

Stepping up to images

Puteaux, Fall/Winter 2020-2021

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##                               ##  
##  Deep Learning in Python  ##  
##                               ##  
#####
```

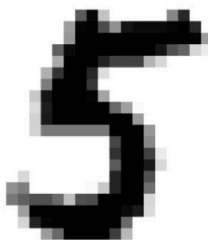
\$1 Introduction to Deep Learning in Python

\$1.4 Fine-tuning keras models

\$1.4.4 Stepping up to images

1. How to recognize handwritten digits?

- The MNIST dataset.
- 28 x 28 grid flattened to 784 values for each image.
- Value in each part of the array denotes the darkness of that pixel.



5. Practice exercises for model validation:

► Package pre-loading:

```
[1]: import pandas as pd  
from keras.layers import Dense  
from keras.models import Sequential  
from keras.utils import to_categorical
```

► Data pre-loading:

```
[2]: df = pd.read_csv('ref8. MNIST.csv', header=None)
X = df.iloc[:, 1:].to_numpy()
y = to_categorical(df.iloc[:, 0])
```

► Evaluating model accuracy on validation dataset practice:

```
[3]: # Create the model: model
model = Sequential()

# Add the first hidden layer
model.add(Dense(50, activation='relu', input_shape=(784, )))

# Add the second hidden layer
model.add(Dense(50, activation='relu'))

# Add the output layer
model.add(Dense(10, activation='softmax'))

# Compile the model
model.compile(optimizer='adam',
              loss='categorical_crossentropy',
              metrics=['accuracy'])

# Fit the model
model.fit(X, y, validation_split=0.3)
```

```
44/44 [=====] - 1s 33ms/step - loss: 43.4840 -
accuracy: 0.2671 - val_loss: 6.5922 - val_accuracy: 0.5890
```

```
[3]: <tensorflow.python.keras.callbacks.History at 0x7f8fdb1d7f10>
```