Ideation Phase

Define the Problem Statements

Date: June 28, 2025

Team ID: LTVIP2025TMID45560

Project Name: Revolutionizing Liver Care: Predicting Liver Cirrhosis using Advanced Machine Learning Techniques

Maximum Marks: 2 Marks

Customer Problem Statement Template:

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

Problem Statements Analysis

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A rural general practitioner with limited diagnostic resources	detect liver cirrhosis in my patients at an early stage	I have to rely on expensive liver biopsies and imaging scans that many patients cannot afford	diagnostic methods are invasive, costly, and not readily available in my clinic	frustrated and worried that I'm missing critical cases that could be treated if caught early
PS-2	A patient with risk factors for liver disease (diabetes, alcohol history)	monitor my liver health regularly and catch any problems early efficiently	I can't afford frequent liver biopsies or expensive scans, and they're also scary and painful	these tests cost thousands of rupees and require traveling to specialized centers	anxious about my health and helpless because I can't access proper monitoring
PS-3	A hepatologist at a tertiary care hospital	screen and prioritize patients referred for liver disease evaluation	I'm overwhelmed with referrals, many of which turn out to be unnecessary while some critical cases get delayed	there's no reliable pre-screening tool to help primary care doctors make better referral decisions	overworked and concerned that the current system is failing both patients and healthcare providers
PS-4	A healthcare administrator managing a public hospital budget	provide quality liver disease care while controlling diagnostic costs	traditional liver disease screening is extremely expensive and strains our limited healthcare budget	liver biopsies, CT scans, and MRIs cost significant amounts per patient, limiting access for the poor	pressured to balance quality care with financial sustainability
PS-5	A family member	understand if	the symptoms of	by the time	scared and

of someone at risk for liver disease	my loved one needs urgent medical attention for	liver cirrhosis are often silent until it's too late, and we can't afford regular expensive testing	symptoms appear, the disease has often	helpless, wanting to protect my family but lacking accessible tools

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		their liver health		progressed to advanced stages	

Key Problem Insights

Primary Pain Points Identified:

1. Cost Barrier: Traditional liver disease diagnostics are prohibitively expensive for many patients
2. Accessibility Gap: Advanced diagnostic tools are not available in rural/remote healthcare settings
3. Late Detection: Current methods often miss early-stage liver cirrhosis when it's most treatable
4. Resource Strain: Healthcare systems are overwhelmed with inefficient screening processes
5. Anxiety & Fear: Patients and families live with uncertainty due to lack of accessible monitoring tools

Target Customer Segments:

- Primary: Rural and urban general practitioners
- Secondary: Patients with liver disease risk factors
- Tertiary: Healthcare administrators and specialists

Impact of Current Problems:

- Delayed diagnosis leading to preventable deaths
- Increased healthcare costs due to late-stage treatments
- Reduced quality of life for patients and families
- Inefficient allocation of healthcare resources
- Widening health equity gaps between urban and rural populations

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How Our Solution Addresses These Problems:

For Healthcare Providers (PS-1, PS-3, PS-4):

- Non-invasive screening using readily available lab parameters
- Cost-effective alternative to expensive imaging and biopsies
- Quick results enabling immediate decision-making

- Improved accuracy in referral decisions and resource allocation

For Patients and Families (PS-2, PS-5):

- Affordable monitoring using basic blood tests
- Early detection when treatment is most effective
- Reduced anxiety through accessible health monitoring
- Empowerment with actionable health information

System-Level Impact:

- Resource optimization through better screening efficiency
- Health equity improvement by making screening accessible
- Cost reduction for healthcare systems and patients
- Better outcomes through early intervention

Success Metrics Based on Problem Statements:

1. Diagnostic Accuracy: >90% accuracy in liver cirrhosis prediction
2. Cost Reduction: 80% reduction in screening costs compared to traditional methods
3. Accessibility: Deployable in resource-limited settings
4. Time Efficiency: Results available within minutes
5. User Satisfaction: High adoption rates among healthcare providers
6. Health Outcomes: Increased early-stage detection rates

Problem Statement Validation:

These problem statements are validated through:

- Literature Review: Studies showing delayed liver disease diagnosis
- Healthcare Data: Statistics on liver disease progression and costs
- Expert Consultation: Insights from healthcare professionals
- Real-world Context: Observations from Indian healthcare settings
- Technology Trends: Growing adoption of AI in healthcare

This problem definition phase ensures our machine learning solution directly addresses real customer pain points rather than creating a solution in search of a problem.