Advanced Machine Learning- Convolution

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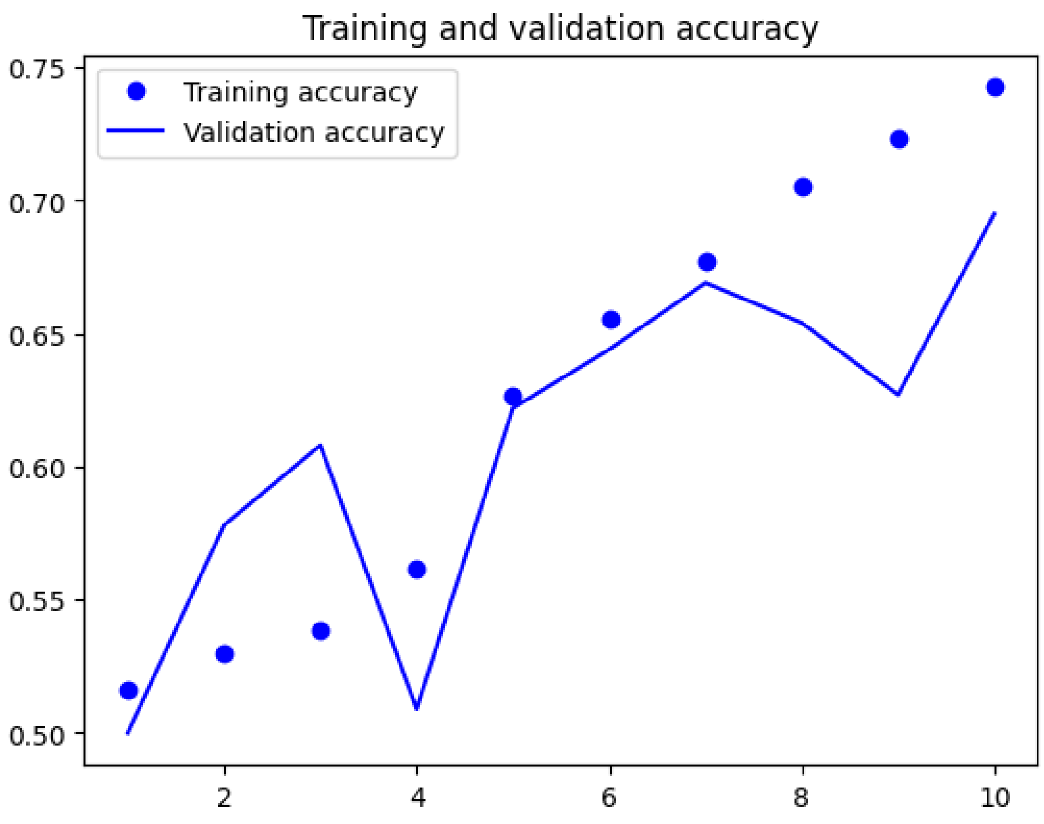

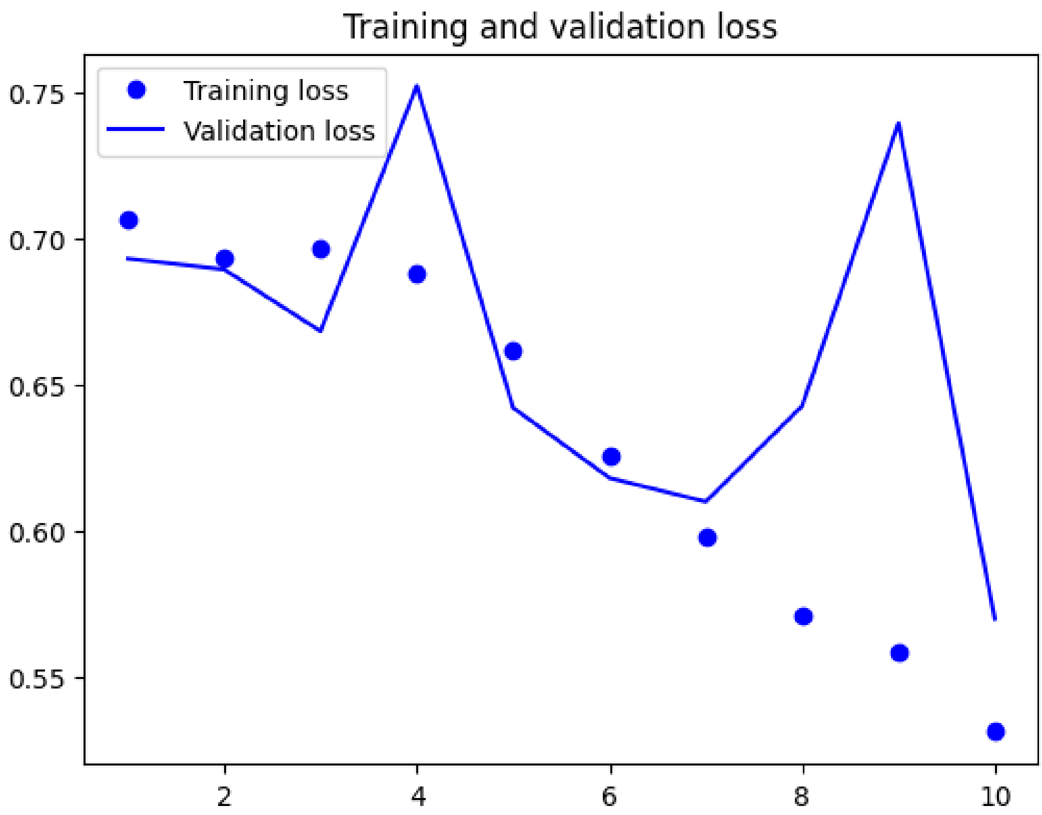

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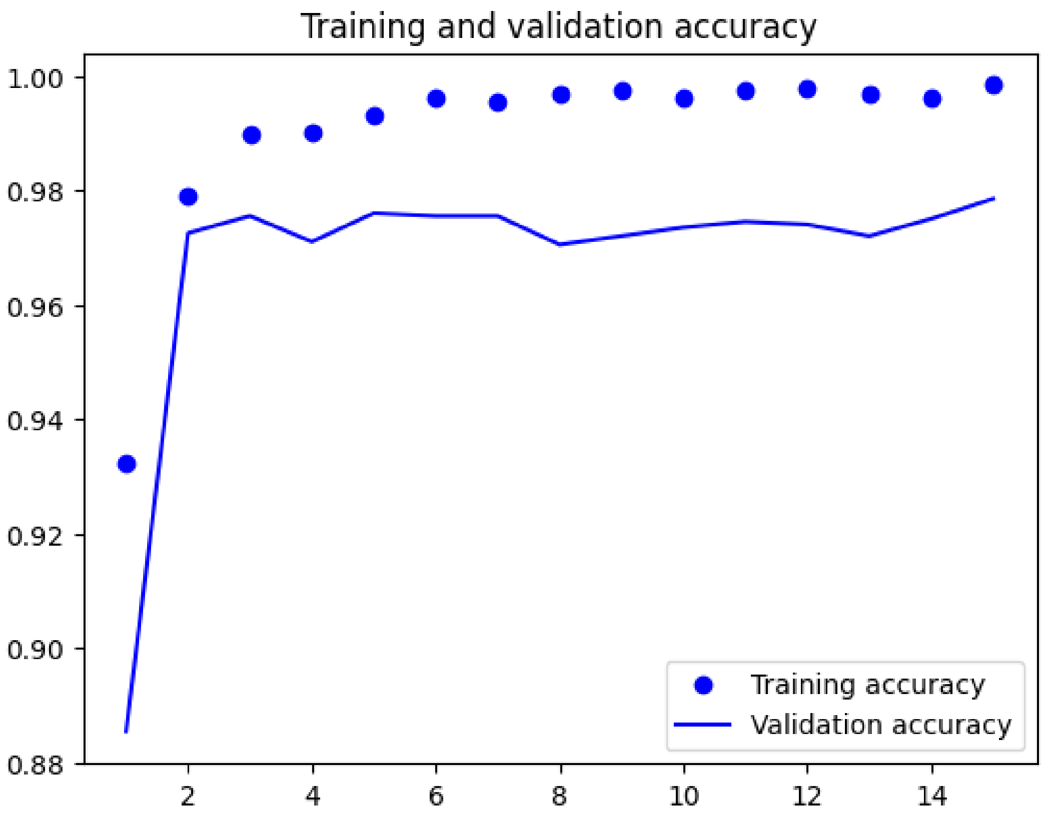

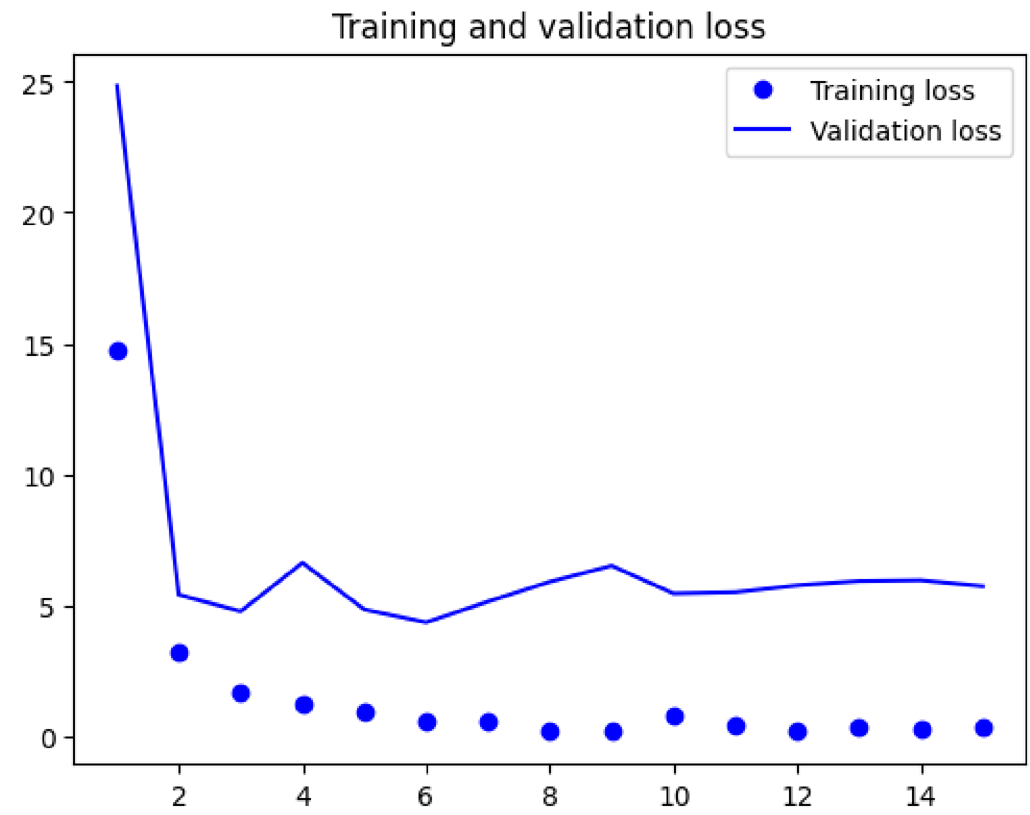

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Summary Report

The provided code is for training a convolutional neural network (CNN) on a cats vs dogs image classification problem using the Keras library in Python. The code includes data preprocessing, model architecture definition, training, and evaluation. The dataset is first loaded from the web, and then the images are pre-processed by resizing them to a fixed size and normalizing their pixel values. The model architecture consists of multiple convolutional and pooling layers, followed by a dense layer for classification. The model is trained for 20 epochs using the binary cross-entropy loss function and the Adam optimizer. The training and validation loss and accuracy are plotted for each epoch. The final trained model is evaluated on a test dataset, and the test accuracy is reported as 70.4%.

The images in the context show the training and validation loss and accuracy plots for the model. The first image shows the training and validation accuracy during the 20 epochs of training. The validation accuracy starts higher than the training accuracy but decreases after a few epochs, indicating overfitting. The second image shows the training and validation loss during the same 20 epochs of training. The validation loss decreases initially but starts increasing after a few epochs, indicating overfitting.

Data augmentation is used to increase the size of the training set and improve the generalization ability of the model. The data augmentation layer randomly flips, rotates, and zooms the training images to create new modified versions of the original data. The augmented training set is used to train a new CNN model for 20 epochs, and the training and validation loss and accuracy are plotted for each epoch. The final trained model is evaluated on the test dataset, and the test accuracy is reported as 83.5%, indicating the effectiveness of data augmentation. The provided code trains a CNN model on a cats vs dogs image classification problem using Keras. Data preprocessing, model architecture definition, training, and evaluation are included in the code. The training and validation loss and accuracy plots show the model's performance during training. Data augmentation is used to increase the size of the training set and improve the model's generalization ability, resulting in a higher test accuracy.

The code defines a function get_features_and_labels that extracts features and corresponding labels for a given dataset. The function takes a dataset (a list of tuples, where each tuple contains images and their corresponding labels) as input, and for each image, it preprocesses the image using the preprocessing function of the VGG16 model and extracts features using a pre-trained convolutional base. The function then concatenates all the features and labels into two numpy arrays and returns them. The function is then used to extract features and labels for the training, validation, and test datasets.The extracted features and labels are then printed using the shape attribute. The output shows that the training features have a shape of (2000, 4096), the training labels have a shape of (2000,), the validation features have a shape of (1000, 4096), the validation labels have a shape of (1000,), the test features have a shape of (1000, 4096), and the test labels have a shape of (1000,).

The output also includes some debugging information, which is displayed when the VGG16 model is loaded. The information includes the number of layers in the model and the output shape of each layer.