Ideation Phase
Brainstorm & Idea Prioritization Template

Date	15 June 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In Rice-Type- -Through-Transfer-Learning Classification**
Maximum Marks	4 Marks

Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Reference: https://www.mural.co/templates/brainstorm-and-idea-prioritization

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Step-2: Brainstorm, Idea Listing and Grouping

Step-3: Idea Prioritization

Template

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- **10 minutes** to prepare
- **1 hour** to collaborate
- **2-8 people** recommended

Need some inspiration?
See a finished version of this template to kickstart your work.
Open example →

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A. **Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B. **Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

C. **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1 Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM
How might we classify Rice Type Through Transfer Learning ?

Key rules of brainstorming
To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

2 Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP
You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Person 1

To make a website that takes images of different types of rice types.

Person 2

Improve the model continuously by retraining with new rice images Improve the model continuously by retraining with new rice images

Person 3

To make a Virtual assistant just like a chatbot that takes images of different rice types.

Person 4

To make a App that also takes images of different types of rice.

3 Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Here's how we can group and label the ideas from above into meaningful clusters:

1. Data Collection & Preparation
   - Collect and label images of different rice types.
   - Preprocess images by resizing, normalizing, and augmenting them.
   - Split the dataset into training, validation, and test sets.

2. Model Selection & Training
   - Select a pre-trained deep learning model (ResNet, VGG, MobileNet, or EfficientNet).
   - Apply transfer learning to fine-tune the model for rice classification.
   - Train the model using TensorFlow or PyTorch with GPU acceleration.
   - Optimize hyperparameters for better accuracy and performance.

3. Model Deployment & Integration
   - Convert the model into a deployable format (TensorFlow Lite, ONNX, or SavedModel).
   - Deploy the trained model as an API using Flask or FastAPI.
   - Host the model on a cloud server for real-time predictions.

4. User Interaction & Application Development
   - Develop a Website to allow users to upload images for classification.
   - Build a Mobile App with camera functionality for instant rice classification.
   - Create a Chatbot that accepts images and provides rice classification in a conversational format.
   - Implement an AI-powered Virtual Assistant that suggests rice cooking methods, nutritional values, etc.

5. Enhancements & Continuous Learning
   - Optimize the system for offline predictions (mobile or embedded AI).
   - Collect feedback and retrain the model with new rice images.
   - Integrate cloud storage for logging predictions and improving AI accuracy.

4 Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

TIP
Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

Feasibility
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

- Choose a pre-trained deep learning model like ResNet, VGG, or EfficientNet. Apply transfer learning to adapt the model for rice type classification.
- By making a model of machine learning user uploads different images of different rice types.
- To build a website for rice type classification using GrainPalette: A Deep Learning Odyssey in Rice Type Classification Through Transfer Learning, follow these steps in simple one-line sentences:
- To make a website that takes images of different types of rice types.
- To make a App that also takes images of different types of rice.
- Collect and label images of different rice types for model training. Preprocess images by resizing, normalizing, and augmenting them.
- Collect images of different rice types with proper labeling. Preprocess images by resizing, normalizing, and augmenting for better model training.
- To make a Virtual assistant just like a chatbot that takes images of different rice types.
- Train the model using TensorFlow or PyTorch with a labeled dataset. Evaluate and optimize the model for better accuracy and performance.
- By making a model of machine learning user uploads different images of different rice types.

Ideation Phase
Define the Problem Statements

Date	15 june 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In Rice-Type- -Through-Transfer-Learning Classification**
Maximum Marks	2 Marks

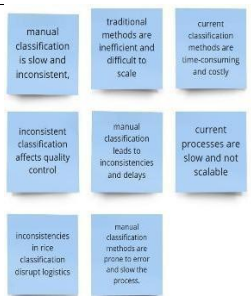
Customer Problem Statement Template:

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

I am	Describe customer with 3-4 key characteristics - *who are they?*	Describe the customer and their attributes here
I'm trying to	*List their outcome or "job" the care about - what are they trying to achieve?*	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way – *what bothers them most?*	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists – *what needs to be solved?*	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view – *how does it impact them emotionally?*	Describe the emotions the result from experiencing the problems or barriers

Example:

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1					

Ideation Phase
Empathize & Discover

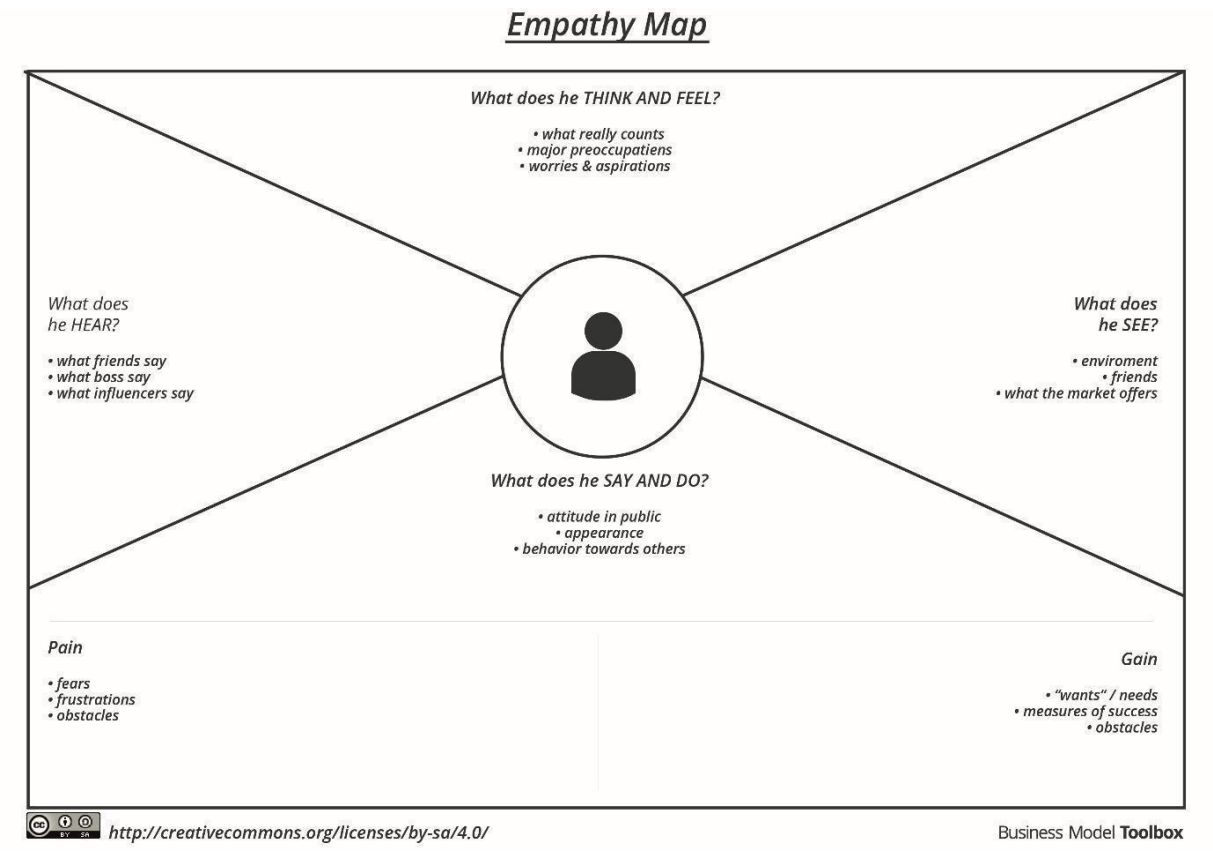
Date	17 June 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In Rice-Type- -Through-Transfer-Learning Classification**
Maximum Marks	4 Marks

Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

Example:



WHO are we empathizing with?

Who is the person we want to understand?
What is the situation they are in?
What is their role in the situation?

They struggle with manual rice classification, which is time-consuming, prone to human error, and lacks consistency. They need a faster, more reliable AI-driven solution.

We are empathizing with quality control analysts, agricultural researchers, food scientists, and rice producers who need an efficient way to classify rice types accurately.

Their job is to analyze and verify rice types, ensuring that the correct classification is applied for packaging, distribution, and quality compliance. They must evaluate AI-based classification models for accuracy and usability.

GOAL

What do they need to DO?

What do they need to do differently?
What job(s) do they want or need to get done?
What decision(s) do they need to make?
How will we know they were successful?

Trust machine learning models for decision-making.

Implement an AI-based system to classify rice types accurately.

Accurately classify rice types for quality control.

Choose the right AI model and approach (e.g., transfer learning).

Time spent on classification is significantly reduced.

Increasing adoption of AI and machine learning in agriculture.

Manual rice classification still being used, leading to slow and inconsistent results.

A quality control analyst working in a rice production company, responsible for ensuring accurate classification of rice types to maintain quality and meet industry standards.

What do they THINK and FEEL?

What do they HEAR?

What are they hearing others say?
What are they hearing from friends?
What are they hearing from colleagues?
What are they hearing second-hand?

"AI can revolutionize agriculture and food quality control."

"AI is advancing fast; you should consider using it."

"We need a solution that is both accurate and easy to use."

"Big companies are already adopting AI for food quality control."

"Some AI models struggle with bias—how will this system avoid that?"

PAINS

What are their fears, frustrations, and anxieties?

Worry that the AI model might misclassify rice types, leading to poor-quality control.

Concern about the availability and quality of rice grain image datasets for training the model.

GAINS

What are their wants, needs, hopes, and dreams?

Dreams of automating the classification process to reduce manual labor and operational costs.

Want a model that can be applied across different regions and rice varieties.

What do they SEE?

What do they see in the marketplace?
What do they see in their immediate environment?
What do they see others saying and doing?
What are they watching and reading?

What do they SAY?

What have we heard them say?
What can we magine them saying?

What other thoughts and feelings might influence their behavior?

Users may hesitate to fully trust an AI-driven system, especially if they have relied on traditional manual classification for years.

They might question the transparency of the model—how it makes decisions and whether they can verify its accuracy.

They may want a customizable model that can be fine-tuned for different rice types or quality standards in different regions.

Expect an easy integration of AI models into existing agricultural workflows.

"Manual classification is slow and inconsistent."

"AI would a promising, but can we trust it to be accurate?"

"We need a more efficient way to classify rice types."

"Final system including confusion matrix folder"

"We want to keep improving the model to ensure accuracy."

"Make sure scientists are aligned with—we should stay ahead of the curve."

"Let's integrate the technology into our daily workflow."

What do they DO?

What do they do today?
What behavior have we observed?
What can we imagine them doing?

Manually inspect and classify rice grains based on size, shape, and color.

Struggling with the time-consuming nature of manual classification.

Showing hesitation toward AI adoption due to lack of expertise.

Using an AI-powered system to automate classification and improve accuracy.

Training staff to work with AI-based tools in daily workflows.

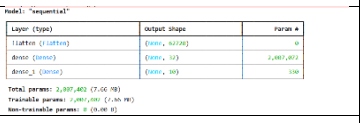
Comparing AI results with manual classifications to build trust.

Project Development Phase
Model Performance Test

Date	20 june 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In-Rice-Type- -Through-Transfer-Learning Classification**
Maximum Marks	-

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S. No.	Parameter	Values	Screenshot
1.	Model Summary	-	
2.	Accuracy	Training Accuracy –0.9688 Validation Accuracy -0.9892	
3.	Fine Tuning Result (if done)	Validation Accuracy -	-

Project Design Phase
Problem – Solution Fit Template

Date	22 june 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In-Rice-Type-Classification-Through-Transfer-Learning**
Maximum Marks	2 Marks

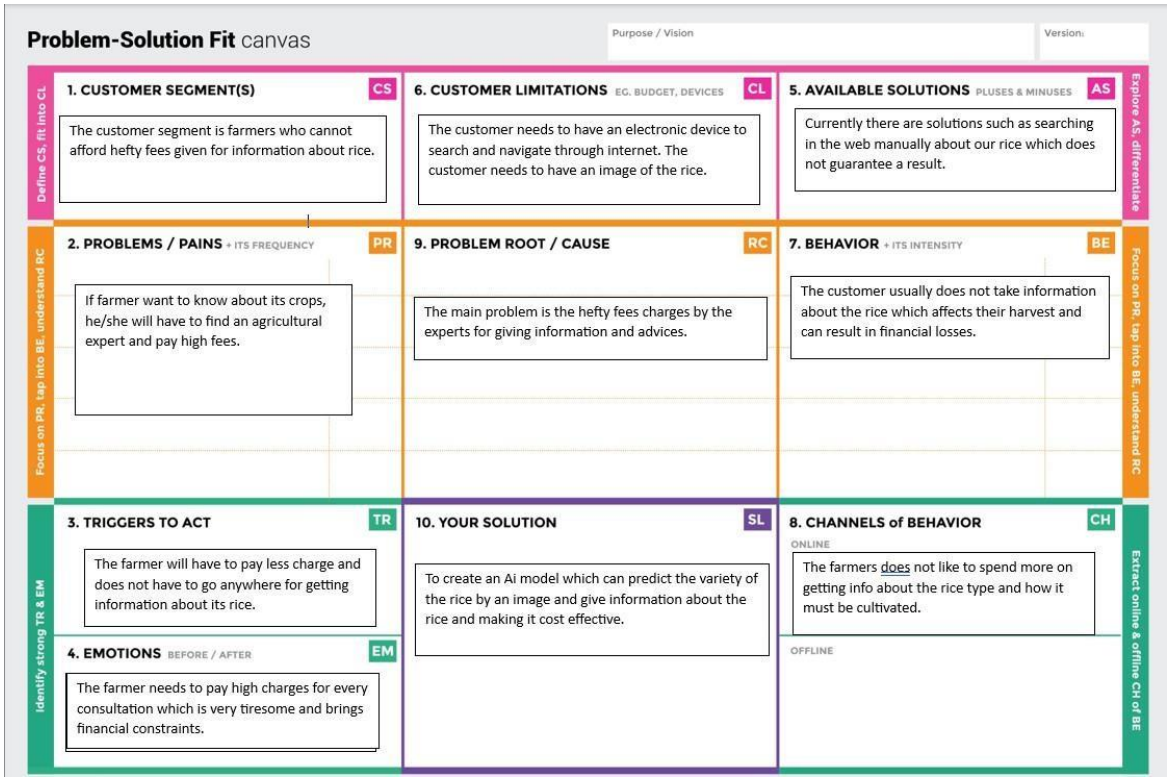
Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

- ❑ Solve complex problems in a way that fits the state of your customers.
- ❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.
- ❑ Sharpen your communication and marketing strategy with the right triggers and messaging.
- ❑ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.
- ❑ **Understand the existing situation in order to improve it for your target group.**

Template:



Project Design Phase
Proposed Solution Template

Date	22 june 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In-Rice-Type-Classification-Through-Transfer-Learning**
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	It is not possible for the farmers to pay the agriculture experts hefty fees every time they have a new produce. We have to come up with a solution to this problem
2.	Idea / Solution description	Train an AI model which can be used by farmers to check the type of rice. The users need to upload image of a rice grain and click on the submit button.
3.	Novelty / Uniqueness	The prediction will be done automatically without any human intervention using a machine learning model.
4.	Social Impact / Customer Satisfaction	The model can predict the rice in very less time and provide services to a very large customer base.
5.	Business Model (Revenue Model)	We can charge amount per prediction which can generate a good profit.
6.	Scalability of the Solution	The model can be scalable by training the model on various different types of rice.

Project Design Phase
Solution Architecture

Date	22 june 2025
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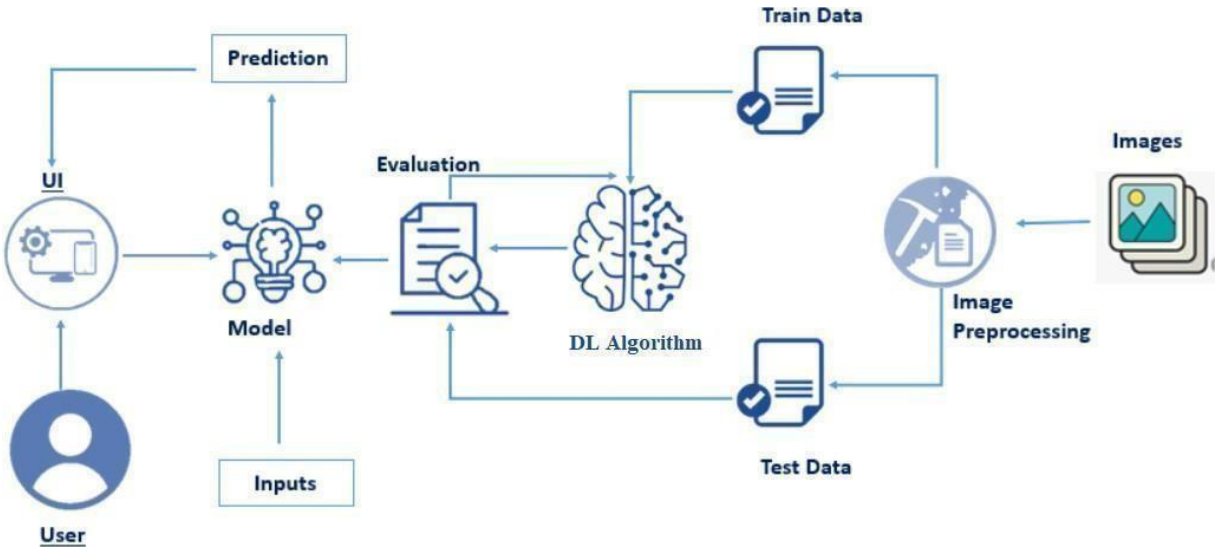
Maximum Marks	4 Marks

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Example - Solution Architecture Diagram:



Key Components of the solution:

1. User Interface (Frontend)

Provides an interface for users to upload rice images and view classification results. Uses HTML, JavaScript, or React to send images to the backend and display predictions.

2. Backend Logic (Flask API)

Handles image preprocessing, runs inference using MobileNetV2, and returns classification results as JSON. Built with Flask/ Fast API for easy deployment.

3. MobileNetV2 (Deep Learning Model)

A lightweight CNN optimized for mobile/web, trained to classify different rice types. Uses depth wise separable convolutions for efficiency and is fine-tuned for accuracy.

4. Output (Rice Classification Result)

Returns a predicted rice category (e.g., Basmati, Jasmine) as JSON, which is displayed on the frontend. Can be integrated into web or mobile apps for real-time use.

Features and Deployment phases:

Features:

User-Friendly UI: Simple interface for image upload and displaying results.

Efficient Backend: Uses Flask/Fast API to handle requests and process images.

Accurate Predictions: MobileNetV2 ensures fast and reliable rice classification.

Deployment phases:

Model Training & Saving: Train MobileNetV2, fine-tune it, and save as .h5.

Backend & API Setup: Develop a Flask API for model inference and JSON response.

Hosting & Deployment: Deploy on Render, AWS, or Google Cloud for public access.

Solution Requirements:

1. Technical requirements:

Frameworks & Libraries: TensorFlow/ Keras for model training, Flask/Fast API for API, and React/HTML for frontend.

Infrastructure: A cloud server (AWS, GCP) or containerized deployment (Docker, Kubernetes).

Storage & Processing: GPU support for training, cloud or local storage for model files and images.

2. Functional requirements:

Image Upload & Processing: Users can upload rice images for classification.

Model Inference & Prediction: Backend processes images and returns the rice type.

Result Display & API Integration: Predictions are displayed in the UI with real-time responses.

Project Planning Logic

Date	22 june 2025
Team ID	LTVIP2025TMID40611
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Maximum Marks	-

A Sprint fixed period or duration in which a team works to complete a set of tasks

An **Epic** is a **big task or project** that is too large to complete in one sprint. It is broken down into **smaller tasks (stories)** that can be completed over multiple sprints.

A **Story** is a small task. It is part of an **Epic**.

A **Story Point** is a number that represents how much effort a story takes to complete. (usually in form of Fibonacci series)

- **1-** Very Easy task
- **2-** Easy task
- **3-** Moderate task
- **5-** Difficult task

Sprint 1: (2 Days)

Data Collection

Collection of Data **2**

Loading Data **1**

Sprint 2: (3 Days)

Data Preprocessing

Handling Missing Values **3**

Handling Categorical values **2**

Sprint 3: (5 Days)

Model Building

Model Building **5**

Testing Model **3**

Sprint 4: (3 Days)

Deployment

Working HTML Pages **3**

Flask deployment **5**

Sprint 3 (5 days)

Total Story Points

Sprint 1 = 3

Sprint 2 = 5

Sprint 3 = 8

Sprint 4 = 8

Velocity= Total Story Points Completed/ Number of Sprints

Total story Points= 3+5+8+8 =24

No of Sprints= 4

Velocity = 24/4=6

6 (Story Points per Sprint)

Your team's velocity is 6 Story Points per Sprint.

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

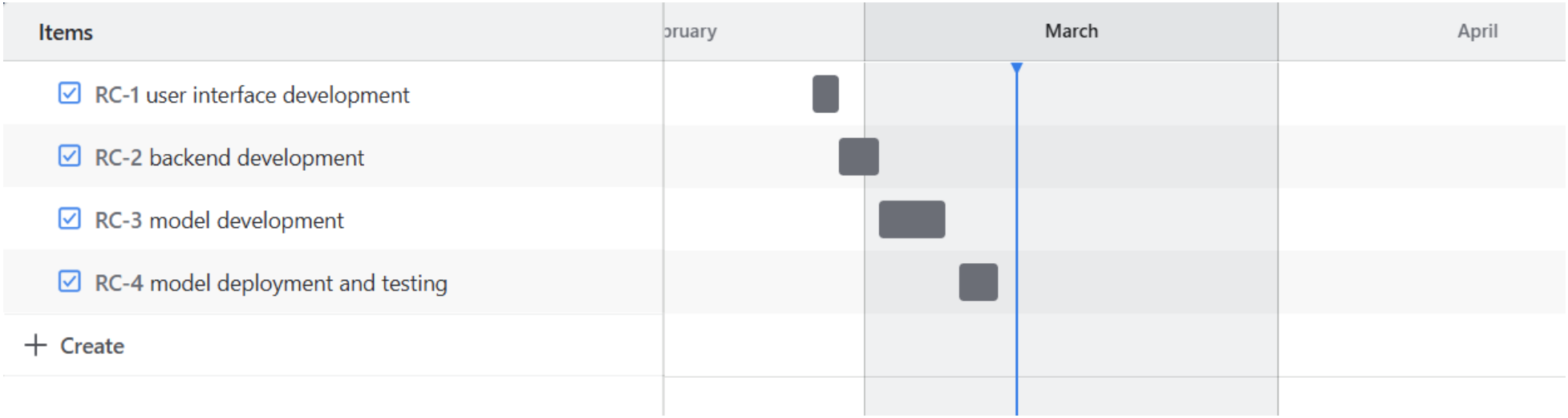
Date	25 june 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In-Rice-Type-Classification-Through-Transfer-Learning**
Maximum Marks	5 Marks

Velocity:
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV=(\text{sprint duration})/\text{Velocity}=13/6=2.16$$

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.


Items
bruary
March
April
RC-1 user interface development
RC-2 backend development
RC-3 model development
RC-4 model deployment and testing
Create

Scenario:
Upload image of any type of rice, processing and see results of what type of rice it is.

Entice
How does someone become aware of this service?

Enter
What do people experience as they begin the process?

Engage
In the core moments in the process, what happens?

Exit
What do people typically experience as the process finishes?

Extend
What happens after the experience is over?

Experience steps
What does the person (or people) at the center of this scenario typically experience in each step?

Entice	Enter	Engage	Exit	Extend
Potential users discover GrainPalette through social media ads, agricultural forums, and industry conferences.	Users are welcomed with a simple onboarding process explaining the app's purpose.	Users upload images of rice grains through the app's camera or file upload feature.	The app displays a summary report of the classification results.	Users receive periodic updates and new features via notifications.
Positive reviews and testimonials from farmers and agricultural experts build curiosity.	A guided tutorial demonstrates how to upload rice grain images for classification.	The deep learning model quickly processes the images and provides classification results.	Users receive recommendations for improving rice quality and market positioning.	Feedback channels allow users to report issues and suggest improvements.
A compelling value proposition, such as "Accurate Rice Classification in Seconds," grabs attention.		The app suggests insights such as grain quality, type, and potential market value.		Data from past classifications helps improve future accuracy through machine learning.
		Real-time feedback allows users to refine their inputs for better accuracy.		
		User satisfaction grows as the app's high accuracy saves time and effort.		

Interactions
What interactions do they have at each step along the way?

- **People:** Who do they see or talk to?
- **Places:** Where are they?
- **Things:** What digital touchpoints or physical objects do they use?

Entice	Enter	Engage	Exit	Extend
Users may see promotional content from social media influencers, agricultural experts, or industry leaders.	Users interact with customer support through chat or FAQs during onboarding.	Users may seek guidance from customer support or other farmers when using the app.	Users may share their results with agricultural experts or other farmers.	Users receive follow-ups from the GrainPalette team through emails or notifications.
They encounter GrainPalette through online ads, agricultural fairs, and farming seminars.	They are usually at home, on the farm, or in agricultural offices while setting up the app.	They are typically in rice fields, warehouses, or grain processing centers during use.	They are usually back at home or in their office while reviewing reports.	They might discuss app performance and results with industry peers at events or meetings.
They interact with social media platforms (e.g., Facebook, Instagram), the GrainPalette website, and online video demos.		They use smartphone cameras to capture rice images and the app's interface to process them.		Push notifications inform users about app updates and new features.
		Some users might consult experts or team members to validate results.		
		Real-time feedback through the app's dashboard enhances user interaction.		

Goals & motivations
At each step, what is a person's primary goal or motivation? ("Help me..." or "Help me avoid...")

Entice	Enter	Engage	Exit	Extend
"Help me find a reliable solution for rice classification."	"Help me understand how to use the app quickly and easily."	"Help me classify rice types accurately and quickly."	"Help me understand the classification report clearly."	"Help me stay updated with app improvements and new features."
"Help me improve the efficiency of sorting rice grains."	"Help me avoid confusion during the onboarding process."	"Help me understand the differences between rice varieties."	"Help me apply the insights to improve rice quality and sales."	"Help me track classification accuracy over time."
"Help me reduce errors in rice type identification."		"Help me make informed decisions based on classification results."		"Help me compare past and present classification trends."
		"Help me avoid misclassifications that could affect quality and pricing."		
		1. "Help me improve efficiency and reduce labor costs."		

Positive moments
What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?

Entice	Enter	Engage	Exit	Extend
Discovering that GrainPalette can automate and simplify rice classification is exciting.	A smooth and quick onboarding process feels easy and welcoming.	Getting fast and accurate results from the deep learning model feels satisfying.	Viewing a detailed and well-organized classification report feels informative and useful.	Receiving helpful tips and updates through notifications feels engaging.
Positive testimonials and high ratings build motivation to try the app.	Successfully uploading the first image without issues creates confidence.	Seeing detailed insights about rice quality and type boosts confidence.	Being able to share or export the results with one click feels seamless.	Tracking classification history and trends over time builds a sense of progress.
Seeing a demo of quick and accurate rice classification feels impressive and promising.		Real-time feedback and improvement suggestions feel empowering.		Seeing improvements in classification accuracy over repeated use feels rewarding.
		High accuracy rates make the process feel productive and rewarding.		
		The ability to compare different rice types side-by-side adds an element of curiosity and learning.		

Negative moments
What steps does a typical person find frustrating, confusing, angering, costly, or time-consuming?

Entice	Enter	Engage	Exit	Extend
Difficulty finding reliable information about the app online creates frustration.	A complicated or lengthy onboarding process can discourage users.	Inaccurate classification results can frustrate and discourage users.	Confusing report formats make it hard to understand the results.	Frequent or irrelevant push notifications may feel intrusive.
Confusing or inconsistent marketing messages reduce trust and interest.	Poor internet connectivity causing delays during setup creates annoyance.	Slow processing times during image analysis can waste time.	Difficulties in exporting or sharing results can create frustration.	Poor customer support when seeking clarification reduces trust.
Lack of clear pricing or hidden costs can make users feel hesitant.		Poor camera integration or image quality issues may lead to failed classification.		Data loss or unavailability of previous reports can anger users.
		Lack of detailed insights or explanations about the classification process may confuse users.		
		Receiving inconsistent results from similar images reduces confidence in the app's accuracy.		

Areas of opportunity
How might we make each step better? What ideas do we have? What have others suggested?

Entice	Enter	Engage	Exit	Extend
Improve visibility by partnering with agricultural organizations and influencers.	Introduce a step-by-step onboarding wizard to simplify the setup process.	Enhance the image recognition model to improve accuracy and reduce processing time.	Provide a clear summary of classification results with actionable insights.	Send personalized notifications about app updates and new features.
Create targeted social media campaigns to reach farmers and agribusinesses directly.	Improve UI/UX design for better navigation and faster understanding of features.	Introduce a progress bar to show how long the classification will take.	Improve report formatting to make data easier to interpret and share.	Allow users to track classification history and trends over time.
Develop a series of short, clear demo videos to explain the app's benefits.		Provide detailed insights about classification criteria to increase user understanding.		Use machine learning to improve classification accuracy based on user feedback.
		Allow users to compare classification results side-by-side for better decision-making.		
		Offer an offline mode for areas with poor internet connectivity.		

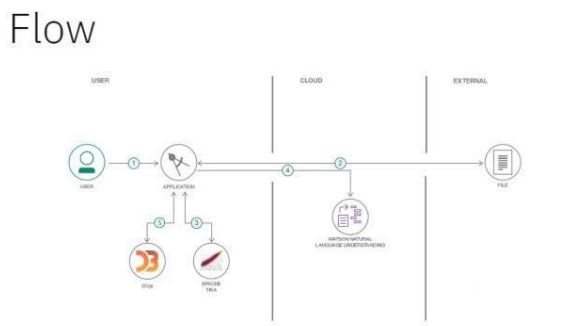
Project Design Phase-II
Data Flow Diagram & User Stories

Date	30 june 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In-Rice Type-Through-Transfer-Learning Classification**
Maximum Marks	4 Marks

Data Flow Diagrams:

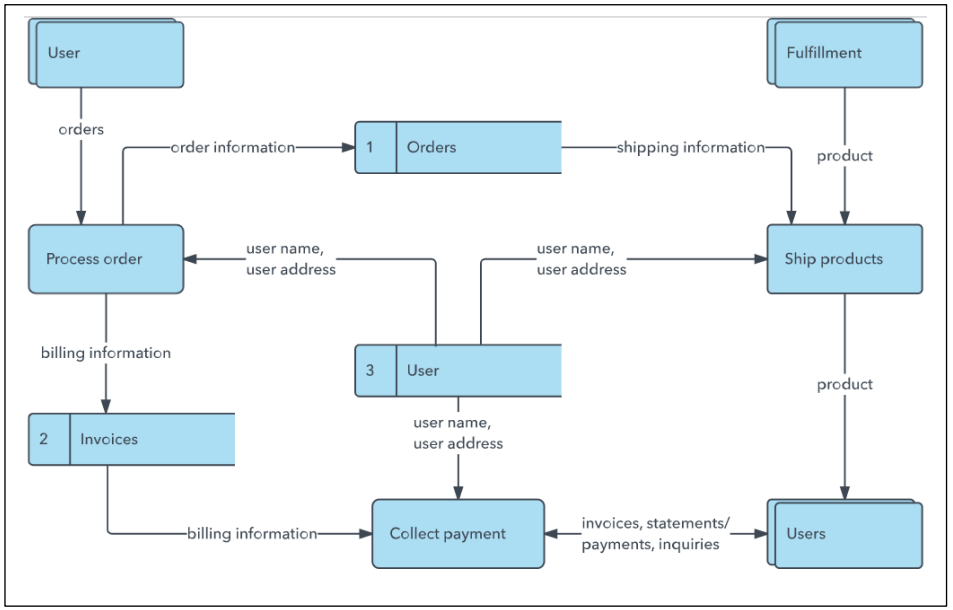
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

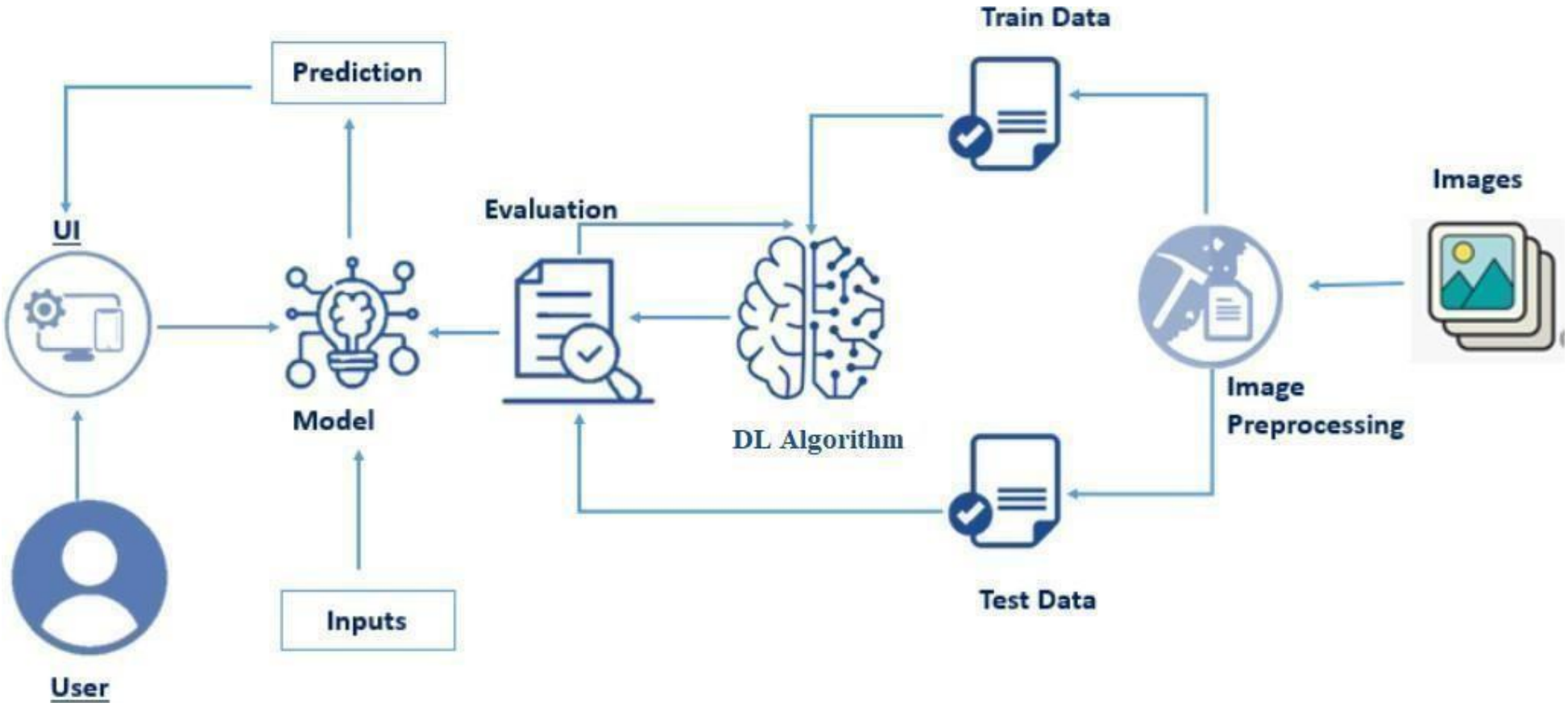
Example: (Simplified)



1. User configures credentials for the Watson Natural Language Understanding service and starts the app.
2. User selects data file to process and load.
3. Apache Tika extracts text from the data file.
4. Extracted text is passed to Watson NLU for enrichment.
5. Enriched data is visualized in the UI using the D3.js library.

Example: DFD Level 0 (Industry Standard)





User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Browsing	USN-1	As a user, I first need to browse through the url to go to the website.	I can use any browsing platform to go to through the url.	High	Sprint-1

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
	upload	USN-2	As a user, I will have to upload the image for the model to predict.	Image must be uploaded in the correct place.	Medium	Sprint-2
	Processing and prediction	USN-3	After uploading the image, the model processes the image and give result based on the image.	The model gives prediction based on the image.	Medium	Sprint-3
	results	USN-4	As a user, I can review the related information with the uploaded rice type image.	The result must be displayed.	High	Sprint-4

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	2 july 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-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	Browsing through URL	website link
FR-2	Get Image	Upload the image
FR-3	Prediction	Machine learning model
FR-4	Details	View the details based on prediction

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The system should have an intuitive, user-friendly interface with clear instructions.
NFR-2	**Reliability**	The prediction must be correct and accurate.
NFR-3	**Performance**	The model must not take much time to predict.
NFR-4	**Availability**	The availability to everyone must be maintained.
NFR-5	**Scalability**	It must be scalable for predicting other types of rice too.

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

Date	2 June 2025
Team ID	LTVIP2025TMID40611
Project Name	**Grain Palette-A-Deep-Learning-Odyssey-In-Rice-Type- -Through-Transfer-Learning Classification**
Maximum Marks	4 Marks

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Rice Type Classification:

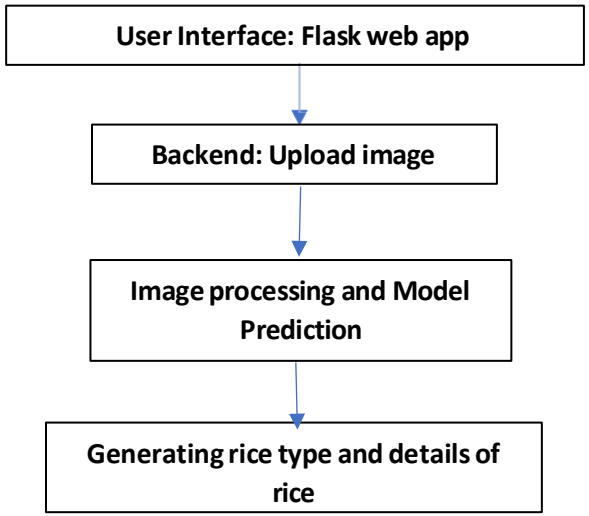


Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	The user interacts with the application via a web interface.	Flask, HTML, CSS
2.	Application Logic-1	Handles user input and processes it for Image prediction.	Python
3.	Application Logic-2	Predicts the Image	MobilenetV2, python
4.	Database	If data storage is required	MySQL
5.	File Storage	Use internal storage to upload the image	Flask
6.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
7.	Machine Learning Model	Predicts the Image	Image classification
8.	Infrastructure (Server / Cloud)	Application Deployment on Local System	Flask

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	MobilenetV2, Flask, Python
2.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	Parallel processing (if required)
3.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Flask
4.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	MobilenetV2