# Keras Example

January 26, 2023

## 1 Keras simple code example

Dereck Alpizar Arce - 7023782

### 1.1 Imports

```python
[1]: import keras
     from keras.datasets import mnist
     from keras.utils import np_utils
     from keras.models import Sequential
     from keras.layers import Dense
```

```python
[2]: print(keras.__version__)
```

```
2.9.0
```

### 1.2 Load the MNIST dataset

```python
[3]: (X_train, y_train), (X_test, y_test) = mnist.load_data()
```

### 1.3 Normalize the input data

```python
[4]: X_train = X_train.astype('float32') / 255
     X_test = X_test.astype('float32') / 255
```

### 1.4 Convert the labels to categorical

```python
[5]: num_classes = 10
     y_train = np_utils.to_categorical(y_train, num_classes)
     y_test = np_utils.to_categorical(y_test, num_classes)
```

### 1.5 Create the model

```python
[6]: model = Sequential()
     model.add(Dense(512, activation='relu', input_shape=(784,)))
     model.add(Dense(num_classes, activation='softmax'))
```

## 1.6   Compile the model

```
[7]: model.compile(loss='categorical_crossentropy', optimizer='adam',␣
      ↪metrics=['accuracy'])
```

## 1.7   Train the model

```
[8]: history = model.fit(X_train.reshape(60000, 784), y_train, batch_size=128,␣
      ↪epochs=5, verbose=1, validation_data=(X_test.reshape(10000, 784), y_test))
     history
```

```
Epoch 1/5
469/469 [==============================] - 1s 3ms/step - loss: 0.2632 -
accuracy: 0.9261 - val_loss: 0.1381 - val_accuracy: 0.9601
Epoch 2/5
469/469 [==============================] - 1s 2ms/step - loss: 0.1071 -
accuracy: 0.9683 - val_loss: 0.0948 - val_accuracy: 0.9713
Epoch 3/5
469/469 [==============================] - 1s 2ms/step - loss: 0.0699 -
accuracy: 0.9795 - val_loss: 0.0760 - val_accuracy: 0.9759
Epoch 4/5
469/469 [==============================] - 1s 3ms/step - loss: 0.0506 -
accuracy: 0.9847 - val_loss: 0.0737 - val_accuracy: 0.9765
Epoch 5/5
469/469 [==============================] - 3s 6ms/step - loss: 0.0375 -
accuracy: 0.9891 - val_loss: 0.0613 - val_accuracy: 0.9799
```

```
[8]: <keras.callbacks.History at 0x19235ed5f10>
```