CNN(Convolutional Neuraul Network) Code review

1. First get data from kaggle(or UCI).
2. Get Dogs and cats images, and our goal is to train a model and distinguish whether an image is a dog or a cat.
3. First, we use feature detector to do Convolution, some information can refer to

[A Beginner's Guide To Understanding Convolutional Neural Networks](https://adeshpande3.github.io/adeshpande3.github.io/A-Beginner%27s-Guide-To-Understanding-Convolutional-Neural-Networks/)

1. Max Pooling, preserve main feature, reduce size and prevent overfitting
2. Adding a second convolutional layer
3. flatten
4. fully connected layer
5. not only the weight are trained, but also the feature detector are trained.
6. In order to train model, so split the data into training data and test data. Here we extract 20% of the data to be test data.
7. To standardize the range of independent variables and features, Scaling training and test data.
8. Build ANN layers. We use two hidden layers and one output layer. Output’s activation function is Sigmoid so that it can produce probability outcomes.
9. Finally, we use 10 batch and 100 epochs to deal with these 1000 data. And use cross validation to compare the results 10 times.

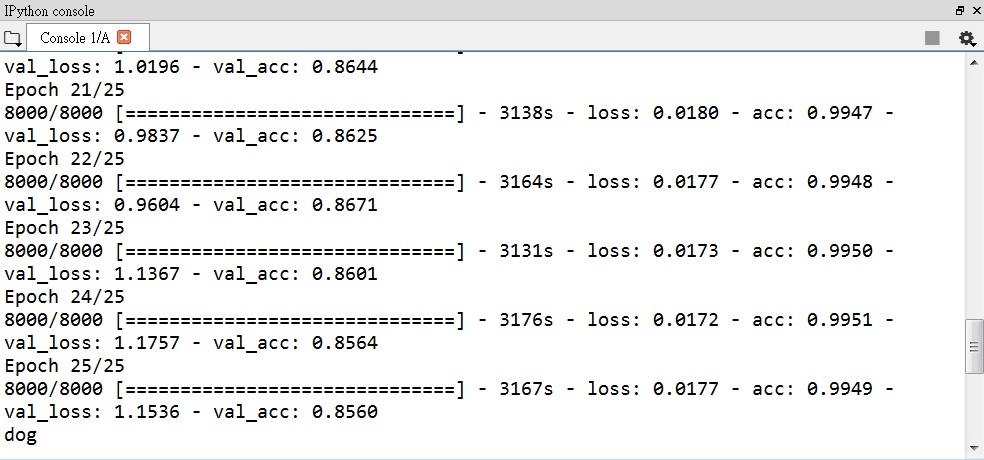
Data:

Lots dogs and cats images from kaggle

Code:

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| # Part 1 - Building the CNN  # Importing the Keras libraries and packages  **from** keras.models **import** Sequential  **from** keras.layers **import** Conv2D  **from** keras.layers **import** MaxPooling2D  **from** keras.layers **import** Flatten  **from** keras.layers **import** Dense  # Initialising the CNN  classifier = Sequential()  # Step 1 - Convolution  classifier.add(Conv2D(32, (3, 3), input\_shape = (64, 64, 3), activation = 'relu'))  # Step 2 - Pooling  classifier.add(MaxPooling2D(pool\_size = (2, 2)))  # Adding a second convolutional layer  classifier.add(Conv2D(64, (3, 3), activation = 'relu'))  classifier.add(MaxPooling2D(pool\_size = (2, 2)))  classifier.add(Conv2D(64, (3, 3), activation = 'relu'))  classifier.add(MaxPooling2D(pool\_size = (2, 2)))  # Step 3 - Flattening  classifier.add(Flatten())  # Step 4 - Full connection  classifier.add(Dense(units = 128, activation = 'relu'))  classifier.add(Dense(units = 1, activation = 'sigmoid'))  # Compiling the CNN  classifier.compile(optimizer = 'adam', loss = 'binary\_crossentropy', metrics = ['accuracy'])  # Part 2 - Fitting the CNN to the images  **from** keras.preprocessing.image **import** ImageDataGenerator  train\_datagen = ImageDataGenerator(rescale = 1./255,  shear\_range = 0.2,  zoom\_range = 0.2,  horizontal\_flip = True)  test\_datagen = ImageDataGenerator(rescale = 1./255)  training\_set = train\_datagen.flow\_from\_directory('dataset/training\_set',  target\_size = (64, 64),#input size  batch\_size = 32, #batch size for updating weights every epoch  class\_mode = 'binary')#how many classes  test\_set = test\_datagen.flow\_from\_directory('dataset/test\_set',  target\_size = (64, 64),  batch\_size = 32,  class\_mode = 'binary')  classifier.fit\_generator(training\_set,  steps\_per\_epoch = 8000,  epochs = 25,  validation\_data = test\_set,  validation\_steps = 2000)  **import** numpy **as** np  **from** keras.preprocessing **import** image  test\_image = image.load\_img('dataset/single\_prediction/cat\_or\_dog\_6.jpg', target\_size = (64, 64))  test\_image = image.img\_to\_array(test\_image)  test\_image = np.expand\_dims(test\_image, axis = 0)  result = classifier.predict(test\_image)  training\_set.class\_indices  **if** result[0][0] == 0:  **print**('cat');  **else**:  **print**('dog'); |

Result:



Summary:

Here, we use adam optimizer and cross validation 10 times to reach average 84% accuracy. To adjust the parameter, we can use other optimizer which can refer to [Deep Learning optimizers](https://medium.com/towards-data-science/types-of-optimization-algorithms-used-in-neural-networks-and-ways-to-optimize-gradient-95ae5d39529f), and also we can change batch size, epoch and then use cross validation to find better training model for our test set data.