

# Artificial Intelligence and Machine Learning

## Project Documentation

### 1. Introduction

- **Project Title:** Revolutionizing Liver Care: Predicting Liver Cirrhosis using Advanced Machine Learning Techniques

- **Team Members:**

Team Leader : Kamathama Vedavardhan Sai

Team member : Ediga Veeresh

Team member :Avula Venkata Harshavardhan

Team member : Karikati Murali Krishna

### 2. Project Overview

- **Purpose:** The goal of this project is to develop an intelligent web-based prediction tool to assess the risk of liver cirrhosis using clinical data and machine learning techniques. It aims to enable early detection and assist healthcare professionals in better decision-making.
- **Features:**
  1. Input form for clinical values (bilirubin, albumin, INR, etc.)
  2. Risk prediction using trained XGBoost model
  3. Risk level output with visual cues
  4. Responsive multi-page interface
  5. Educational content on liver disease

### 3. Architecture

#### **Frontend:**

Built using **HTML**, **CSS**, and optionally **Bootstrap** for styling. Pages include Home, Prediction, Dashboard, and About. React was not used in this project.

#### **Backend:**

Implemented using **Flask** (Python). It serves the trained XGBoost model and handles HTTP requests.

#### **Database:**

No persistent database was used. All predictions are handled in real-time using the loaded `.pkl` model. In future, MongoDB/PostgreSQL can be added for data storage.

### 4. Setup Instructions

#### **Prerequisites:**

Python 3.9+

Flask

Jupyter/Colab (for model training)

Required Python libraries: xgboost, pandas, sklearn, joblib

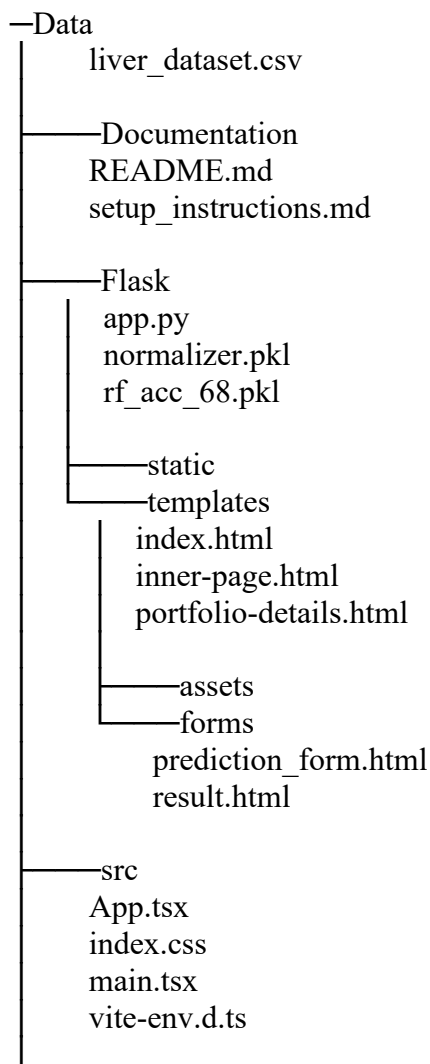
### Installation:

```
git clone https://github.com/your-repo/livercare-ai
cd liver care-ai
pip install -r requirements.txt
python app.py
or
# Backend
cd server
pip install -r requirements.txt
python app.py

# Frontend
cd ../client
npm install
pythonapp.py
```

## 5. Folder Structure

liver-cirrhosis-prediction/



└── Training  
    liver\_cirrhosis\_training.py

## 6. Running the Application

Frontend & Backend (Flask)

⇒ Python app.py

Access via: <http://127.0.0.1:5000/>

## 7. API Documentation

[file:///c:/liver%20care%20project/project/Documentation/API\\_Documentation.md](file:///c:/liver%20care%20project/project/Documentation/API_Documentation.md)

## 8. Authentication

Authentication Not Implemented

In future versions, authentication for doctors can be added using Flask-Login or JWT.

## 9. User Interface

Modern, multi-page layout

Clean navigation bar (Home, Prediction, Dashboard, About)

Risk level badges for result clarity

Input validation on the form

## 10. Testing:

### 1. Model Testing:

Used train\_test\_split, confusion matrix, and classification report

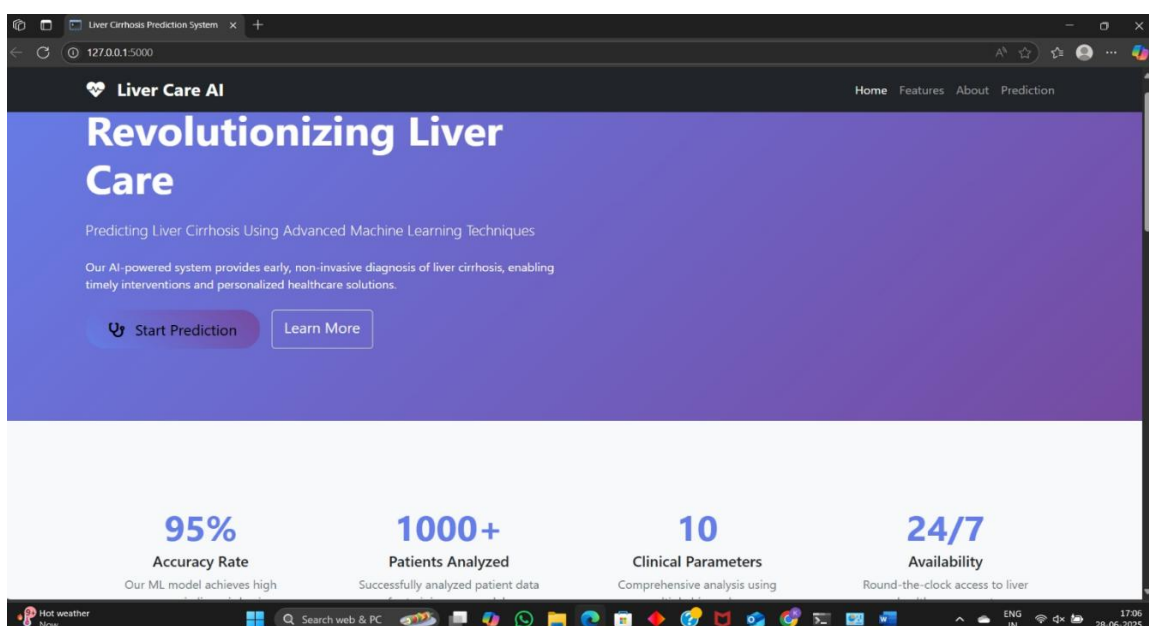
### 2. Tools: Scikit-learn, XGBoost

Manual UI Testing:

Verified form inputs, navigation flow, and backend integration

## 11. screenshots or Demo:

Home page screenshot:



Prediction page screenshot:

Liver Care AI

Back to Home

Liver Cirrhosis Prediction

Enter patient clinical parameters for AI-powered cirrhosis risk assessment

Normal Reference Ranges

Total Bilirubin	0.2-1.2 mg/dL
Direct Bilirubin	0.0-0.3 mg/dL
Alkaline Phosphatase	44-147 U/L
ALT	7-56 U/L
AST	10-40 U/L
Total Proteins	6.0-8.3 g/dL
Albumin	3.5-5.0 g/dL
A/G Ratio	1.1-2.5

Patient Demographics

Age (years)

Gender

Select Gender

Liver Function Tests

Total Bilirubin (mg/dL)

Direct Bilirubin (mg/dL)

Alkaline Phosphatase (U/L)

ALT (U/L)

ZIM - SA

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Core features screenshot:

Liver Care AI

HomeFeaturesAboutPrediction

Core Features

Advanced machine learning for early liver cirrhosis detection

Advanced ML Algorithms

Utilizes Random Forest, XGBoost, and SVM algorithms for accurate predictions

Non-Invasive Diagnosis

Predicts liver cirrhosis using standard laboratory blood test results

Early Detection

Enables early-stage detection for timely medical intervention

Clinical Decision Support

Assists healthcare professionals in making informed decisions

Real-time Analysis

Instant prediction results with confidence intervals

Secure & Private

HIPAA-compliant data handling and privacy protection

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## **10. Known Issues**

No persistent database – data not stored after prediction

Basic error handling – input validation needs improvement

No authentication – anyone can access prediction interface

## **11. Future Enhancements**

Add login for doctors

Store results in MongoDB

Enable PDF report downloads

Add chatbot or mobile version