

Literature Survey

Liver cirrhosis is a chronic and irreversible condition that causes scarring of liver tissue, often resulting in life-threatening complications if not diagnosed early. Traditionally, diagnosis relies on invasive liver biopsies or clinical evaluations which are costly, time-consuming, and inaccessible in remote areas.

In recent years, **machine learning (ML)** techniques have gained prominence in the medical field due to their ability to learn patterns from complex datasets and make accurate predictions. Several research studies have applied ML models such as **Decision Trees, Random Forests, Support Vector Machines (SVM), and XGBoost** for classifying liver disease stages using patient medical parameters like bilirubin, albumin, SGOT, and prothrombin time.

Notable studies include:

- **"Prediction of Liver Disease using Data Mining Algorithms" by Rathi et al.** – used classification algorithms on the Indian Liver Patient Dataset (ILPD) to identify disease presence with ~73% accuracy.
- **"A Comparative Study of ML Algorithms for Liver Disease Diagnosis" by Karthik et al.** – highlighted the efficiency of ensemble models like Random Forest in achieving higher accuracy.
- **"Early Detection of Liver Cirrhosis Using ML" by Kumar et al.** – implemented feature engineering and ensemble techniques, improving early diagnosis rates.

Despite promising results, many existing models are not integrated into practical web-based systems, limiting real-world usability.

This project builds upon past work by not only training an accurate model (Random Forest: 99.98%) but also deploying it via a **Flask web interface** that allows users to input clinical values or upload lab reports for prediction—bridging the gap between research and real-world application.