Heavens' Light is Our Guide

Rajshahi University of Engineering & Technology

Department of Computer Science & Engineering

CSE 3100
Web-Based Application Project

HCV-Ai: Non-invasive Hepatitis C Virus Detection System

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Contents

List of Codes

List of Figures

1 Introduction

The web application brings to life a machine learning framework developed for the non-invasive detection of Hepatitis C Virus (HCV), as outlined in our recent research. Designed with accessibility and accuracy in mind, the platform allows users—particularly patients and healthcare providers—to upload standard laboratory data and receive predictions about the possible stage of HCV infection: healthy, hepatitis, fibrosis, or cirrhosis.

The primary objective of the application is to make early and accurate HCV detection more accessible, especially in low-resource settings where traditional diagnostic methods are often invasive, costly, and difficult to access. By leveraging routine blood test results and state-of-the-art machine learning techniques—including synthetic data generation, feature selection, and explainable AI—this application aims to provide reliable, interpretable predictions that can assist in timely clinical decision-making.

This system addresses a critical gap in healthcare: the lack of affordable and scalable tools for multiclass liver disease classification. Whether you're a clinician, researcher, or concerned individual, this platform empowers you with actionable insights using only non-invasive lab data.

2 System Components

2.1 Frontend Components

2.2 Backend Components

2.3 Dataflow Diagram

2.4 User Interaction Diagram

2.5 Key Features

3 Tools & Technologies

3.1 Languages

- HTML
- CSS
- JavaScript
- Python

3.2 Vue JS

3.3 FastAPI

3.4 Postgres

3.5 Scikit-Learn

Justification for tools selection