Enchanted Wings: Marvels of Butterfly Species

1. Introduction

Project Title: Enchanted Wings: Marvels of Butterfly Species

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2. Project Overview

Purpose:

To develop a deep learning model that classifies butterfly species using image input, integrated with a Flask web application.

Features:

- Upload butterfly images via web interface
- Model predicts species using transfer learning
- Real-time output displayed on UI

3. Architecture

Transfer learning is used to classify 75 butterfly species from 6499 images.

Scenarios:

- Biodiversity Monitoring
- Ecological Research
- Citizen Science and Education

4. Setup Instructions

Install Anaconda Navigator

Run in Anaconda Prompt:

pip install numpy

pip install pandas

pip install scikit-learn

pip install matplotlib

pip install scipy

pip install seaborn

pip install tensorflow

pip install Flask

5. Project Flow

Upload image -> Flask receives -> Model predicts -> UI displays output

Steps:

- Data Collection, Preprocessing, Augmentation
- Model Training & Saving
- Application Development

6. Project Structure

Folder Layout:

- templates/index.html
- templates/result.html
- app.py
- vgg16_model.h5
- butterfly.ipynb

7. Dataset Collection and Understanding

Butterfly dataset from Kaggle (75 classes, 6499 images). Visualized and analyzed using matplotlib/seaborn.

8. Data Visualization

Random image display for dataset verification using Python.

9. Application Building

Flask app built with model integration.

Tasks:

- Build HTML
- Create Flask backend
- Load model

10. Building HTML Pages

index.html: image upload form

result.html: displays prediction below uploaded image

11. Running the Web Application

Run: python app.py

URL: http://localhost:5000

Upload -> Predict -> Result

12. Known Issues

- Dataset imbalance may affect results

- UI is minimal

13. Future Enhancements

- Add more data

- Improve UI/UX

- Add Grad-CAM visualizations