7. Suggested Improvements

7.1 Overview

Based on the lecturer's feedback and project evaluation, several key areas have been identified for enhancement. This section outlines structured improvements in problem definition, system design, AI model performance, UI/UX, deployment, and evaluation.

7.2 Refinement of Problem Statement & Objectives

1. **Clarify the Project Scope**
    - Define the problem in a **more structured and concise manner**.
    - Clearly state the **use case, target users, and expected outcomes**.
    - Emphasize the **real-world applicability** of the system.
2. **Set Measurable Goals**
    - Define **specific success metrics** (e.g., prediction accuracy, processing speed).
    - Ensure project objectives **align with practical use cases**.

7.3 Enhancement of System Design & Data Flow

1. **Improve Data Flow & System Behavior Representation**
    - Refine **Data Flow Diagrams (DFD)** to show **clearer data movement**.
    - Define **input-output relationships** for each component.
    - Ensure **sequence diagrams** align with system interactions.
2. **Better Component Relationships**
    - Improve **Component Diagrams** to illustrate **dependencies between modules**.
    - Ensure modularity for **scalability and ease of maintenance**.

7.4 Optimization of AI Models

1. **Fine-tune Model Performance**
    - Apply **advanced hyperparameter tuning** (Grid Search, Bayesian Optimization).
    - Improve **data preprocessing** (e.g., outlier removal, feature engineering).
    - Use **regularization techniques** to prevent overfitting.
2. **Benchmark Against Existing Models**

- Compare results with **traditional machine learning models** (Random Forest, XGBoost).
- Include **baseline comparisons** to validate improvements.

3. **Optimize Model Training & Inference**
    - Implement **parallel processing** for faster training.
    - Use **quantization and pruning** for lightweight inference.

7.5 UI/UX Design & Prototyping

1. **Enhance the Streamlit Interface**
    - Improve **layout structure** for better navigation.
    - Implement **real-time feedback** on data uploads and predictions.
    - Provide **dynamic visualizations** for result interpretation.
2. **Improve User Experience & Accessibility**
    - Follow **UI/UX best practices** (consistent color schemes, typography).
    - Ensure **responsiveness for different screen sizes**.
    - Include **error handling messages** for better user guidance.

7.6 Deployment & Integration Improvements

1. **Refine Deployment Strategy**
    - Use **Docker** for containerized deployment.
    - Implement **CI/CD pipelines** for automated updates.
    - Host on **cloud services** (AWS, GCP, Azure) for scalability.
2. **Optimize API & System Performance**
    - Optimize **model inference speed** using **GPU acceleration**.
    - Use **caching mechanisms** to reduce repeated computations.
    - Improve **database indexing** for faster queries.