

Animal Image Classifier

using MobileNetV2 transfer-learning

A project for classifying animals species in images using convolutional neural networks and transfer learning with MobileNetV2. In this folder also is our journey, arriving at our best model Model 7, included, starting from our Model 0.

Project overview

This project applies transfer learning to efficiently classify images of 10 animal types. We used the MobileNetV2 architecture, pre-trained on ImageNet, and fine-tuned it for our custom data set to achieve high accuracy with limited training time and resources.

Data set

Source: Animal-10 data set

Size: approx. 28,000 images

Classes: dog, cat, horse, cow, elephant, chicken, sheep, butterflies, spider, squirrel

Model architecture

Base model: MobileNetV2 (pre trained on ImageNet)

Custom top layers: GlobalAveragePooling2D

Dropout(0.3,0.5)

Dense(64, activation='relu')

Dense(10, activation='softmax')

Training Details

Loss function: `sparse_categorical_crossentropy`

Optimizer: Adam (tested $1e-5$ to $3e-3$)

Callbacks:

- EarlyStopping (patience=10)
- ReduceLROnPlateau
- ModelCheckpoint

Data split: 70% training, 15% validation, 15% test

Results

Best accuracy: **96%** on validation data

Effective use of: dropout to reduce overfitting

learning rate scheduling

fine-tuning for better generalisation

Key advantages: lightweight and fast with MobileNetV2, works well with limited data, achieves high accuracy with transfer-learning, generalisable to other image classification tasks