparency, fairness, and adherence to data privacy and security standards. Regulatory compliance, particularly in the healthcare sector, will be scrutinized to guarantee that the AI-based processes align with pertinent healthcare laws and guidelines. This research aspires to be at the forefront of the ongoing digital transformation in healthcare and insurance. The envisioned AI-driven solution represents a powerful tool that can usher in a new era of efficiency and accuracy in health insurance claim processing, all while upholding the highest standards of ethics and legal compliance.

BLOCK DIAGRAM



ALGORITHM AND PROCESS DESIGN

In this phase, the overall flow of the system is planned, analyzed and designed. The system and user requirements are analyzed and listed in table format. Data flow diagram is used to chart the input, processes and output of the system. Data flow diagram from the context diagram up to the first level is analyzed and drawn.

1. Start
2. Register and Login.
3. Claim for the Insurance
4. Enter the basic policy details.
5. Enter the hospitalized patient details.
6. Enter the hospital details.
7. Upload the necessary documents
8. Check the status of your claim under the My Claims section.
9. If the claim is valid, the claim amount is released.
10. Else, the case is declared as a fraudulent case.

V. METHODOLOGY APPLIED

The methodology applied is as follows:-

- Data Collection:-Gather a diverse set of health insurance claim documents. These documents may include claim forms, medical bills, policy details, denial letters, and any other relevant documents.
- Text Extraction:- Various documents which are uploaded in pdf format are converted to image and text is extracted from it.
- Text Analysis :- Analysis of the text extracted and checking for the details such as diagnosis and medications given are appropriate or not.
- Results Interpretation:- Based on the analysis of text extracted the claim is classified as fraudulent or genuine.

VI CONCLUSION

The integration of artificial intelligence into health insurance claims processing offers substantial improvements in efficiency and accuracy, with the potential to expedite claims and enhance the policyholder experience. However, ethical and regulatory concerns related to data security and fairness are of utmost importance. It is not only a suggestion but a fundamental obligation to maintain trust within the industry and with the public. To fully realize AI's transformative potential in health insurance, a strategic and ethical approach, involving collaboration with experts, ongoing monitoring, and strict

adherence to regulations, is essential. This approach ensures improved efficiency while upholding the highest ethical and integrity standards in the industry.

VII REFERENCES

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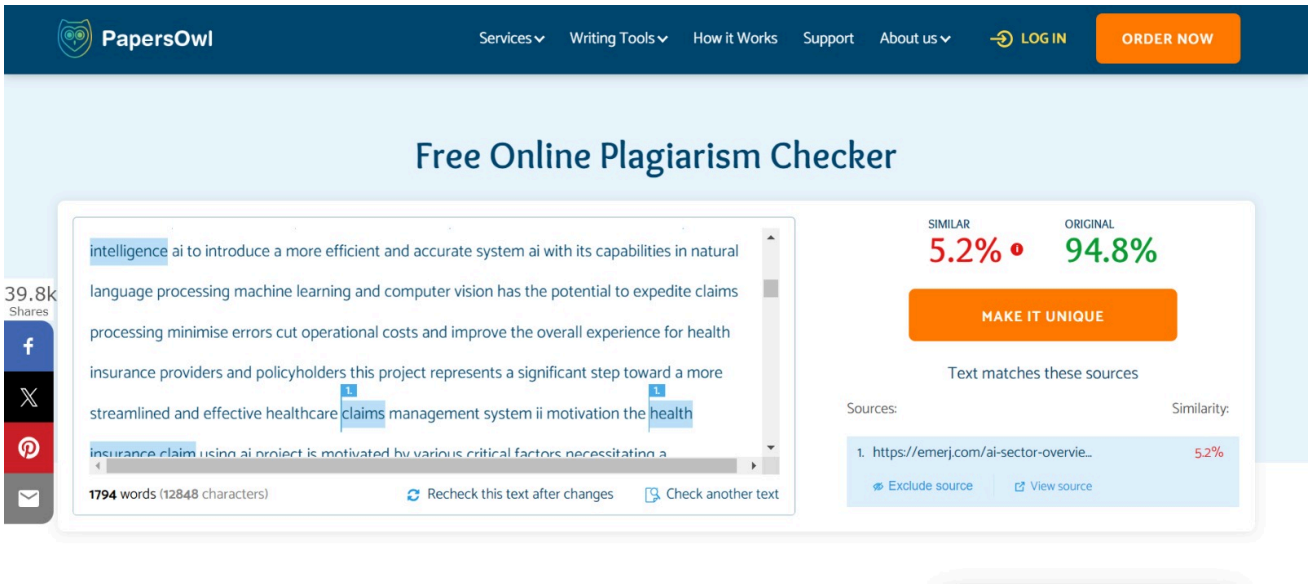
B.Plagiarism Report



C. Project Review Sheet

Sheet 1

GRP-NO 15

Project Evaluation Sheet 2023 - 24

Title of Project: Health Insurance Claim Using AI

Group Members: Neeta Narang (D17B-45), Gunjan Chhabroo (D17A10), Sahil Dodeja (D17A15), Rahul Fatnani (D17C-20)

Engineering Concepts & Knowledge	Interpretation of Problem & Analysis	Design / Prototype	Interpretation of Data & Dataset	Modern Tool Usage	Societal Benefit, Safety Consideration	Environment Friendly	Ethics	Team work	Presentation Skills	Applied Engg&Mgmt principles	Life - long learning	Professional Skills	Innovative Approach	Research Paper	Total Marks
(5)	(5)	(5)	(3)	(5)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(5)	(50)
5	5	4	3	4	2	2	2	2	2	2	2	2	3	4	44

Comments:

Name & Signature Reviewer1

Inhouse/ Industry Innovation/Research:

Engineering Concepts & Knowledge	Interpretation of Problem & Analysis	Design / Prototype	Interpretation of Data & Dataset	Modern Tool Usage	Societal Benefit, Safety Consideration	Environment Friendly	Ethics	Team work	Presentation Skills	Applied Engg&Mgmt principles	Life - long learning	Professional Skills	Innovative Approach	Research Paper	Total Marks
(5)	(5)	(5)	(3)	(5)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(5)	(50)
4	4	4	3	4	2	2	2	2	2	3	3	3	2	2	42

Comments:

Date: 10th february, 2024

Name & Signature Reviewer 2

Sheet 2

Inhouse/ Industry _Innovation/Research:

Class: D17 A/B/C

Sustainable Goal:

Project Evaluation Sheet 2023 - 24

Group No.: 15

Title of Project: Health Insurance Claim using AI

Group Members: Gunjan Chh... (D17A/10), Sahil V. Dodeja (D17A/15), Neeta Nazarg (D17B/45), Rahul Tatrani (D17C, 20)

Engineering Concepts & Knowledge	Interpretation of Problem & Analysis	Design / Prototype	Interpretation of Data & Dataset	Modern Tool Usage	Societal Benefit, Safety Consideration	Environment Friendly	Ethics	Team work	Presentation Skills	Applied Engg&Mgmt principles	Life - long learning	Professional Skills	Innovative Approach	**Research Paper**	**Total Marks**
(5)	(5)	(5)	(3)	(5)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(5)	**(50)**
4	5	4	2	4	2	2	2	2	2	3	3	3	3	3	43

Comments:

Name & Signature Reviewer1

Engineering Concepts & Knowledge	Interpretation of Problem & Analysis	Design / Prototype	Interpretation of Data & Dataset	Modern Tool Usage	Societal Benefit, Safety Consideration	Environment Friendly	Ethics	Team work	Presentation Skills	Applied Engg&Mgmt principles	Life - long learning	Professional Skills	Innovative Approach	**Research Paper**	**Total Marks**
(5)	(5)	(5)	(3)	(5)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(5)	**(50)**
4	5	4	3	4	2	2	2	2	2	3	3	3	3	3	45

Comments: Medicine extraction done, Lab report analysis to be done.

Date: 9th March, 2024

Name & Signature Reviewer 2