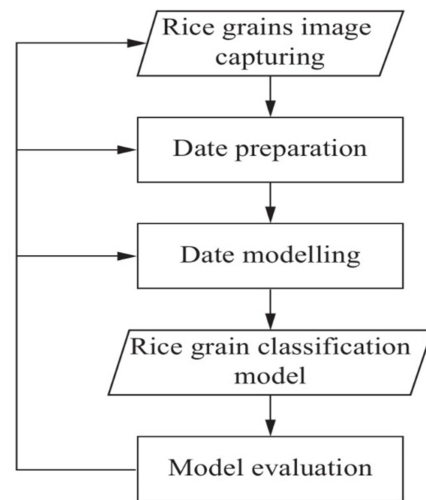


Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	27 June 2025
Team ID	LTVIP2025TMID41438
Project Name	GrainPalette – A Deep Learning Odyssey in Rice Type Classification Through Transfer Learning
Maximum Marks	4 Marks

Technical Architecture:



Example: Rice Type Classification Using Advanced Machine Learning Techniques

Table-1: Components & Technologies:

S.No	Component	Description	Technology
1	User Interface	Simple UI (optional web frontend)	HTML, CSS, Streamlit / Flask (optional)
2	Application Logic-1	Image preprocessing (resizing, normalization)	Python (OpenCV, NumPy, PIL)
3	Application Logic-2	Model training and prediction using CNN	Python (TensorFlow, Keras, MobileNetv4)
4	Application Logic-3	Evaluation metrics and display	Seaborn, Matplotlib
5	Database	Local image dataset	Folder-based storage, Pandas metadata
6	Cloud Database	(Not used)	—
7	File Storage	Dataset stored and accessed locally	Local filesystem / Google Drive (in Colab)
8	External API-1	(Not used)	—
9	External API-2	(Not used)	—
10	Machine Learning Model	Identify rice grain type using image classification	MobileNetv4 + Transfer Learning (CNN)
11	Infrastructure	Executed in browser or cloud environment	Google Colab, Jupyter Notebook, Streamlit

Table-2: Application Characteristics:

S.No	Characteristic	Description	Technology
1	Open-Source Frameworks	Used for model development and training	TensorFlow, Keras, OpenCV, NumPy, Pandas
2	Security Implementations	No external security needed (offline/local analysis)	Not applicable (for local use)
3	Scalable Architecture	Can be deployed with REST API via Flask for web integration	Flask / Streamlit
4	Availability	Highly available via Colab or cloud-hosted deployment	Google Colab, Render, Heroku (optional)
5	Performance	Lightweight model optimized for fast real-time predictions using MobileNet	TensorFlow (MobileNetv4) + GPU (optional)