



Görüntü İşleme Dersi-MEK
Bilgisayar Mühendisliği, Yıldız Teknik Üniversitesi
Ödev 3

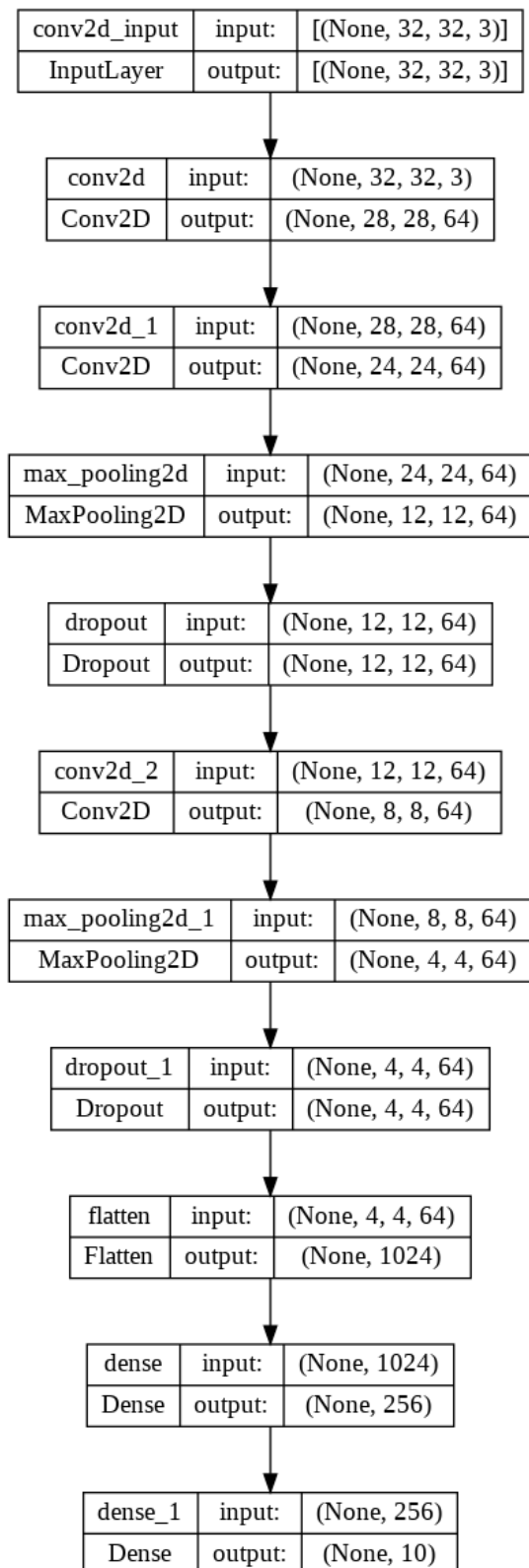
Bengi Yurdusever
19011014

METHOD:

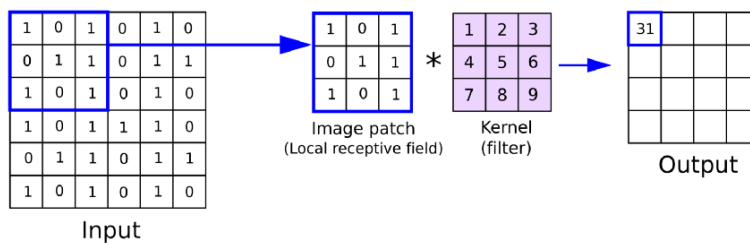
In this assignment, a CNN model is trained on CIFAR-10 dataset to classify images.

Different sizes of filters and number of convolutional layers are examined to find the best model.

Model with the highest accuracy is given on the right.

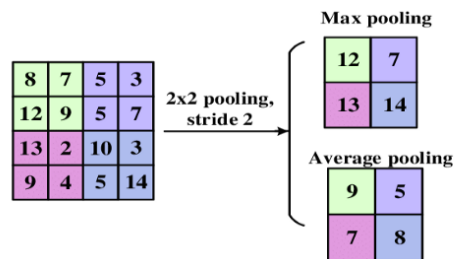


1)Filters:



Filters are used to extract features in convolutional layers. The values are updated as the kernels moves around the image. Stride parameter determines how many pixels the kernel moves on the image. Padding parameter can used to prevent the shrinking after convolution. Number of filters are taken as 32 and 64 to find the best fit.

1) Pooling:



Pooling can generalize features after the convolution results and reduce the size.

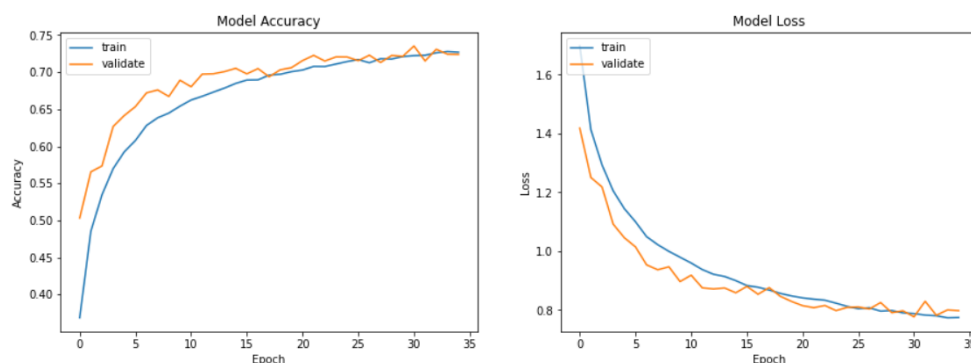
2) Flatten:

Flatten layer reduces the size to 1D. Results of this layer are fedded to fully connected layer.

CNN Model Layer:

- Convolutional Layer: extracts features
- Pooling Layer: reduces dimension
- Drop-out: mask some of the neurons and prevent overfit

By adding these layers sequentially, a model consisting of 32 filters with 3-layer and (5.5) size filters was obtained. The training data given to the model was preprocessed and the pixel values were normalized. As a result of the trials, the batch size of the model was determined as 32 and it was trained for 35 epochs. The following image shows the results of the model on the validation data.

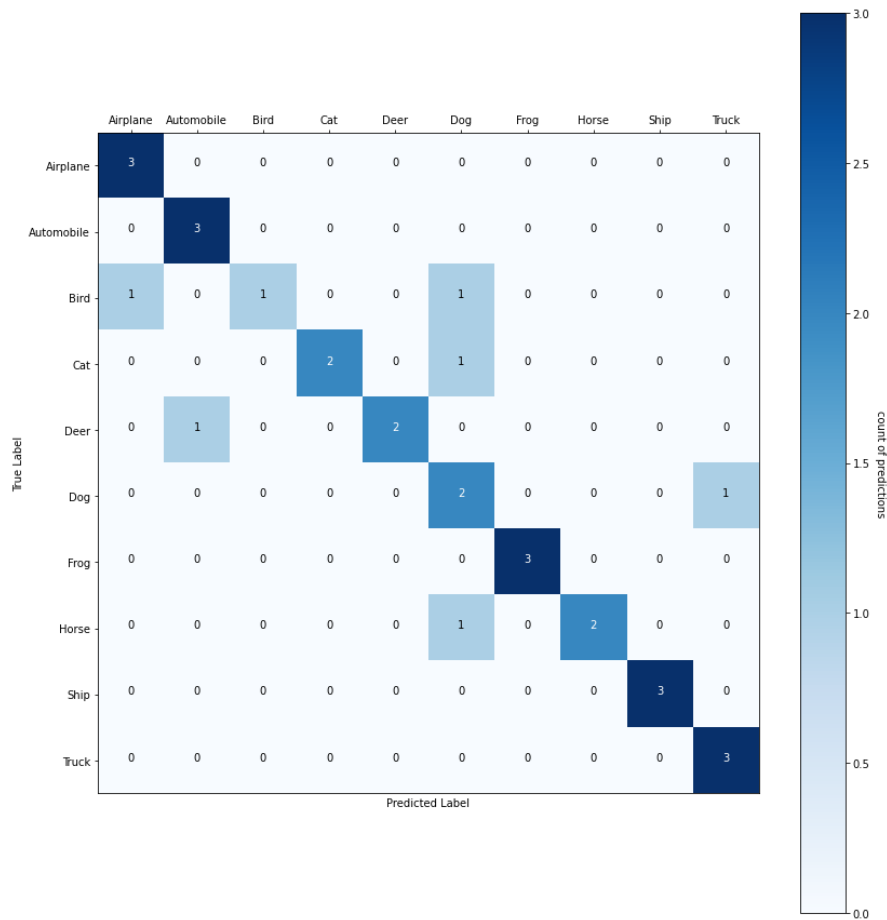


APPLICATION

In this section, three pictures from each of the 10 different classes in the test set were randomly selected and the class predictions of these pictures were ordered from largest to smallest according to their probability. Thus, the table was filled by obtaining the 5 classes with the most similar query picture.

Rastgele Seçilen Sorgu Resmi	En Benzer 1.Sınıf	En Benzer 2.Sınıf	En Benzer 3.Sınıf	En Benzer 4.Sınıf	En Benzer 5.Sınıf	Rastgele Seçilen Sorgu Resmi	En Benzer 1.Sınıf	En Benzer 2.Sınıf	En Benzer 3.Sınıf	En Benzer 4.Sınıf	En Benzer 5.Sınıf
	Airplane	ship	frog	bird	truck		Truck	automobile	cat	dog	airplane
	Airplane	cat	bird	automobile	frog		Dog	cat	bird	horse	deer
	Airplane	bird	frog	truck	deer		Dog	cat	horse	deer	bird
	Automobile	truck	ship	airplane	cat		Frog	cat	bird	deer	dog
	Automobile	airplane	truck	deer	bird		Frog	bird	deer	Dog	cat
	Automobile	Truck	airplane	Ship	dog		Frog	Cat	deer	Bird	dog
	Bird	frog	airplane	deer	cat		Horse	dog	cat	deer	bird
	Dog	cat	frog	bird	deer		Dog	deer	horse	cat	bird
	Airplane	bird	ship	deer	dog		Horse	dog	deer	cat	bird
	Cat	dog	frog	deer	horse		Ship	airplane	automobile	truck	horse
	Dog	cat	airplane	bird	deer		Ship	airplane	automobile	truck	bird
	Cat	dog	bird	deer	ship		Ship	airplane	cat	truck	automobile
	Deer	horse	bird	airplane	cat		Truck	cat	dog	deer	horse
	Deer	frog	bird	Cat	automobile		Truck	ship	airplane	cat	horse
	Automobile	truck	airplane	Horse	cat		Truck	automobile	horse	airplane	dog

CONFUSION MATRIX:



RESULT:

Convolutional neural networks can successfully complete difficult tasks such as object classification. The reason why such tasks are difficult is that the data size is large and does not consist of a set of rules. However, CNN can achieve high success because it performs this process by minimizing information loss and extracting important features from large data.

Hyper-parameters given to the CNN model should be chosen carefully as they will affect the success of the model. For example, setting the batch-size too large may speed up the training phase, but will cause the model to generalize the results. In the experiments conducted in this context, it is observed that the model gives the best results when the batch-size is set to 32. In addition, the number of epochs has been chosen as 35 so that the model can learn without overfitting.