Project Design Phase
Solution Architecture

Team ID	LTVIP2025TMID38181
Project Name	Enchanted Wings :Marvels Of butterfly Species
Maximum Marks	4 Marks

Architecture Components & Flow:

1. User Interaction Point (Mobile/Web App)

- **Used by:** Field researchers, students, citizen scientists
- **Function:** Capture butterfly image and submit for identification
- **Technologies:** Mobile Camera / Browser Upload

2. Flask Backend (App Server)

- **Used by:** All scenarios
- **Function:** Accepts image upload → sends it to the trained model for prediction
- **Framework:** Flask (Python), REST API

3. Model Server (Trained VGG16)

- **Used by:** Flask backend
- **Function:** Classifies butterfly species (among 75 classes)
- **Technology:** Keras `.h5` model file loaded in memory

4. Prediction Output

- **Display:** Web/mobile interface shows species name + confidence score
- **Logging:** Results are saved for research or personal logs (user-specific)

5. Database (Optional – for long-term storage)

- **Scenario:** Ecological Research
- **Stores:** Species name, timestamp, location, user ID
- **Tech:** SQLite / Firebase / DynamoDB

6. Visualization & Dashboard (Optional)

- **Scenario:** Research + Citizen Science
- **Use:** Show migration heatmaps, prediction stats, history of sightings
- **Tools:** Matplotlib, Seaborn, Plotly

Solution Architecture System

Reference:-

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4744274/
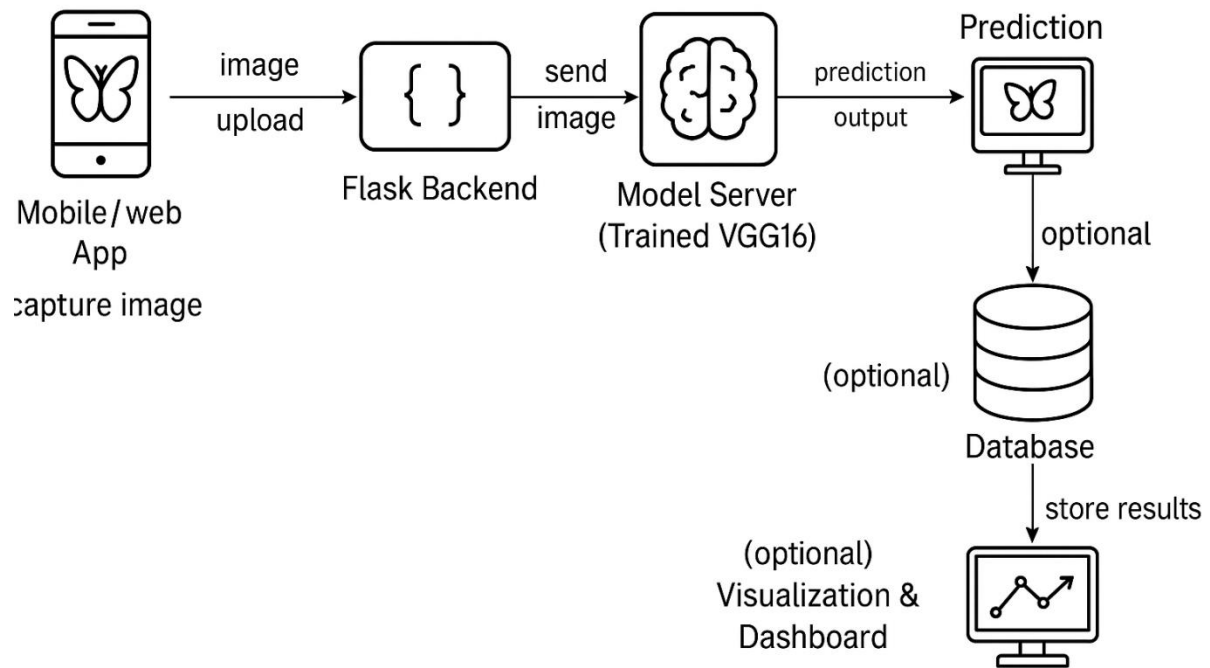
2. https://www.tensorflow.org/api_docs/python/tf/keras/preprocessing/image/ImageDataGenerator