Animal Image Classification Using Deep Learning (ResNet50)

1. Introduction

This project focuses on building an image classification system capable of identifying animals from images using Deep Learning techniques. The system leverages Transfer Learning with a pre-trained ResNet50 model.

2. Problem Statement

Given an input image of an animal, the system should correctly classify it into one of 15 animal categories such as Cat, Dog, Lion, Tiger, etc.

3. Dataset Description

The dataset contains images organized into 15 folders, each representing a distinct animal class. All images are resized to 224×224 pixels with 3 color channels.

4. Model Architecture

The ResNet50 model pre-trained on ImageNet is used as the base model. Custom layers including Global Average Pooling, Dense, and Dropout are added to adapt it to the classification task.

5. Training Process

Data augmentation is applied to improve generalization. The model is trained using categorical cross-entropy loss and Adam optimizer. Early stopping and model checkpointing are used to avoid overfitting.

6. Results

The trained model successfully predicts animal categories with good accuracy. The system correctly classified test images such as a Cat image during inference.Predicted Class: Cat Confidence: 99.46%

7. Conclusion

This project demonstrates the effectiveness of transfer learning for image classification. Using a pre-trained CNN significantly reduces training time while maintaining high accuracy.

8. Future Enhancements

Future improvements include increasing dataset size, applying advanced fine-tuning, and deploying the model as a web or mobile application.