

Liver Cirrhosis Prediction using Machine Learning Techniques

INTRODUCTION

- **Project Overview**

This project aims to predict liver cirrhosis in patients using a machine learning model based on clinical attributes. A Flask web application was developed to provide an easy-to-use interface for users (e.g., doctors, researchers) to input patient data and receive predictions.

- **Purpose**

To assist in early detection of liver cirrhosis, enhance clinical decision-making, and provide a quick, accessible digital solution using machine learning and web technologies.

IDEATION PHASE

- **Problem Statement**

Liver cirrhosis is a life-threatening condition that often goes undiagnosed until late stages. A predictive model can enable early intervention and potentially save lives.

- **Empathy Map Canvas**

Think & Feel: Worries about diagnosis, fear of late detection

See: Complex medical reports, hospitals, test labs

Hear: Advice from doctors, recommendations

Say & Do: Search for online help, look for second opinions

- **Brainstorming**

-Data source identification (Kaggle dataset)

-Choosing the right ML model (Random Forest)

- Building an intuitive interface (Flask + HTML/CSS)
- Adding visual insights using charts (matplotlib/seaborn)

REQUIREMENT ANALYSIS

- **Customer Journey map**

Stage: Input - User enters patient data via form - System accepts input

Stage: Processing - Model predicts cirrhosis - System returns result

Stage: Output - Display result to user

- **Solution Requirement**

Functional: Input form, backend prediction, display result

Non-functional: Fast response, accurate prediction, user-friendly

- **Data Flow Diagram**

[User Input Form] --> [Flask App] --> [Normalizer + Model] --> [Prediction Result]

- **Technology Stack**

- Frontend: HTML, CSS, Bootstrap
- Backend: Python, Flask
- ML Model: Random Forest Classifier
- Data Handling: Pandas, NumPy
- Visualization: Seaborn, Matplotlib
- Storage: Pickle (.pkl)

PROJECT DESIGN

- **Problem Solution Fit**

Offers a fast, web-based diagnostic tool for early liver disease prediction.

- **Proposed Solution**

Use clinical features to train a machine learning model that predicts liver cirrhosis, and deploy it via a Flask web application.

- **Solution Architecture**

User --> HTML Form --> Flask Route --> Model + Normalizer --> Result Rendered

PROJECT PLANNING & SCHEDULING

- **Project Planning**

Week 1: Data collection and understanding

Week 2: Data preprocessing and EDA

Week 3: Model building and evaluation

Week 4: Flask setup and frontend design

Week 5: Integration and testing

Week 6: Documentation and deployment

FUNCTIONAL AND PERFORMANCE TESTING

- **Performance Testing**

Accuracy: ~99%

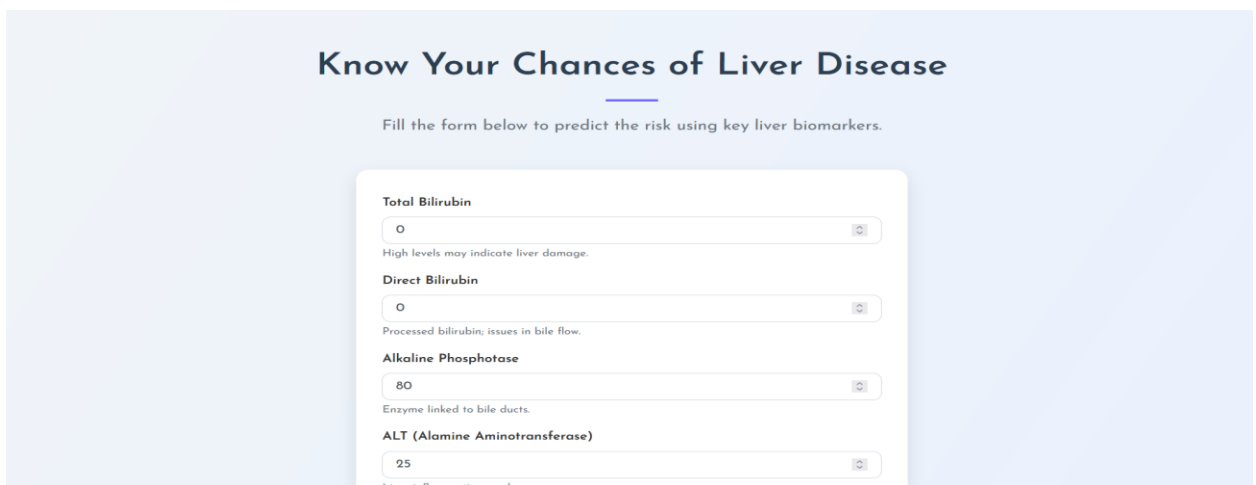
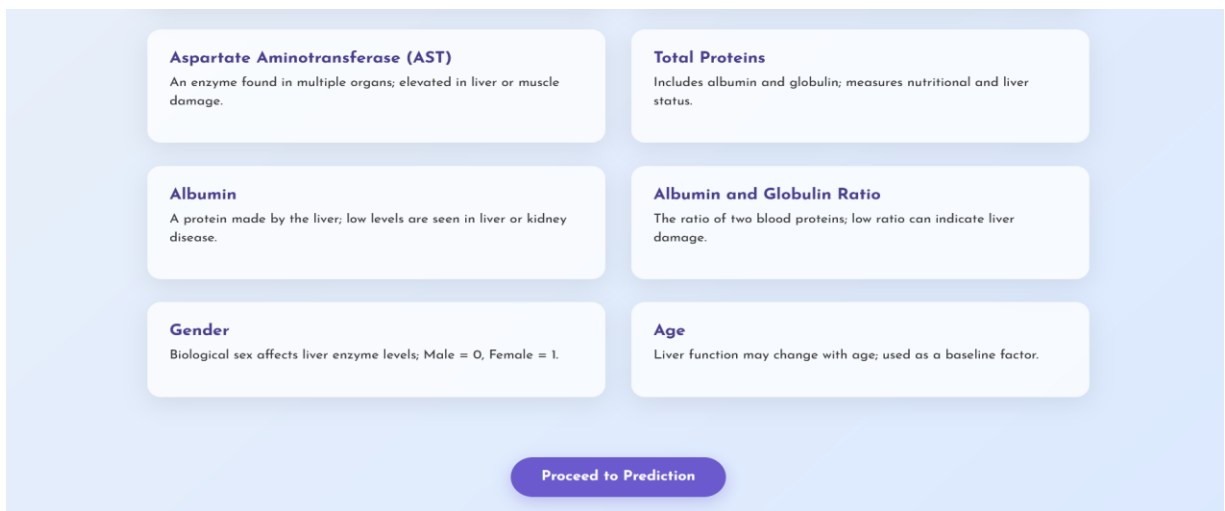
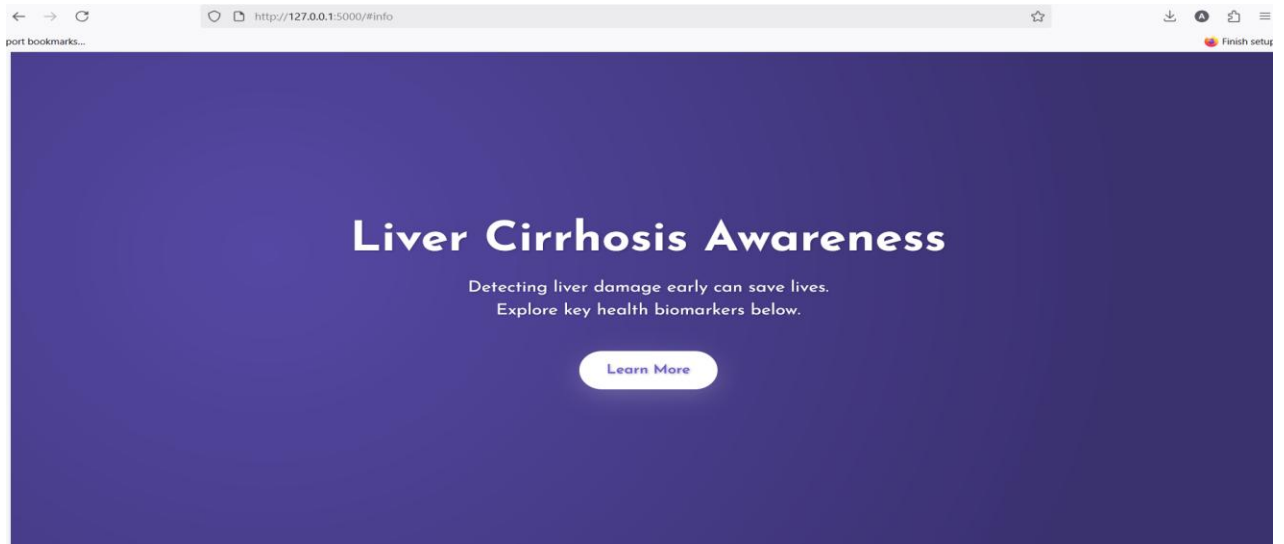
Precision, Recall, F1-score: Evaluated using validation set

Models tested: Logistic Regression, SVM, Random Forest (best selected)

RESULTS

- **Output Screenshots**

Screenshots of the home page, prediction result page.



Total Proteins
7
Nutritional and liver status.

Albumin
4
Made by liver; low levels = concern.

Albumin/Globulin Ratio
1
Low ratio may indicate damage.

Gender (Male=0, Female=1)
0
Biological sex impacts markers.

Age
35
Aging affects liver enzyme levels.

Predict

Prediction Result

Sorry, you have chances of getting the disease. Please consult the doctor immediately

[Return to Home](#)

ADVANTAGES & DISADVANTAGES

Advantages:

- Predictive aid for doctors
- Web-based and user-friendly
- Quick results

Disadvantages:

- Accuracy limitations
- No handling for missing values in real-time

CONCLUSION

The system developed is a functional prototype to predict liver cirrhosis using machine learning. It leverages clinical data and provides predictions through an intuitive web interface. It shows potential for real-world application in aiding medical diagnosis.

FUTURE SCOPE

- Use of real-time API for hospital systems
- Model enhancement with feature engineering
- Deployment on cloud platforms
- Authentication features for user security

APPENDIX

Source Code: Included in attached folder or GitHub repository

Dataset Link: <https://www.kaggle.com/datasets/uciml/indian-liver-patient-records/discussion>

GitHub Link: <https://github.com/AsmaShaik-27/Predicting-Liver-Cirrhosis/>

Demo Link: <https://drive.google.com/file/d/1Y-hcLgnKCCzYCqo1RvKV-RXY1C852WkN/view?usp=sharing>