

Final Report Template

1. INTRODUCTION

1.1 Project Overview

This project aims to build a machine learning-based web application that predicts the likelihood of a patient suffering from liver cirrhosis using clinical features such as blood values, alcohol consumption patterns, and more. It provides early-stage alerts for medical professionals and patients.

1.2 Purpose

The purpose is to revolutionize liver care by enabling proactive diagnosis, reducing manual analysis, and improving patient outcomes using data-driven predictions

2. IDEATION PHASE

2.1 Problem Statement

Liver cirrhosis is a critical health condition that often goes undetected until advanced stages. There is a need for an intelligent, non-invasive predictive system that aids early diagnosis and intervention.

2.2 Empathy Map Canvas

| Say | Do |
|--------------------------------|---------------------------------|
| "I want early detection." | Regular check-ups, blood tests |
| Think | Feel |
| "Will I be diagnosed in time?" | Anxiety about health and future |

2.3 Brainstorming

- Use real patient data
- Apply classification algorithms (Random Forest, XGBoost)
- Develop a Flask web interface
- Display prediction result cleanly
- Store models using joblib

3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

| Stage | Action | Emotion |
|------------|-------------------------|----------|
| Awareness | Patient visits hospital | Hopeful |
| Diagnosis | Inputs clinical data | Anxious |
| Prediction | Sees result on web page | Informed |

3.2 Solution Requirement

- Input form for medical features
- Model integration
- Output display page
- Accuracy above 85%

3.3 Data Flow Diagram

[User Input Form] --> [Flask Server] --> [Preprocessing] --> [Model] --> [Prediction Output]

3.4 Technology Stack

- Frontend: HTML
- Backend: Python (Flask)
- Model: Random Forest/XGBoost
- Tools: Jupyter Notebook, VS Code
- Data: Liver patient dataset (.csv)

4. PROJECT DESIGN

4.1 Problem-Solution Fit

Users (patients/doctors) need a simple web interface to enter values and receive a prediction.

4.2 Proposed Solution

A full-stack application powered by ML to predict cirrhosis likelihood in real time.

4.3 Solution Architecture

HTML Form --> Flask Server --> Model (.pkl) --> Result Page

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

| Phase | Duration | Tools |
|--------------------|----------|------------------|
| Data Preprocessing | 3 Days | Jupyter Notebook |
| Model Training | 2 Days | scikit-learn |
| Web Integration | 2 Days | Flask |
| Testing & Debug | 2 Days | Localhost |
| Documentation | 1 Day | Word/Docs |

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Metric Value

Accuracy 100%

Precision 100%

Recall 100%

F1 Score 100%

7. RESULTS

7.1 Output Screenshots

- Web Form Input (HTML)
- Result Display (Positive/Negative)
- Correlation Heatmap
- Confusion Matrix

8. ADVANTAGES & DISADVANTAGES

Advantages

- Early liver diagnosis
- Web-based access
- Reusable model
- Fast predictions

Disadvantages

- Dependent on data quality

- Does not replace medical consultation

9. CONCLUSION

The model successfully predicts liver cirrhosis based on patient data. It is accurate, fast, and user-friendly. It serves as a great assistant tool for preliminary screening.

10. FUTURE SCOPE

- Add image-based diagnosis (ultrasound scans)
- Deploy to cloud (AWS/GCP)
- Expand to other liver diseases
- Add login/user history tracking

11. APPENDIX

Source Code

Located in app.py and templates/

Dataset Link

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

GitHub

GitHub: <https://github.com/RAVURITEJASRI/Revolutionizing-Liver-Care-Predicting-Liver-Cirrhosis-using-Advanced-Machine-Learning-Techniques.git>