

Final Report

1. INTRODUCTION

1.1 Project Overview

HepaCheck is an AI-powered liver cirrhosis prediction tool that enables users to input clinical parameters and receive a prediction of risk. The project combines machine learning, web technologies, and user-friendly design to create a practical tool for healthcare applications.

1.2 Purpose

The primary objective is to facilitate early detection of liver cirrhosis using clinical parameters, leveraging machine learning for accurate predictions, and presenting the results through a responsive web interface.

2. IDEATION PHASE

2.1 Problem Statement

Liver cirrhosis is often diagnosed in later stages, leading to poor outcomes. There is a need for an accessible, data-driven tool to predict cirrhosis risk earlier using patient data.

2.2 Empathy Map Canvas

Our target users include clinicians, patients, and researchers. They seek fast, reliable, and understandable predictions. Challenges include complexity of clinical data and lack of technical know-how.

2.3 Brainstorming

We brainstormed a lightweight, responsive Flask app powered by a Random Forest model trained on real-world liver data. We incorporated validation, interpretability, and hosting for public access.

3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

User visits the app, enters clinical parameters, clicks predict, views result, and checks feature importance.

3.2 Solution Requirement

Requirements include: ML model, web form, preprocessing pipeline, chart visualization, hosting platform.

3.3 Data Flow Diagram

Input → Form Validation → Scaling → Prediction → Result Display → Feature Chart.

3.4 Technology Stack

Frontend: HTML, CSS, JavaScript

Backend: Python (Flask)

ML: scikit-learn (Random Forest)

Visualization: Chart.js

Hosting: PythonAnywhere

4. PROJECT DESIGN

4.1 Problem Solution Fit

Clinicians and users can input their clinical parameters into a lightweight form and receive predictions instantly.

4.2 Proposed Solution

An interactive web-based system that integrates ML models for cirrhosis risk prediction and presents results with interpretation.

4.3 Solution Architecture

The architecture includes a Flask backend with routes for input and prediction, integrated with a pre-trained model and scaler.

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Week 1: Dataset exploration and preprocessing

Week 2: Model development and evaluation

Week 3: Flask integration and frontend

Week 4: Hosting, testing, and documentation

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Tested on multiple browsers and devices. Model performance measured using accuracy and prediction speed.

7. RESULTS

7.1 Output Screenshots

Includes form page, prediction result, and feature importance chart. Screenshots attached in appendix.

8. ADVANTAGES & DISADVANTAGES

Advantages:

- Easy to use
- Fast predictions
- Explainable ML

Disadvantages:

- Static model (not retrained automatically)
- Limited dataset size

9. CONCLUSION

HepaCheck is a deployable AI solution that assists in early liver cirrhosis detection. It combines clinical knowledge, ML, and web development for a real-world application.

10. FUTURE SCOPE

Planned improvements include feedback-based retraining, user accounts for saving reports, and integration with medical databases.

11. APPENDIX

Github Link: https://github.com/MohammedKaif-3/Liver_Cirrhosis

Dataset Link: <https://www.kaggle.com/datasets/bhavanipriya222/liver-cirrhosis-prediction>

Live Demo: <https://hepacheck.pythonanywhere.com/>