Pet Breed Classification Using Deep Learning
A DS4002 Case Study by Anvitha Bandam

Have you ever walked into a pet shelter or a vet's office and wondered what breed that dog or cat might be? In many real-world settings, breed identification plays a crucial role, whether it's helping a lost pet find its way home, matching animals with potential adopters, or diagnosing breed-specific medical conditions. However, not all breeds are easy to tell apart, especially when there are 35 different breeds and animals vary in lighting, pose, and background.

Now imagine you're a data scientist tasked with building a reliable system that can assist veterinarians, shelters, and pet owners by automatically identifying a pet's breed from a simple photo. How accurate could your model be? Could it outperform a human eye? Your role in this project is to develop a machine learning solution using the Oxford-IIIT Pet Dataset, which contains over 7,000 labeled images of dog and cat breeds. Using Python and TensorFlow in Google Colab, you'll train a convolutional neural network (CNN) model using transfer learning with ResNet-50, evaluate its performance, and visualize its results.

This case study introduces key machine learning concepts like image preprocessing, data augmentation, transfer learning, and model evaluation using confusion matrices and performance metrics like precision, recall, and accuracy. All of this is managed within a cleanly organized GitHub repository with reproducible scripts and outputs.

GitHub Repository: https://github.com/AnvithaB04/CS3-DS4002

References

[1] Tanish Sharma. "Detailed Explanation of Residual Network (ResNet50) CNN Model." *Medium*, 2023. https://medium.com/@sharma.tanish096/detailed-explanation-of-residual-network-resnet50-cnn-model-106e0ab9fa9e

[2] Analytics Vidhya. "Understanding Transfer Learning for Deep Learning." *Analytics Vidhya*, 2021. https://www.analyticsvidhya.com/blog/2021/10/understanding-transfer-learning-for-deep-learning/