MEDICAL TERMINOLOGY SIMPLIFIER

A PROJECT REPORT SUBMITTED TO

THE NATIONAL INSTITUTE OF ENGINEERING, MYSURU
(An Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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in
Computer Science and Engineering

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THE NATIONAL INSTITUTE OF ENGINEERING

(An Autonomous Institute under Visvesvaraya Technological University, Belagavi)

Department of Computer Science & Engineering

CERTIFICATE

This is to certify that the project work entitled A sustainability consultant needs assistance Generating eco-friendly practice recommendations for businesses is a bonafide work carried out by **D Ganesh Murthy (4NI22CS050) , Darshan D A(4NI22CS051), Darshan S(4NI22CS052), Deekshith P Kumar (4NI22CS053) Deepak M B(4NI22CS054)** in partial fulfillment for the award of degree of **Bachelor of Engineering in Computer Science and Engineering**, of Visvesvaraya Technological University, Belagavi, during the year **2025-26**. It is certified that all corrections suggestions indicated during internal assessment have been incorporated and the corrected copy has been deposited in the department library. This project report has been approved in partial fulfillment for the award of the said degree as per academic regulations of The
National Institute of Engineering (Autonomous Institution).

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ABSTRACT

Medical terminology is often complex, making it difficult for patients to understand their diagnoses, treatments, and medical procedures. This communication gap can lead to confusion, misinterpretation, and reduced adherence to treatment plans, ultimately affecting patient outcomes. Effective patient education requires translating complex medical language into simpler, more accessible terms without compromising accuracy. However, manually simplifying medical jargon is time-consuming and requires extensive medical expertise.

Generative AI (GenAI) offers a powerful solution by leveraging Natural Language Processing (NLP) to automatically translate medical terminology into patient-friendly language. By training AI models on medical literature, patient education materials, and expert-reviewed glossaries, we can develop a system that provides accurate and context-aware explanations. Advanced deep learning models, such as GPT-4 and BioBERT , can generate simplified descriptions while preserving the medical integrity of the information.

This report explores the methodology, challenges, and potential applications of AI-powered medical text simplification. It discusses data collection, model selection, and validation techniques to ensure reliability and usability in real-world healthcare settings. By integrating AI-driven solutions into healthcare communication, providers can improve patient understanding, promote better decision-making, and enhance overall health literacy. The implementation of such systems could bridge the gap between medical professionals and patients, leading to more effective and informed healthcare experiences.

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MEDICAL TERMINOLOGY SIMPLIFIER

Introduction

Effective communication in healthcare is essential for ensuring patients understand their medical conditions, treatments, and preventive measures. However, medical terminology is often highly technical and difficult for the average person to comprehend. Complex jargon can create confusion, leading to misinterpretation of health information, poor adherence to treatment plans, and increased anxiety among patients. As a result, there is a growing need for simplified medical communication to bridge the gap between healthcare professionals and patients.

Traditionally, medical professionals and patient educators have been responsible for translating complex medical language into simpler terms. However, this process is time-consuming and requires significant effort to ensure accuracy while maintaining the intended medical context. Moreover, healthcare providers may not always have the time to simplify information for every patient, leading to disparities in patient comprehension and engagement. A more efficient, scalable, and automated approach is necessary to enhance health literacy and improve patient outcomes.

Recent advancements in Artificial Intelligence (AI), particularly in Natural Language Processing (NLP), have paved the way for AI-driven solutions to simplify medical terminology. Generative AI (GenAI) models, such as GPT-4 and BioBERT, can analyze complex medical texts and generate easy-to-understand explanations. These models can be trained on medical literature, patient education materials, and expert-reviewed glossaries to ensure the accuracy and reliability of their outputs. By integrating AI-powered language simplification into healthcare, we can make medical information more accessible to patients.

This report explores the role of Generative AI in translating medical jargon into patient-friendly language. It discusses the challenges of medical communication, the methodology for developing AI-based solutions, and the potential applications of these technologies in real-world healthcare settings. By leveraging AI, healthcare providers can improve patient comprehension, enhance doctor-patient communication, and ultimately contribute to better health outcomes.

Problem Statement

Effective communication between healthcare providers and patients is crucial for accurate diagnosis, treatment adherence, and overall well-being. However, medical terminology is often complex, technical, and difficult for the average person to understand. Patients with limited health literacy may struggle to comprehend their diagnoses, medication instructions, or surgical procedures, leading to confusion, anxiety, and potential health risks. This communication gap can result in poor treatment adherence, misinterpretation of medical advice, and increased hospital readmissions.

While healthcare professionals attempt to simplify medical explanations, they often face time constraints and varying levels of patient comprehension. Manual simplification of medical language is a challenging and resource-intensive process that requires both medical expertise and linguistic skills. Additionally, existing patient education materials may not be personalized to individual needs, making it difficult for patients to fully grasp their medical conditions and treatment options.

Generative AI (GenAI) offers a promising solution by automating the translation of complex medical jargon into simple, easy-to-understand language. However, challenges such as maintaining medical accuracy, preserving context, and ensuring AI-generated outputs are reliable remain critical concerns. There is a need for a robust AI-driven system that can accurately simplify medical terminology while preserving essential medical information.

This study aims to explore the development of an AI-based model capable of translating complex medical terms into patient-friendly language. By leveraging Natural Language Processing (NLP) techniques and deep learning models, the proposed system seeks to enhance patient comprehension, improve doctor-patient communication, and promote better health outcomes.

Objective

1. **To Develop an AI-Based System for Medical Terminology Simplification**
    - Design and implement a Generative AI model capable of translating complex medical jargon into patient-friendly language.
    - Ensure that the AI system maintains medical accuracy and contextual relevance.
2. **To Improve Patient Understanding of Medical Information**
    - Enhance health literacy by providing clear, simplified explanations of diagnoses, treatments, and procedures.
    - Reduce patient anxiety and confusion by making medical communication more accessible.
3. **To Assist Healthcare Providers in Effective Communication**
    - Provide doctors, nurses, and medical staff with an AI-powered tool to quickly simplify medical terms.
    - Reduce the time spent manually explaining complex terminology to patients.
4. **To Validate the AI Model for Accuracy and Reliability**
    - Train the model using expert-reviewed medical datasets and patient education materials.
    - Conduct testing and evaluation to ensure the AI-generated explanations are medically accurate and easy to understand.
5. **To Explore Real-World Applications in Healthcare**
    - Investigate the integration of AI-driven medical simplification into hospital systems, telemedicine platforms, and mobile health apps.
    - Assess the potential impact of AI-assisted patient education on treatment adherence and health outcomes.

Implementation

To achieve the project's goals, we utilized a combination of frontend and backend technologies to create an efficient and user-friendly system. The implementation ensures that the platform is responsive, scalable, and easy to use for restaurant staff who need to generate daily menu descriptions quickly and effectively.

- **Frontend**: The user interface is developed using **HTML, CSS, and JavaScript**, ensuring a seamless and visually appealing experience. HTML structures the content, CSS provides styling for an attractive layout, and JavaScript adds interactivity, allowing restaurant staff to input available ingredients dynamically. The interface is designed to be intuitive, requiring minimal training for users to navigate and generate descriptions effortlessly.

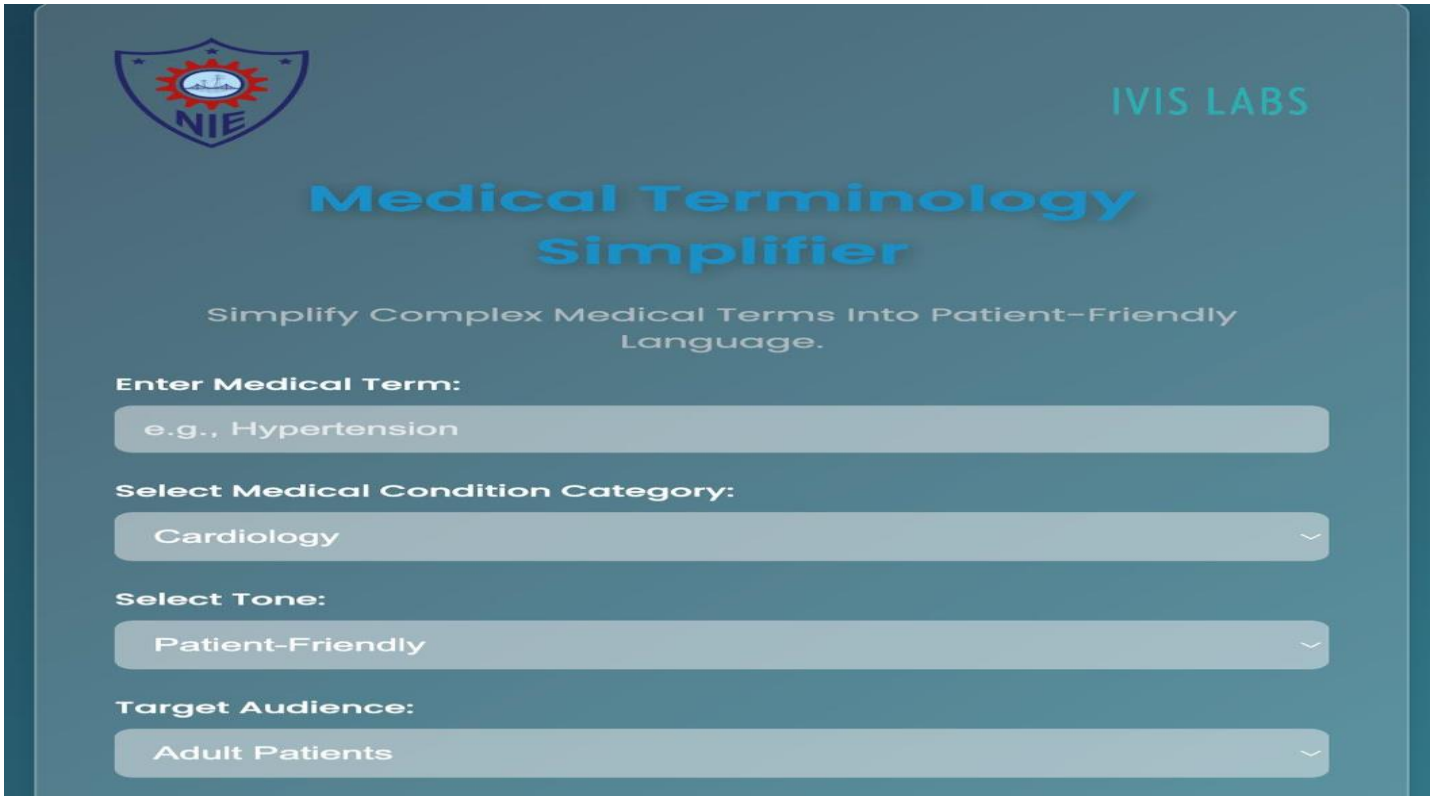
- **Backend**: The core logic is implemented in **Python**, utilizing **FastAPI**, a modern web framework known for its high performance and fast execution. FastAPI enables efficient API development, handling multiple user requests asynchronously, ensuring a smooth and responsive experience. This makes the system ideal for real-time menu generation, allowing updates and new descriptions to be generated instantly when ingredients change.

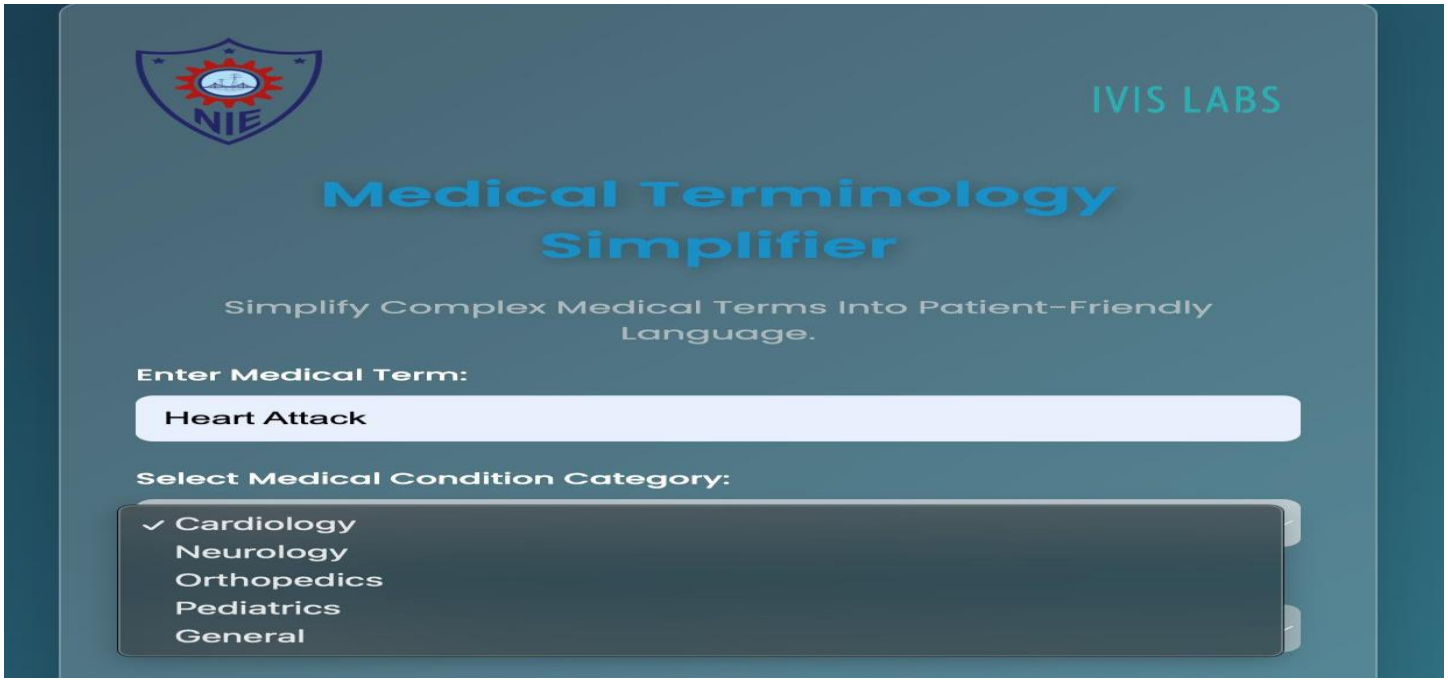
- **Natural Language Processing (NLP)**: NLP techniques, including tokenization, sentiment analysis, and text generation, are employed to craft creative and engaging menu descriptions. These techniques ensure that the descriptions are linguistically coherent, enticing, and aligned with culinary terminology. By analyzing ingredient combinations and common dish structures, the system generates descriptions that feel natural and appealing to customers.

- **Database Integration**: The system can be integrated with a **database** to store ingredient availability, past menu descriptions, and customer preferences. This allows for more personalized and intelligent recommendations over time. For instance, if a restaurant frequently offers seafood specials, the system can refine descriptions based on previous successful dishes, improving the appeal of future menu items. The database also helps track inventory, ensuring that dishes are suggested based on actual ingredient availability, reducing waste and optimizing supply chain efficiency.

- **Scalability and Performance Optimization**: The platform is designed to scale efficiently, accommodating restaurants of various sizes. The use of **FastAPI** ensures low-latency API responses, while database indexing and caching techniques improve data retrieval times. The frontend is optimized for different devices, ensuring accessibility across desktops, tablets, and mobile phones. Additionally, the system supports multiple cuisine styles, allowing easy customization for different restaurant themes and food cultures.

Results:-


IVIS LABS
Medical Terminology Simplifier
Simplify Complex Medical Terms Into Patient-Friendly Language.
Enter Medical Term:
e.g., Hypertension
Select Medical Condition Category:
Cardiology
Select Tone:
Patient-Friendly
Target Audience:
Adult Patients


IVIS LABS
Medical Terminology Simplifier
Simplify Complex Medical Terms Into Patient-Friendly Language.
Enter Medical Term:
Heart Attack
Select Medical Condition Category:
Cardiology
Neurology
Orthopedics
Pediatrics
General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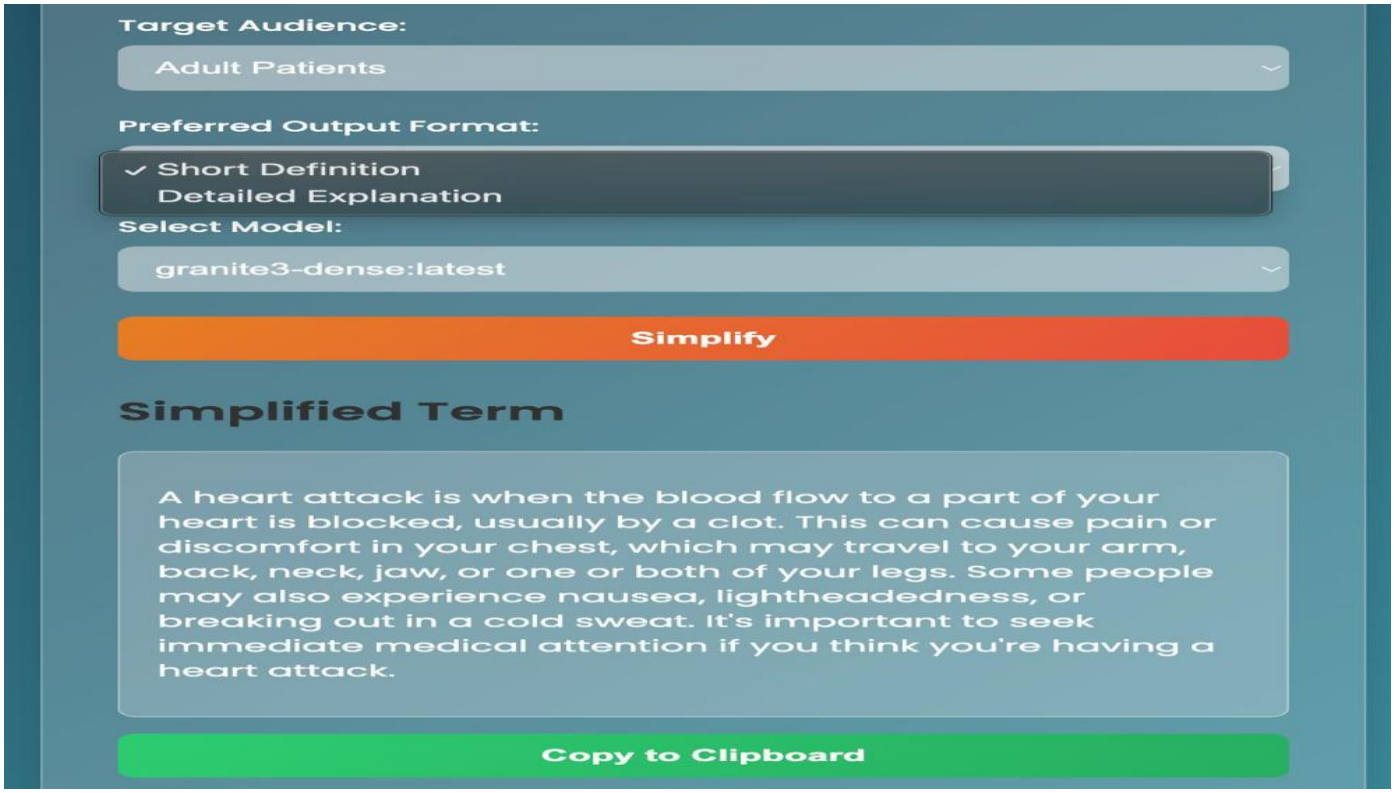
Target Audience:
Adult Patients
Children
Elderly
Medical Students


Target Audience:
Adult Patients
Preferred Output Format:
Short Definition
Detailed Explanation
Select Model:
granite3-dense:latest
Simplify
Simplified Term
A heart attack is when the blood flow to a part of your heart is blocked, usually by a clot. This can cause pain or discomfort in your chest, which may travel to your arm, back, neck, jaw, or one or both of your legs. Some people may also experience nausea, lightheadedness, or breaking out in a cold sweat. It's important to seek immediate medical attention if you think you're having a heart attack.
Copy to Clipboard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System Design & Tech Stack

1. System Architecture

The AI-based medical terminology simplification system follows a modular design, ensuring scalability, accuracy, and ease of integration into healthcare platforms.

The system consists of the following key components:

A. Input Module

- Accepts medical terms, reports, or full-text inputs from healthcare providers or patients.
- Supports multiple input formats (text, voice, API).

B. Natural Language Processing (NLP) Module

- Named Entity Recognition (NER): Identifies and extracts medical terms from input text.
- Context Understanding: Uses deep learning models to understand the medical context before simplification.

C. AI Simplification Model

- Pretrained AI Models: Utilizes models like GPT-4, BioBERT, or MedPaLM.
- Fine-Tuning: Trained on medical datasets and patient-friendly glossaries for accurate translation.
- Validation Mechanism: Ensures output maintains medical integrity and clarity.

D. Output Module

- Generates simplified medical explanations.
- Provides visual aids (charts, infographics) to enhance understanding.
- Allows integration with hospital systems, patient portals, and mobile apps.

E. Feedback & Learning Module

- Collects feedback from medical professionals and patients.
- Improves AI model accuracy through continuous learning.

Conclusion

Effective communication in healthcare is essential for improving patient understanding, treatment adherence, and overall well-being. However, complex medical terminology often acts as a barrier, making it difficult for patients to comprehend their diagnoses and treatment plans. The use of Generative AI (GenAI) for medical text simplification presents a promising solution to bridge this communication gap by translating complex medical jargon into easy-to-understand language.

By leveraging Natural Language Processing (NLP) and deep learning models like GPT-4 and BioBERT, the proposed AI system can generate simplified medical explanations while maintaining accuracy and context. Integrating such AI-driven solutions into healthcare systems, telemedicine platforms, and patient portals can significantly enhance health literacy, reduce anxiety, and empower patients to make informed medical decisions. Additionally, this technology can support healthcare providers by reducing the time required for manual explanations, allowing them to focus on delivering quality care.

Despite its potential, AI-based medical text simplification must undergo rigorous validation to ensure accuracy and reliability. Challenges such as contextual misunderstandings, medical misinformation, and ethical concerns must be carefully addressed. Future advancements in AI models, combined with feedback from medical professionals and patients, can further refine this technology to make it more effective and widely applicable.

In conclusion, AI-powered medical terminology simplification can revolutionize patient education by making healthcare information more accessible and understandable. With continuous improvements and responsible implementation, this technology has the potential to enhance doctor-patient communication, improve treatment outcomes, and contribute to a more patient-centric healthcare system.

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