# Project Design Phase Problem – Solution Fit Template

Date	28 June 2025
Team ID	LTVIP2025TMID35624
Project Name	Revolutionizing Liver Care: Predicting Liver Cirrhosis Using Advanced Machine Learning Techniques
Maximum Marks	2 Marks

### **Problem – Solution:**

We propose building a machine learning (ML)—based predictive model to detect liver cirrhosis in its early stages using non-invasive, routinely available clinical and laboratory data. The model will assist in identifying high-risk individuals and support early diagnosis and proactive intervention.

#### 1. Data Source:

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

Description: This dataset includes structured, anonymized patient records featuring:

- **Demographics**: Age, Gender, Location
- Medical History: Alcohol consumption, Hepatitis infections, Diabetes
- Laboratory Tests: Blood counts, liver function tests, lipid profiles
- Clinical Indicators: Blood pressure, obesity status, family history

## 2. Solution Workflow

- 1. Data Collection & Preprocessing
  - Perform preprocessing steps such as:
    - Handling missing values
    - Encoding categorical variables (e.g., gender, yes/no lifestyle factors)
    - Normalizing continuous features
    - o Feature selection to retain only the most relevant attributes
  - Data Exploration and Preprocessing
    - o Univariate Analysis: Histograms were plotted for numerical features.
    - Bivariate Analysis: Scatter plots and pair plots explored relationships between features.
    - Outlier Handling: Outliers were detected and managed using the IQR method.

### 2. Model Development

- Train and evaluate multiple machine learning algorithms, including:
  - Random Forest

- Naïve Bayes
- XG Boost
- o Logistic Regression CV
- Random Forest
- Support Vector Classifier
- o Ridge Classifier
- o Logistic Regression
- K-Nearest Neighbors (KNN)
- Apply cross-validation and hyperparameter tuning to optimize performance.
- Use evaluation metrics: Accuracy, Precision, Recall, F1-score, and Confusion Matrix to validate the models.

## 3. Model Selection

We will select and optimize the best model based on performance metrics to achieve the highest accuracy.

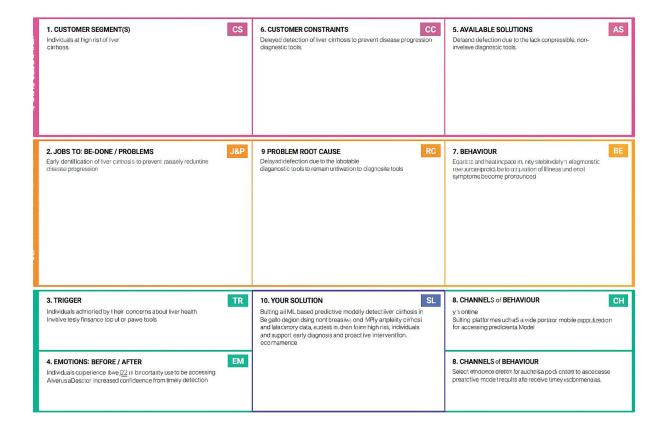
## 4.Prediction

• Generate predictions in the form of: Binary classification (Cirrhosis: Yes/No)

# 5. Interface Design

- Building a user-friendly web or mobile platform using tools like: HTML/ CSS
   +JavaScript(Frontend), Flask (Backend)
- Users can input lab results and receive the Prediction results.

# Template:



### References:

- 1. <a href="https://www.ideahackers.network/problem-solution-fit-canvas/">https://www.ideahackers.network/problem-solution-fit-canvas/</a>
- 2. <a href="https://medium.com/@epicantus/problem-solution-fit-canvas-aa3dd59cb4fe">https://medium.com/@epicantus/problem-solution-fit-canvas-aa3dd59cb4fe</a>