

Cat and Dog Classification Model Project

Overview

This document provides a detailed summary of the Cat and Dog Classification Model project. The project involved developing a machine learning model (Support Vector Machine) to classify images of cats and dogs, as well as a third category consisting of quite different images. The primary objective was to build a classification model using SVM.

Project Steps

The project was divided into the following key steps:

1. Data Collection

Gathered a dataset consisting of 100 images of cats, 100 images of dogs, and 100 images of cars from sources like Kaggle.

2. Feature Extraction

Utilized various libraries, including OpenCV, Sklearn, Sk-image, Numpy, Pandas and Matplotlib to read images from the dataset and extract Histogram of Oriented Gradients (HOG) features.

3. Labeling

- Extracted labels for each image, where the label corresponds to the folder name in which the image is stored. Specifically, "cat" for cat images, "dog" for dog images, and a third label for unrelated images.

4. Model Training

Trained machine learning algorithm on training and testing dataset Support Vector Machine (SVM) and extract the HOG features and labels.

5. Model Tuning

Fine-tuned the model using Grid Search to optimize its performance.

Involved Libraries

The project relied on the following Python libraries:

- OpenCV: Used for image processing and feature extraction.
- scikit-learn (sklearn): Employed for machine learning model development and evaluation.
- scikit-image: Utilized for additional image processing functions.
- keras: Keras simplifies the process of building and training deep neural networks, making it an ideal choice for exploring deep learning models for image classification.
- numpy: Employed for data manipulation.

Deliverables

The project produced the following deliverables:

1. Python Code Files:

- Training Script: Contains the code for data preprocessing, feature extraction, model training, and tuning.
- Testing Script: Includes the code for evaluating the model's performance on the test dataset.

2. Trained Model:

- The trained model, in Pickle or joblib extension, ready for use in making predictions.

3. Project Documentation:

- A short document explaining the choice of the machine learning algorithm(s) used and the flow of the project.

Conclusion

This project successfully implemented a Cat and Dog Classification Model using traditional machine learning algorithms. By collecting and preprocessing the dataset, extracting HOG features, training the model, and evaluating its performance, we achieved a practical and functional image classification system.

The project's outcome highlights the importance of feature extraction and machine learning in solving classification problems. Further enhancements can be made by exploring different algorithms and fine-tuning to achieve even better classification accuracy.