



Module 7: Learning from Pre-Built Models - Assignment

Problem Statement:

The categorization of images into distinct classes is a pervasive task in computer vision, and it has a wide array of applications, including in pet identification and animal monitoring systems. In this assignment, we aim to develop a model capable of accurately distinguishing between cat and dog images. Instead of building a convolutional neural network (CNN) from scratch, we will leverage transfer learning using the VGG16 model, a pre-trained model on the ImageNet dataset. VGG16 is renowned for its effectiveness in image recognition tasks, but it does not have broad categories for cats and dogs. Therefore, we will utilize the convolutional (Conv) layers of VGG16 for feature extraction and add custom fully connected (Cat) layers for the classification task.

Objectives:

Utilize VGG16 for Feature Extraction:

- Employ the VGG16 model, excluding its top layers, to serve as a feature extractor for cat and dog images.
- Ensure the input images are of the correct size (150x150) and preprocessed appropriately to match VGG16's requirements.

Data Preprocessing and Augmentation:

Implement image data generators for real-time data augmentation, ensuring a robust and varied dataset for training the classification layers.

Build and Train the Classification Model:

- Add custom fully connected layers on top of the VGG16 model for the classification task.
- Freeze the convolutional layers of VGG16 to retain the pre-trained features and only train the added classification layers.

Model Compilation and Training:

- Compile the model using stochastic gradient descent, categorical cross-entropy as the loss function, and accuracy as the evaluation metric.

- Train the model using the training data, and validate its performance using a validation set.

Evaluate and Test the Model:

- Assess the model's performance based on its accuracy in classifying images into cat or dog categories.
- Implement a prediction function to classify new images, providing the predicted category and the associated confidence level.