Project Explanation:

Enchanted Wings - Butterfly Species Classification

# 1. Overview

This section provides a brief explanation of the project structure and core components of the machine learning model used to classify butterfly species.

# 2. Tools Used

- Python  
- Jupyter Notebook  
- TensorFlow / Keras  
- OpenCV  
- Streamlit

# 3. Folder Descriptions

- Document/: Contains the project report and presentations.  
- Project Files/: Includes the model code (training notebook), Streamlit app (`app.py`), and `requirements.txt`.  
- Video Demo/: Contains a video demonstration of the project.

# 4. app.py - Streamlit Application

This file runs a simple web interface where users can upload butterfly images and receive species predictions. It uses the trained CNN model for inference.

# 5. model\_training.ipynb - Model Training

A Jupyter Notebook used to preprocess the dataset, define a CNN architecture, and train the model. Accuracy and loss graphs are plotted for evaluation.

# 6. requirements.txt

Lists all the required libraries to run the model and app. Install using `pip install -r requirements.txt`.

# 7. Workflow Summary

1. Data is loaded and preprocessed.  
  
2. CNN model is built using Keras.  
  
3. Model is trained, validated, and tested.  
  
4. The trained model is used in the Streamlit app for predictions.  
  
5. Results are displayed in a user-friendly interface.