BAHÇEŞEHİR UNIVERSITY

Faculty of Engineering and Natural Sciences

Department of Software Engineering

COOP4490 ASSIGNMENT REPORT

Name Surname: Zeki Furkan Kutlu

Student Number:1805029

Introduction:

The problem at hand is to classify images of cats and dogs. This problem can be tackled using various machine learning techniques, such as convolutional neural networks (CNNs). In this report, we will compare the performance of four different CNN models and Resnet-18 model on this task: Model1, Model2, Model 3, and Model 4.

Model 1 is using a basic feedforward neural network with fully connected layers for image classification. It is trained using the Adam optimizer with categorical cross-entropy loss and the accuracy metric.

Model 2 is using a convolutional neural network with multiple convolutional and max pooling layers for image classification. It is trained using the Adam optimizer with categorical cross-entropy loss and the accuracy metric.

Model 3 is using a convolutional neural network with multiple convolutional and max pooling layers for image classification. It is trained using the Adam optimizer with categorical cross-entropy loss and the accuracy metric. In this model, the activation function for the convolutional layers is 'relu' and the activation function for the dense layers is 'relu'.

Model 4 is using a pre-trained ResNet-18 model with the final fully connected layer replaced with a new fully connected layer for image classification. It is trained using the Adam optimizer with categorical cross-entropy loss and the accuracy metric. The model is trained for 5 epochs and the final accuracy on the test set is calculated

Experimental Results:

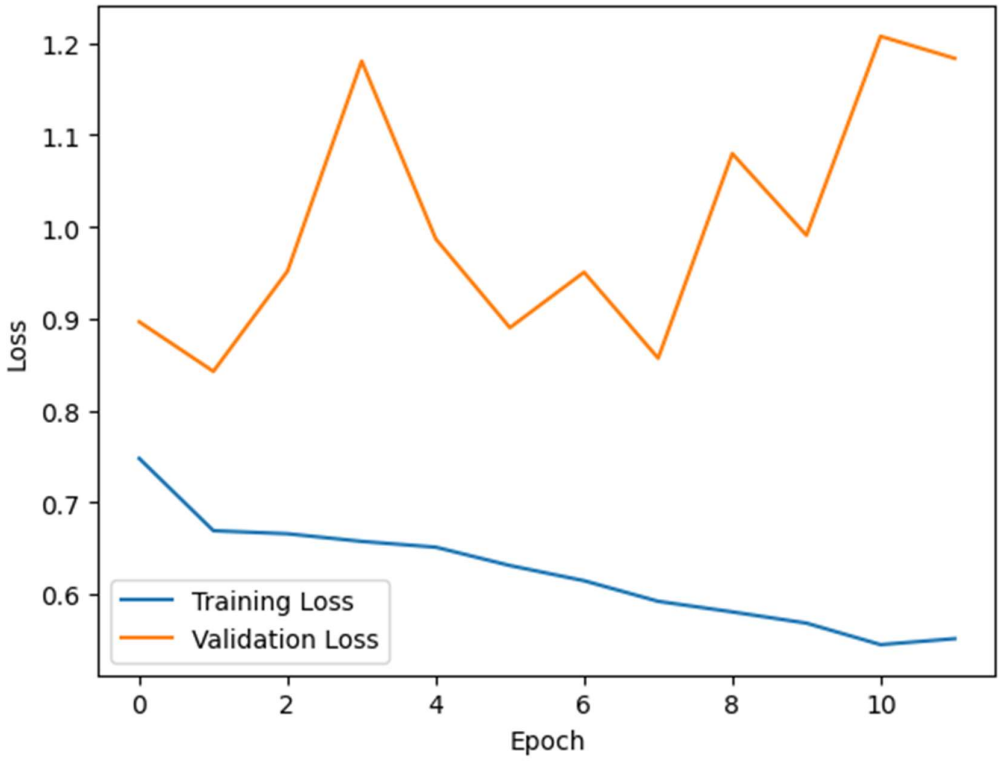
To evaluate the performance of the four models, we used a dataset consisting of 2000 images of cats and dogs, with 1600 images for training and 400 images for testing. The dataset was split into training and test sets in a stratified fashion to ensure that the class distribution is equal in both sets.

The models were trained for a fixed number of epochs and their performance was evaluated on the test set. The experimental results are shown below:

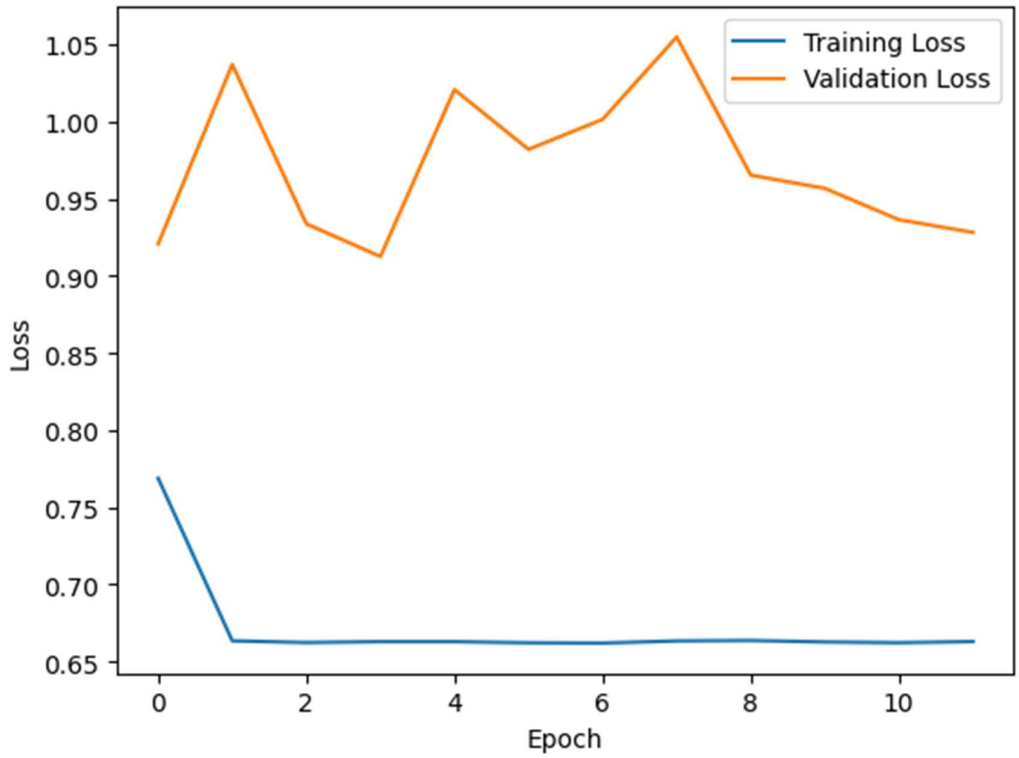
Model	Test Accuracy	Training Time
model1	0.6175	approximately 1min
model2	0.5000	approximately 2min
model3	0.5000	approximately 1min
model4	0.5525	approximately 15min

Learning Curves

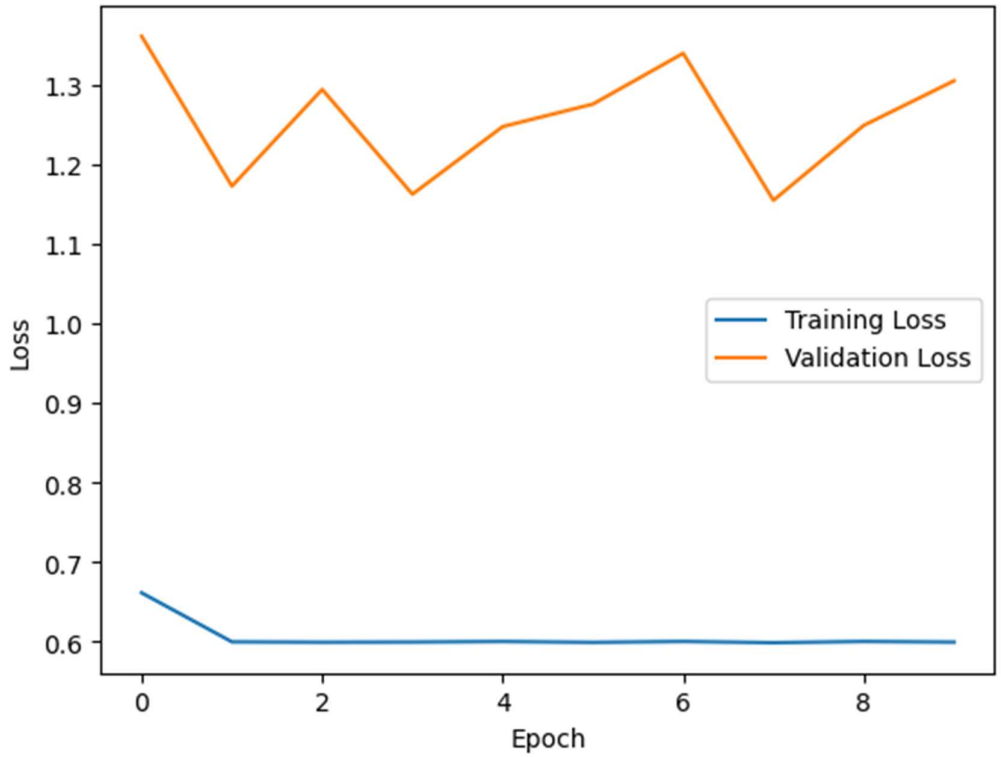
Model 1:



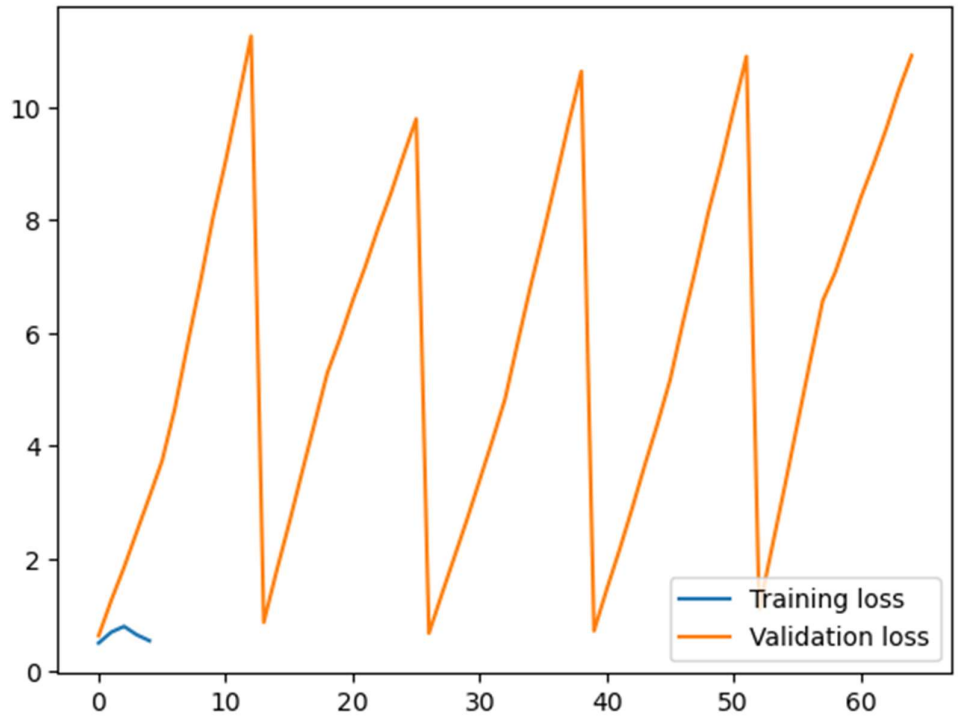
Model 2 :



Model 3 :



Model 4 :



According to Experimental results Model1 achieved the highest test accuracy, while Model 2 and Model 3 performed the worst.

Conclusion:

Based on the experimental results, we can conclude that Model 1 is the best performer among the four models. However, it is worth noting that the high test accuracy of Model 1 might be due to overfitting, as indicated by the large gap between the training and validation accuracy.

Some potential directions for further improvement could include increasing the size of the training dataset, using regularization techniques to prevent overfitting, or experimenting with different architectures and hyperparameters.