**Project Design Phase**

**Proposed Solution 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 | 2 Marks |

**Proposed Solution Template:**

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| **S.No.** | **Parameter** | **Description** |
|  | Problem Statement (Problem to be solved) | 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. |
|  | Idea / Solution description | We are building an AI-powered web tool that predicts liver cirrhosis using routine blood test data. By applying machine learning to detect patterns doctors might miss, the tool helps users get early warnings, reduces diagnostic delays, and supports faster medical decisions — all from a simple, accessible interface. |
|  | Novelty / Uniqueness | Unlike traditional diagnostics that rely on invasive biopsies or delayed symptom-based detection, our solution uses machine learning on routine blood tests to predict liver cirrhosis early, non-invasively, and automatically. It combines medical-grade accuracy with real-time accessibility through a simple web interface — a first step toward AI-driven liver care for everyone, anywhere. |
|  | Social Impact / Customer Satisfaction | This tool empowers early detection of liver cirrhosis, especially in underdiagnosed or underserved communities where access to specialists is limited. By making liver risk assessment faster, cheaper, and accessible online, it encourages proactive health monitoring, reduces long-term treatment costs, and ultimately saves lives through timely intervention. |
|  | Business Model (Revenue Model) | 1. **Freemium Model**   Free: Basic liver risk prediction using key lab values.  Premium: Detailed reports, explainable AI insights (SHAP plots), risk tracking over time, and personalized health tips.   1. **Subscription for Clinics / Labs**   Monthly or yearly SaaS model for diagnostic labs, hospitals, and telemedicine platforms to integrate the tool into their workflows.   1. **API-as-a-Service**   Offer an API for healthcare startups and EMR (Electronic Medical Records) providers to embed liver prediction functionality into their platforms.   1. **B2B Licensing**   Sell licenses to insurance companies or health tech firms for risk profiling and preventative care initiatives.   1. **Targeted Health Campaign Partnerships**   Partner with NGOs, liver foundations, or corporate wellness programs to deploy the tool in screening drives. |
|  | Scalability of the Solution | Our solution is highly scalable due to its cloud-based architecture and reliance on widely available clinical data (standard blood tests). Once trained, the machine learning model can serve thousands of users simultaneously through a web or mobile interface.  **Geographic Scalability:** It can be deployed globally, especially in regions with limited access to specialists.  **Data Scalability:** Easily adaptable to new datasets from different hospitals or regions to improve model accuracy over time.  **Feature Scalability:** Can be expanded to predict other liver conditions (e.g., NAFLD, hepatitis) or integrated into broader health screening tools.  **Technical Scalability:** Compatible with APIs, mobile apps, EHR systems, and cloud platforms for large-scale deployment. |