Identifying Pet Breeds with Deep Learning

DS4002 Case Study - Lucas Vallarino
https://github.com/lucasvg133/CS3-DS4002

In today's digital age, artificial intelligence is reshaping how we care for animals. Machine learning models that can accurately identify pet breeds from images are increasingly valuable for veterinarians, shelters, breeders, and pet owners alike. With quick breed identification, shelters can match pets to appropriate homes faster, veterinarians can anticipate breed-specific health concerns, and pet owners can learn about their companions' needs.

Across the world, thousands of lost pets arrive at shelters every day — but without accurate breed identification, many face delayed adoptions or even missed chances for reunion. A robust image-based classification tool could dramatically change that reality by providing fast and reliable breed identification from a simple photograph.

As a data scientist, your task is to design and train a machine learning model capable of classifying dog and cat breeds based on images. You are provided with a dataset containing thousands of annotated pet images representing 37 different breeds. By applying convolutional neural network (CNN) techniques, you must build a model that achieves **at least 90% classification accuracy** on unseen images.

Imagine you are building this system for a national shelter network, where each second counts. Your model must generalize well, and your case study should document your full pipeline: from data preprocessing and augmentation strategies to model training, evaluation, and final recommendations.

Your mission: Deliver a high-performing CNN model, backed by a clear, compelling case study.