Project Design Phase
Solution Architecture

Date:	24 June 2025
Team ID:	LTVIP2025TMID36354
Project Name:	Enchanted Wings: Marvels of Butterfly Species
Maximum Marks:	4 Marks

1. Solution Overview

This project aims to automate butterfly species identification using deep learning. The system uses transfer learning with the VGG16 model to classify butterfly images into 75 different species. A Flask-based web interface allows users to upload butterfly images and receive real-time predictions.

2. Functional Description

The system comprises the following modules:

• Image Preprocessing Module – resizes, scales, and normalizes input images.
• DL Model Module – a trained VGG16 model that performs classification.
• Evaluation Module – validates the model against test data.
• Web Interface – built using Flask, allows users to upload images and view predictions.
• Class Mapping – displays readable species names instead of numerical labels.

3. Architecture Diagram

The below architecture diagram illustrates the end-to-end workflow of the butterfly classification system:
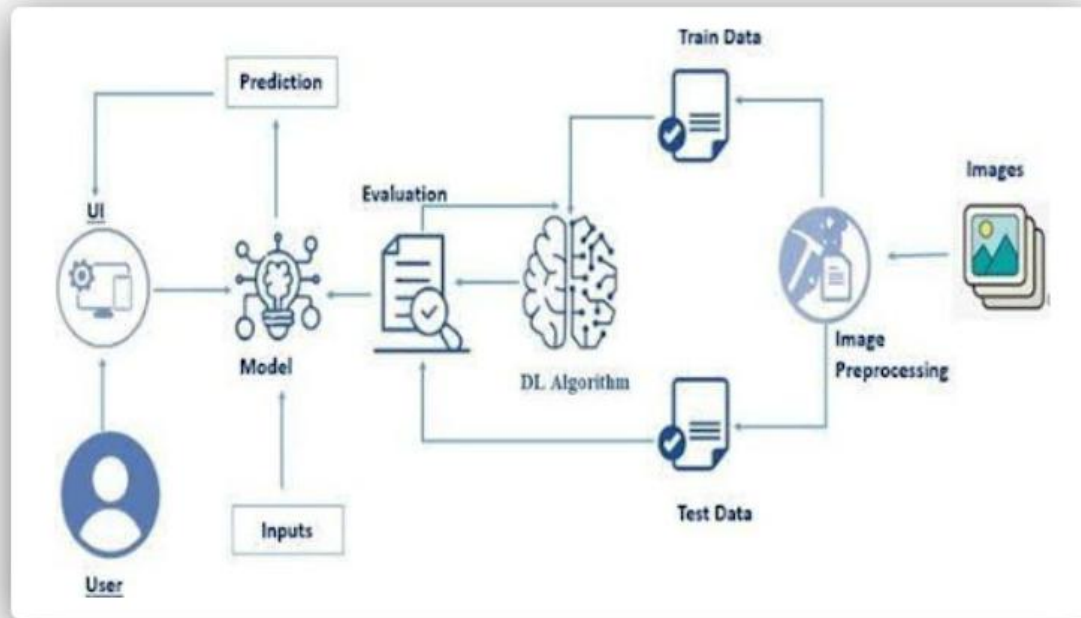
4. Component Explanation

• User Interface: Provides an image upload feature for users.

• Input Layer: Receives input image from the user.

• Image Preprocessing: Resizes image to 224x224 pixels and scales pixel values.

• DL Algorithm: Uses a VGG16 model fine-tuned on 75 butterfly species.

• Evaluation: Model performance is validated using separate test data.

• Prediction: Model predicts class index which is mapped to species name.

5. Conclusion

This solution enables efficient and accessible butterfly species identification through AI. It benefits conservation efforts, educational research, and biodiversity monitoring.