Brainstorm & Idea Prioritization Template

Ideation Phase

Field	Details
Date	28 June 2025
Team ID	LTVIP2025TMID45560
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.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

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

Team Composition

- MASABATTULA DIVYA (ID: S201086) - Lead ML Engineer & Data Scientist
- KOTA HEMALATHA (ID: S200381) - Backend Developer & Model Validation Specialist

Problem Statement Selection Process

Initial Problem Identification

Our team began by identifying critical healthcare challenges where machine learning could make a significant impact:

1. Cancer Detection using Medical Imaging
2. Heart Disease Prediction using ECG Data
3. Liver Cirrhosis Prediction using Clinical Parameters SELECTED

4. Diabetes Risk Assessment using Lifestyle Data
5. Mental Health Screening using Social Media Analysis

Problem Statement Refinement

Through collaborative discussion and research, we refined our selected problem:

Initial Statement: "Predict liver diseases using patient data"

Refined Statement: "Develop a machine learning-based system to predict liver cirrhosis using readily available clinical and biochemical parameters, enabling early detection and reducing reliance on invasive diagnostic procedures"

Problem Validation Criteria

Clinical Significance: High mortality rate, often diagnosed late
Data Availability: Clinical datasets accessible
Technical Feasibility: Suitable for ML classification
Real-world Impact: Can improve patient outcomes
Innovation Potential: Non-invasive prediction approach

Stakeholder Analysis

- Primary: Patients at risk of liver cirrhosis
- Secondary: Healthcare professionals (doctors, nurses)
- Tertiary: Healthcare institutions, insurance companies
- Regulatory: Medical device authorities (if deployed clinically)

Step-2: Brainstorm, Idea Listing and Grouping

Brainstorming Session Details

- Duration: 2 hours
- Method: Hybrid (in-person + virtual collaboration)
- Tools Used: Digital whiteboard, sticky notes, mind mapping
- Rules: No judgment, build on ideas, quantity over quality

Raw Ideas Generated (50+ Ideas)

GROUP A: Data Sources & Features

1. Standard liver function tests (ALT, AST, Bilirubin)

2. Complete blood count parameters
3. Demographic data (age, gender, BMI)
4. Lifestyle factors (alcohol, smoking, diet)
5. Medical history (diabetes, hypertension)
6. Genetic markers and family history
7. Ultrasound measurements
8. CT/MRI imaging features
9. Elastography results (FibroScan)
10. Patient symptoms questionnaire
11. Medication history
12. Environmental exposure data
13. Social determinants of health
14. Vital signs monitoring
15. Laboratory trend analysis over time

GROUP B: Machine Learning Approaches

16. Logistic Regression (baseline model)
17. Random Forest Classifier
18. Support Vector Machines (SVM)
19. XGBoost Gradient Boosting
20. K-Nearest Neighbors (KNN)
21. Neural Networks (Deep Learning)
22. Ensemble methods (Voting, Stacking)
23. Convolutional Neural Networks (for imaging)
24. Recurrent Neural Networks (for time series)
25. Transformer models
26. AutoML solutions
27. Federated learning approach
28. Transfer learning from related diseases
29. Reinforcement learning for treatment optimization
30. Bayesian machine learning for uncertainty

GROUP C: Technical Implementation

31. Web-based application (Flask/Django)
32. Mobile application (iOS/Android)
33. Desktop software
34. Cloud-based API service
35. Real-time dashboard for hospitals
36. Integration with Electronic Health Records (EHR)
37. Telemedicine platform integration
38. Wearable device connectivity
39. Voice-activated interface
40. Blockchain for secure data sharing
41. Edge computing for privacy
42. Progressive Web App (PWA)
43. WhatsApp/Telegram bot interface
44. QR code-based quick access
45. Offline capability for rural areas

GROUP D: Validation & Evaluation

46. Cross-validation techniques
47. External validation on different datasets
48. Clinical trial validation
49. Comparative studies with existing methods
50. Real-world evidence collection
51. A/B testing in clinical settings
52. Regulatory approval process
53. Health economics evaluation
54. Patient outcome tracking
55. Long-term follow-up studies

**Idea C