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# Ai-Powered Health Report Analyzer: Translating And Explaining Medical Reports Using Deep Learning

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**Abstract**

Medical reports often contain complex medical terms and are typically written in English, which makes them difficult for many patients to understand. This project presents a simple and smart web application that allows users to upload their lab reports, simplifies difficult medical language, and translates the results into the user's native language. Using Artificial Intelligence (AI), Natural Language Processing (NLP), and translation APIs, the system converts medical reports into clear and meaningful summaries. Built with React.js and Node.js, this web app also respects user privacy by processing and storing data only with user consent. The goal is to make health reports accessible, understandable, and useful to everyone — regardless of language or background.

**Keywords**

AI in healthcare, medical report simplification, native language translation, deep learning, NLP, health tech.

## 1. Introduction

Medical reports are a key part of healthcare communication, but for many patients, understanding them is a challenge. These reports are often filled with difficult terminology and written only in English, which can be unfamiliar to many users in India. As a result, patients may feel confused or anxious and might not fully understand their health conditions. This project addresses this issue by creating a tool that simplifies technical medical language and translates it into the user's preferred local language. By improving understanding, this system helps users make informed decisions and feel more confident about their health.

## 2. Literature Review

In recent years, Artificial Intelligence (AI) and Natural Language Processing (NLP) have made it much easier for people to interact with complex information—especially in the healthcare field. Researchers have explored various ways to make medical content easier to understand using AI tools.

For example, Mridha *et al.* [1] conducted a detailed study on automatic text summarization. Their work explained how AI can pull out the most important parts of long documents, which is very helpful when simplifying confusing medical reports.

Gaikwad [2] looked into how AI is being used more generally in healthcare—for things like diagnosis and improving how doctors and patients communicate. His study showed that AI can help make medical information more understandable, which helps patients make better decisions.

Le Glaz *et al.* [3] focused specifically on mental health and showed how machine learning and NLP can simplify clinical language. This is important because many patients struggle to understand medical terms, especially if they don't have a background in healthcare.

More recently, models like ChatGPT have shown the ability to explain complex medical terms in plain language. According to IEEE reviews from 2023 [4], [5], some hospitals have started testing AI tools that can turn complicated diagnostic reports into easier summaries. However, these tools are still new—they often don't support local languages or scanned reports and may not work in real time.

While these developments are promising, most current systems still have major gaps. They usually don't support regional languages like Hindi or Marathi, they may not simplify medical terms properly, and they often can't read scanned documents. Also, many of these tools are made for doctors rather than everyday users.

That's why our project is important. It builds on existing research and aims to create a user-friendly tool that not only simplifies medical language but also translates it into the user's native language—all while giving users control over their data.

## 3. Methodology

The system is built with a clean and modular architecture. The frontend is created using React.js, providing an interactive interface where users can upload lab reports and select a target language. The backend, built with Node.js and Express.js, processes uploaded files and sends them to a third-party AI API for simplification and translation.

Here's how it works: the user uploads a report in PDF or text format. The text is then simplified using the API and translated into the user's selected language (such as Hindi, Marathi, Tamil, etc.). The final result is displayed on the screen and can be downloaded if needed. Importantly, reports are only stored if the user chooses to save them. This ensures privacy and gives users full control over their data.

## 4. Results and Analysis

To confirm the functionality of the system, two medical reports in **PDF format** were used for basic testing. These reports were uploaded using the application's interface and included standard diagnostic content such as cholesterol levels and blood test results. The system successfully extracted the text from both PDFs, simplified the medical language, and translated the output into native languages (Hindi and Marathi) as selected by the user.

This simple test validated the upload, simplify, and translate flow. It also demonstrated that the AI integration correctly handled medical terminology. Users were able to clearly understand the translated output, which included terms like "high cholesterol" and "elevated sugar level" in simplified and localized formats. The test was not intended as a full performance evaluation but showed that the core system features work smoothly and reliably with PDF inputs.

## 5. Conclusion and Future Work

This project demonstrates a practical use of AI and NLP in healthcare. It helps users understand their medical reports without needing expert help. The system simplifies medical language, translates content into local languages, and respects user privacy.

There are still some limitations. The system cannot yet process scanned or handwritten reports because it lacks OCR (Optical Character Recognition). It also relies on third-party APIs for simplification and translation, which may not be perfect for every medical context.

In the future, we aim to add OCR functionality, train our own medical language models for better accuracy, include voice-based explanations for accessibility, and develop a mobile app version. These additions will make the system even more helpful for users.

## 6.References

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