**Ideation Phase**

**Brainstorm & Idea Prioritization Template**

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| Date | 27 June 2025 |
| Team ID | **LTVIP2025TMID35735** |
| Project Name | **Revolutionizing Liver Care : Predicting Liver Cirrhosis using Advanced Machine Learning Techniques** |
| Maximum Marks | 4 Marks |

**Brainstorm & Idea Prioritization Template:**

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions..

**Step-1: Team Gathering, Collaboration and Select the Problem Statement**

The team is collaborated in all aspects and shared the work in every thing that we do in the project and no one is assigned to do a specific part and not divided the work.All teamates together did the project

**Problem Statement :**

**Revolutionizing Liver Care: Predicting Liver Cirrhosis Using Advanced Machine Learning Techniques**

**Statement:**

Liver cirrhosis is a progressive and potentially fatal condition characterized by irreversible liver damage. Early diagnosis is crucial for improving treatment outcomes and reducing mortality, yet traditional diagnostic methods are often expensive, invasive (e.g., biopsies), and not always accessible—especially in low-resource settings. Moreover, interpreting complex clinical data manually is time-consuming and subject to human error.

In this context, there is a pressing need for an intelligent, automated system that can accurately predict liver cirrhosis risk using readily available patient health data such as blood test results and clinical indicators.

This project aims to develop a machine learning-based predictive model capable of identifying patients at risk of liver cirrhosis with high accuracy. The model will be integrated into a user-friendly web application for doctors and healthcare providers, enabling faster, data-driven decisions, early intervention, and more personalized care.

**Step-2: Brainstorm, Idea Listing and Grouping**

**1. Brainstorming Session**

“How can we best develop a reliable, interpretable, and user-friendly liver cirrhosis prediction system using machine learning?”

Encourage team members to contribute freely in the following categories:

* Data-related ideas
* Machine learning techniques
* Frontend design for doctors
* Clinical utility
* Tools and infrastructure

**2. Idea Listing**

| **Idea** | **Description** | **Category** |
| --- | --- | --- |
| Use ILPD dataset | Source for liver data | Data |
| Handle missing values | Clean/Impute data | Preprocessing |
| Apply SMOTE | Fix class imbalance | Preprocessing |
| Train RF, XGBoost, SVM | Compare models | Modeling |
| Use SHAP for interpretability | Explain predictions | Explainability |
| Evaluate with F1, AUC | Check model performance | Evaluation |
| Build Flask app | Doctor-friendly UI | Deployment |
| Allow CSV upload | Batch predictions | UX |
| Export reports | PDF for doctors | UX |
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**3. Idea Grouping**

1. **Data & Preprocessing**

Clean data, encode features, apply SMOTE

1. **ML Modeling**

Train and compare classifiers

1. **Evaluation & Interpretability**

Use metrics, SHAP for model explanation

1. **UI/UX Design**

Streamlit app, CSV upload, risk indicators

1. **Deployment & Security**

Deploy on cloud, add login for users

**Step-3: Idea Prioritization**

To ensure fast and effective progress, we prioritized ideas based on impact and effort. High-impact, low-effort tasks—like using the ILPD dataset, cleaning data, applying SMOTE, training ML models, and building a Streamlit UI—will be implemented first. Medium-priority items, such as SHAP for interpretability and report downloads, will follow once the core system works. Low-priority tasks like user login and Flask migration will be saved for later development stages. This approach ensures we deliver a functional, valuable prototype quickly.