**Project Design Phase**

**Problem – Solution Fit Template**

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| Date | 28 June 2025 |
| Team ID | LTVIP2025TMID40163 |
| Project Name | grainpalette - a deep learning odyssey in rice type classification through transfer learning |
| Maximum Marks | 2 Marks |

### 🌾 Problem–Solution Fit Template – GrainPalette: A Deep Learning Odyssey in Rice Type Classification

### ⚠️ The Problem–Solution Fit

We identified a pressing challenge for **rice millers, quality inspectors, and agricultural distributors**:

the lack of an accurate, scalable, and fast method to identify and classify rice grain varieties for packaging, pricing, and export.

Manual classification is **time-consuming**, **subjective**, and vulnerable to **human error**, leading to inconsistency, mislabeling, and loss of trust in quality control.  
This becomes especially problematic in bulk operations or when dealing with high-value grains like Basmati or Arborio.

**GrainPalette** introduces a **deep learning–powered image classification system**, built using **transfer learning with MobileNet/ResNet**, enabling automated rice variety recognition using simple images—cutting down processing time, improving accuracy, and modernizing the grain sorting process.

### 🎯 Purpose

✅ **Empower agribusinesses and sorting teams** with a powerful tool to accurately classify rice varieties, reducing the dependency on expert manual graders.

✅ **Enable broader adoption** by optimizing the system for low-resource environments (can run on basic laptops or phones, optionally offline), ensuring accessibility in **rural and semi-urban areas**.

✅ **Boost confidence and transparency** in agricultural processing through consistent, repeatable results—important for export compliance, pricing accuracy, and brand reliability.

✅ **Address key operational pain points**, like:

* Inconsistent grading outcomes
* Time lost in manual sorting
* Cost of human errors and misclassification
* Scaling difficulty during peak harvest or shipment cycles

GrainPalette offers a **cost-effective, fast, and accurate solution** to a long-standing problem—making AI work where it matters most: **in the hands of farmers, millers, and distributors.**