

**Problem Planning and Understanding:**

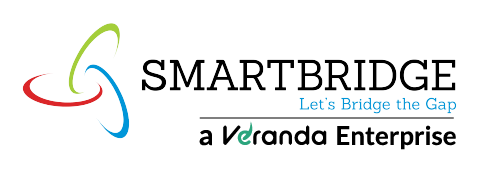
**1.Problem Statement:**

The objective of this project is to build a deep learning model capable of classifying different types of rice grains using image data. By leveraging **Transfer Learning**, we aim to develop a robust and efficient classifier that can distinguish between rice varieties such as Basmati, Jasmine, Arborio, etc., with high accuracy.

1. **Project Objectives:**

* + The analysis phase is to gain a thorough understanding of the problem domain, the data involved, and the expected outcomes.
  + Development phase is to build the classification model based on the insights gained during analysis.
  + This phase focuses on the theoretical evaluation of the model's performance and its ability to meet the project goals.
  + This phase deals with the theoretical framework for making the model usable in a practical environment.

1. **Project Timeline & Phases:**



**Time**

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| --- | --- | --- |
| **Phase** | **(Duration)** | **Activities** |
| **Phase 1: Problem Understanding& Planning** | Week 1 | Define problem, set objectives, understand the rice classification task |
| **Phase 2: Data Preprocessing**  **Phase 3:** | Week 2 | Download dataset |
| **Exploratory Analysis** | Week 3 | Analyze class Distribution, visualize sample images |
| **Phase 4: Model Development** | Weeks 4–5 | Train the model on training data, validate using test set |
| **Phase 5: Model Evaluation** | Week 6 | Evaluate models using accuracy, precision, recall, F1score. |
| **Phase6: Optimization & Tuning** | Week 7 | Build a simple UI using Streamlit or flak to test the model via a web interface |
| **Phase 7: Final Integration** | Week 8 | Preforming testing, get peer feedback, finalize documentation. |

1. **Dataset:**

* + **Name:** Grain Palette-A Deep Learning Odyssey In Rice Type Classification Through Transfer Learning
  + **Source:** UCI Machine Learning Repository or Kaggle
  + **Attributes:** Basmati, Jasmine, Arborio, Ipsala, Karacadag, grain shape, edge pattern, Smoothness, Roughness, pattern of the grain

1. **Tools & Technologies:**

* + **Languages:** Python
  + **Libraries:** pandas, numpy, matplotlib, seaborn, scikit-learn, xgboost
  + **ML Models:** Logistic Regression, Random Forest, XGBoost, SVM
  + **Deployment:** Streamlit or Flask (optional)
  + **Version Control:** Git & GitHub
  + **Documentation:** Jupyter Notebooks, PDF Report

1. **Evaluation Metrics:**

* + Accuracy
  + Precision
  + Recall
  + F1-Score
  + Confusion Matrix

1. **Risk Management:**

| Risk |  | Mitigation Strategy |
| --- | --- | --- |
| Imbalanced Dataset |  | Data augmentation, manual balancing |
| Overfitting |  | Use dropout, early stopping, validation monitoring |
| Similar-Looking Classes |  | Use deeper models, fine-tune more layers |
| Deployment Failures |  | Test locally, choose light models, use reliable tools |

**8.Expected Outcome:**

* A high-accuracy model that can predict the grain palette.
* Solve a real-world agricultural image classification problem.
* Identifying different types of rice grains based on image dataset.

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