

CST 476-2 Deep Learning

Lab Sheet 05

Activity: Identifying Dogs and Cats with Convolutional Neural Networks (CNNs)

Aim:

The aim of this lab session is to implement a CNN for classifying images of dogs and cats. This hands-on exercise will cover essential aspects of image classification, including data loading, preprocessing, CNN model architecture design, training, and evaluation.

Dataset:

Cats and Dogs Dataset

Description of the Dataset:

The dataset consists of a diverse collection of images featuring both cats and dogs. Each image is labeled with its corresponding class (e.g., cat_123.jpg, dog_123.jpg, etc.), creating a comprehensive dataset for training and evaluating image classification models. The dataset is well-organized into two main sections, arranged in separate folders. In the train folder, a substantial collection of cat and dog images can be found, each placed in its respective folder, totaling 12,500 images for both cats and dogs. The sample folder is designed for practical use and includes four subfolders: train with 500 images per class, test with 100 images per class, validation with 50 images per class, and predict with a mix of 12 cat and dog images, with 6 of each. This dataset structure provides a straightforward and diverse resource for training, testing, and validating CNNs for classifying images of cats and dogs.

Tasks:

- Download the dataset from the VLE.
- Open your Jupyter Notebook environment and import the necessary libraries.
- Load the train, validation, and test datasets into your Jupyter Notebook environment using a suitable approach.
- Build a CNN model to effectively classify the given inputs.
- Compile the model, specifying the optimizer and loss function.
- Train the model using the training dataset.
- Evaluate the model's performance on the test dataset.
- Predict provided unseen data to apply the model to real-world use.
- Experiment with model training by changing the number of layers, number of filters, architecture, activation function, adjusting the learning rate, changing other hyperparameters, etc.