Project Proposal: Anemia Sense – Leveraging Machine Learning for Precise Anemia Detection

1. Project Title

Anemia Sense – A Machine Learning-Based Anemia Detection System

2. Problem Statement

Anemiasense leverages machine learning algorithms to provide precise recognition and management of anemia, a condition characterized by a deficiency of red blood cells or hemoglobin.

3. Objectives

- To build a machine learning model capable of detecting anemia from basic blood test values.
- To develop a user-friendly web interface for patients or healthcare providers to input values and get instant predictions.
- To compare the performance of multiple ML models to choose the most accurate and efficient one.
- To demonstrate deployment of the model into a real-time application using Flask and HTML/CSS.

4. Methodology

To accomplish this, we have to complete all the activities listed below,

- Data Collection & Preparation
  - Collect the dataset
  - Data Preparation

- Exploratory Data Analysis
  - Descriptive statistical
  - Visual Analysis

- Model Building
  - Training the model in multiple algorithms
  - The model

- Performance Testing & Hyperparameter Tuning
  - Testing model with multiple evaluation metrics
  - Comparing model accuracy before & after applying hyperparameter tuning

- Model Deployment
    - Save the best model
    - Integrate with Web Framework

5. Tools & Technologies

- Python, Pandas, NumPy, scikit-learn, XGBoost
- Flask for backend development
- HTML5, CSS3 for UI/UX
- GitHub for version control and collaboration
- Colab/Jupyter Notebook for model experimentation

6. Expected Outcomes

- A reliable machine learning model for anemia detection with over 90% accuracy.
- A responsive and accessible web interface for real-time predictions.
- Analytical insights into the importance of features in anemia classification.

9. Conclusion

This project is an attempt to merge healthcare and technology, enabling smarter and faster diagnosis using machine learning. It simplifies anemia screening and promotes awareness through digital healthcare solutions.