Project Design Phase-II

Solution Requirements (Functional & Non-functional)

Date: 31 January 2025

Team ID: [Your Team ID]

Project Name: GrainPalette - A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning

Maximum Marks: 4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration & Authentication	Registration through Form
		Registration through Gmail
		Registration through Facebook
FR-2	User Confirmation	Confirmation via Email
		Confirmation via OTP
FR-3	Rice Image Upload & Processing	Single Image Upload
		Batch Image Upload
		Image Format Validation
		Image Quality Assessment
FR-4	Rice Classification Engine	Deep Learning Model Integration
		Transfer Learning Implementation
		Real-time Classification
		Confidence Score Generation
FR-5	Results & Analytics Dashboard	Classification Results Display
		Confidence Score Visualization
		Historical Analysis
		Export Results (PDF/CSV)
FR-6	Rice Type Database Management	Rice Variety Information Storage
		Nutritional Data Integration
		Regional Classification
		Search & Filter Functionality
FR-7	Model Performance Monitoring	Accuracy Metrics Tracking
		Performance Analytics
		Model Retraining Alerts
		Error Rate Monitoring
FR-8	User Profile Management	Profile Creation & Updates
		Classification History
		Preferences Settings
		Account Deletion
FR-9	Admin Panel	User Management
		Model Configuration
		System Analytics
		Content Management
FR-10	API Integration	RESTful API Endpoints
		Third-party Integration Support

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
		Mobile App API
		Webhook Support

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	- Intuitive user interface with minimal learning curve - Mobile-responsive design - Accessibility compliance (WCAG 2.1) - Multi-language support - Maximum 3 clicks to perform rice classification
NFR-2	Security	- End-to-end encryption for data transmission - Secure user authentication (OAuth 2.0) - Input validation and sanitization - Protection against common vulnerabilities (OWASP Top 10) - Regular security audits and penetration testing
NFR-3	Reliability	- System uptime of 99.9% - Graceful error handling and recovery - Data backup and disaster recovery - Fault tolerance mechanisms - Automated health checks and monitoring
NFR-4	Performance	- Image classification within 3 seconds - Support for concurrent users (1000+) - Image processing optimization - Efficient memory usage - Response time < 2 seconds for web requests
NFR-5	Availability	- 24/7 system availability - Load balancing across multiple servers - CDN integration for global access - Automated failover mechanisms - Scheduled maintenance windows
NFR-6	Scalability	- Horizontal scaling capability - Auto-scaling based on demand - Microservices architecture - Database sharding support - Cloud-native deployment
NFR-7	Maintainability	- Modular code architecture - Comprehensive documentation - Automated testing suite - Version control integration - CI/CD pipeline implementation
NFR-8	Compatibility	- Cross-browser compatibility - Mobile device support (iOS/Android) - Various image format support - Integration with popular ML frameworks - Backward compatibility maintenance
NFR-9	Data Privacy	- GDPR compliance - Data anonymization techniques - User consent management - Right to be forgotten implementation - Data retention policies
NFR-10	Accuracy	- Minimum 95% classification accuracy - Consistent performance across rice varieties - Robust handling of image variations - Confidence threshold validation - Continuous model improvement