DL_02

March 8, 2021

1 MNIST Trabalhando com imagens de dígitos

MNIST um data set com imagens de 20000 handwritten dígitos 28 x 28.

[3]:
```
import pandas as pd
import tensorflow as tf

mnist = pd.read_csv('/content/sample_data/mnist_train_small.csv',header=None)
```

[28]:
```
mnist.head()
```

[28]:

	0	1	2	3	4	5	6	…	778	779	780	781	782	783	784
0	6	0	0	0	0	0	0	…	0	0	0	0	0	0	0
1	5	0	0	0	0	0	0	…	0	0	0	0	0	0	0
2	7	0	0	0	0	0	0	…	0	0	0	0	0	0	0
3	9	0	0	0	0	0	0	…	0	0	0	0	0	0	0
4	5	0	0	0	0	0	0	…	0	0	0	0	0	0	0
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
9995	3	0	0	0	0	0	0	…	0	0	0	0	0	0	0
9996	2	0	0	0	0	0	0	…	0	0	0	0	0	0	0
9997	1	0	0	0	0	0	0	…	0	0	0	0	0	0	0
9998	7	0	0	0	0	0	0	…	0	0	0	0	0	0	0
9999	8	0	0	0	0	0	0	…	0	0	0	0	0	0	0

[10000 rows x 785 columns]

[10]:
```
mnist.columns
```

[10]:
```
Int64Index([  0,   1,   2,   3,   4,   5,   6,   7,   8,   9,
            …
            775, 776, 777, 778, 779, 780, 781, 782, 783, 784],
           dtype='int64', length=785)
```

[11]:
```
mnist.shape
```

[11]:
```
(20000, 785)
```

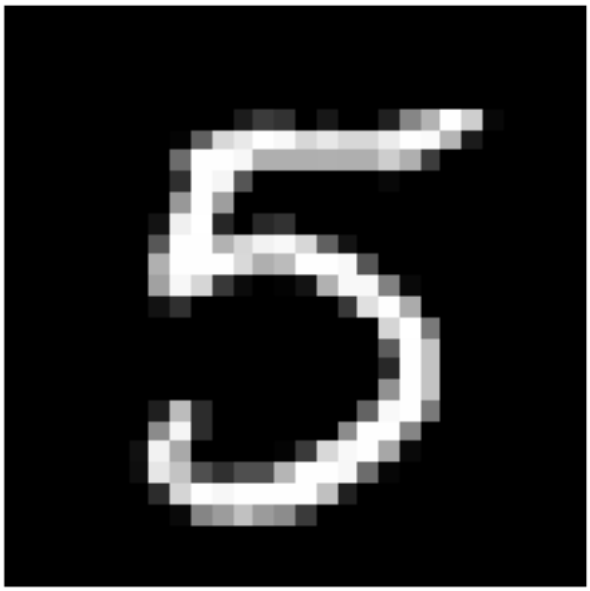
2 plot das imagens

[38]:
```
tf.Variable(mnist[0]) # mnist[0] = Coluna 0
```

[38]:
```
<tf.Variable 'Variable:0' shape=(20000,) dtype=int64, numpy=array([6, 5, 7, …,
2, 9, 5])>
```

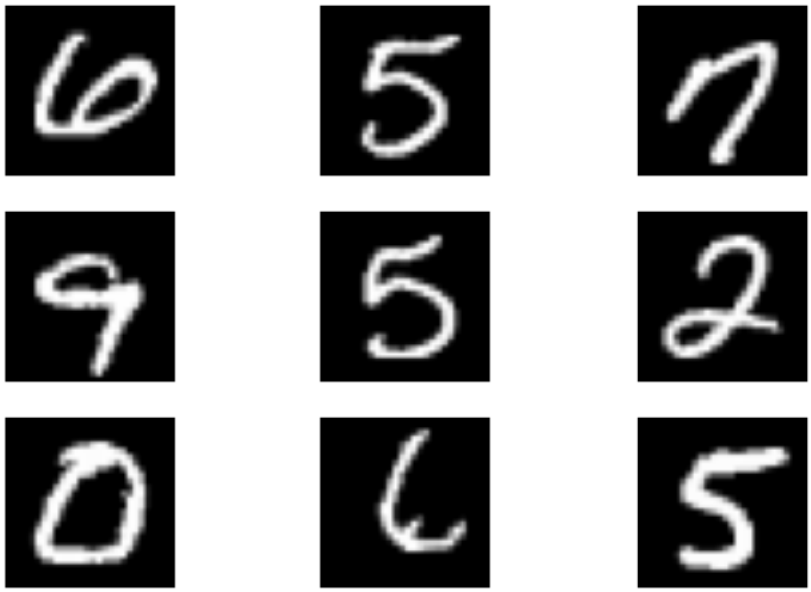
[23]:
```
import matplotlib.pyplot as plt
import numpy as np

# functions to show an image
# mnist.iloc[1][1::] => Linha 0 e Coluna de 1 até o último
# Portanto, no código abaixo, eu localizo todos os valores da linha '1' até a
# última coluna '784' e aplico um reshape para o formato [28,28]
plt.imshow(tf.reshape( tf.Variable(mnist.iloc[1][1::]) , [28,28]), cmap='gray')
plt.axis('off')
plt.show()
```



[126]:
```
for i in range(9):
  ax = plt.subplot(3,3,i+1)
  ax.imshow(tf.reshape( tf.Variable(mnist.iloc[i][1::]) , [28,28]), cmap='gray')
  plt.axis('off')

plt.show()
```



3 Exercício

Empregue o modelo de código abaixo para gerar o conjunto da dados das imagens e de seus labels em tensores. Gere ao menos 100 elementos dos 20000.

[59]:
```
# modelo

mnist_tf = tf.Variable(tf.zeros([20000, 28, 28], tf.int64))#...<uma matriz␣
 ↪28x28 de ZEROS para cada dígito> )Tensor.set_shape
mnist_tf_labels = tf.Variable(mnist[0])#...<os rótulos de cada dígito>  )
print(mnist_tf.shape)

# # cuidado... mnist[0] é a coluna 0, mnist.iloc[0] é a linha 0!!!
for i in range(100): # only 100
  mnist_tf[i].assign( tf.reshape(tf.Variable(mnist.iloc[i][1::]) , [28,28]))# ..
 ↪.<os dados das imagens> ))
```

```
(20000, 28, 28)
```

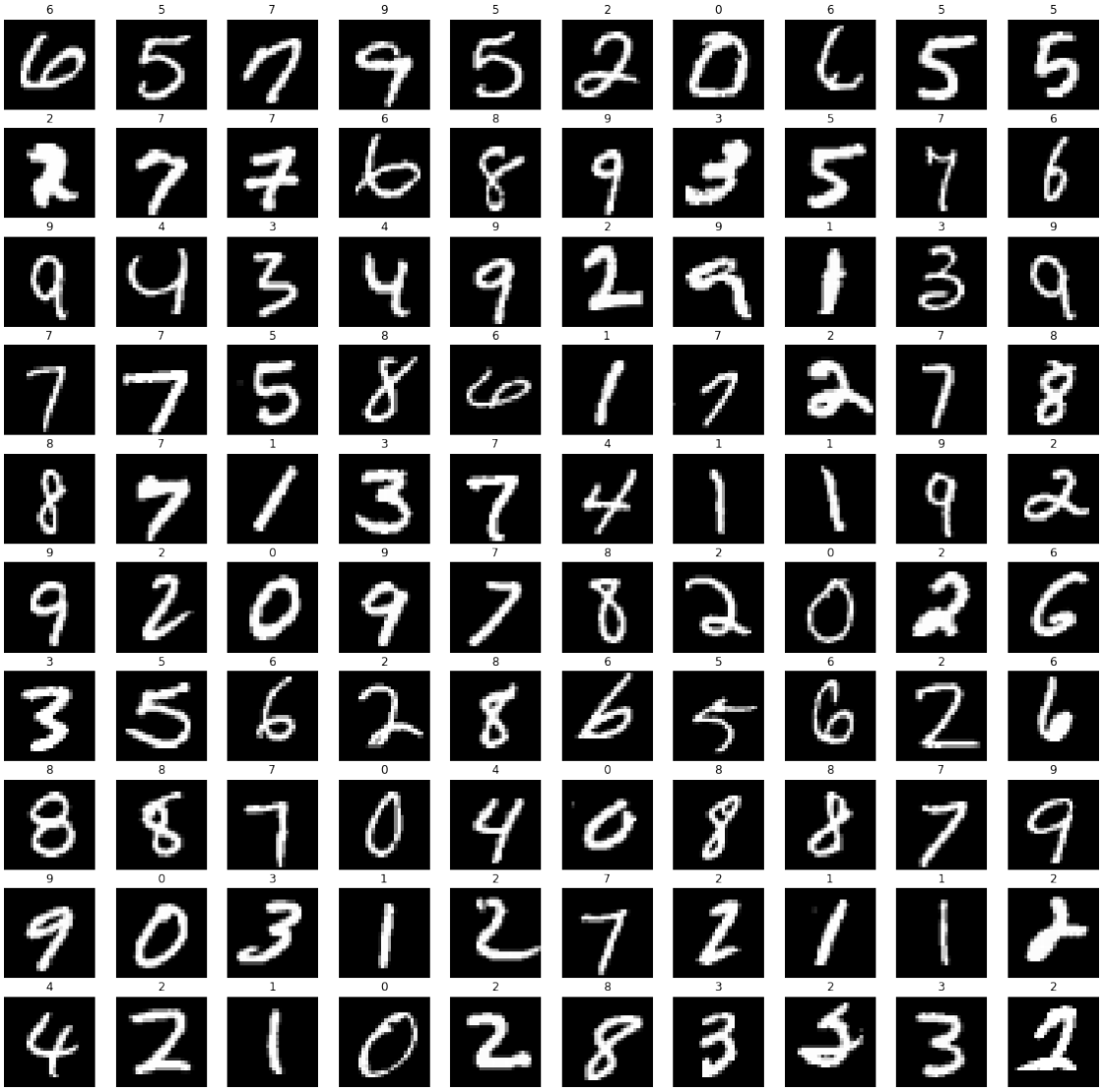
[60]:
```
import matplotlib.pyplot as plt

plt.figure(figsize=(20,20))

for i in range(100):
  ax = plt.subplot(10,10,i+1)
  ax.imshow(mnist_tf[i], cmap='gray')
```

```
  ax.set_title(str(mnist_tf_labels[i].numpy()))
  plt.axis('off')

plt.show()
```



4 Trabalhando com imagens fotográficas (RGB)

[62]:
```
from tensorflow.keras import datasets, layers, models
```

[64]:
```
(train_images, train_labels), (test_images, test_labels) = datasets.cifar10.
↪load_data()
```

```
Downloading data from https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz
170500096/170498071 [==============================] - 4s 0us/step
```

[65]:
```
# Normalize pixel values to be between 0 and 1
train_images, test_images = train_images / 255.0, test_images / 255.0
```

[66]:
```
type(train_images)
```

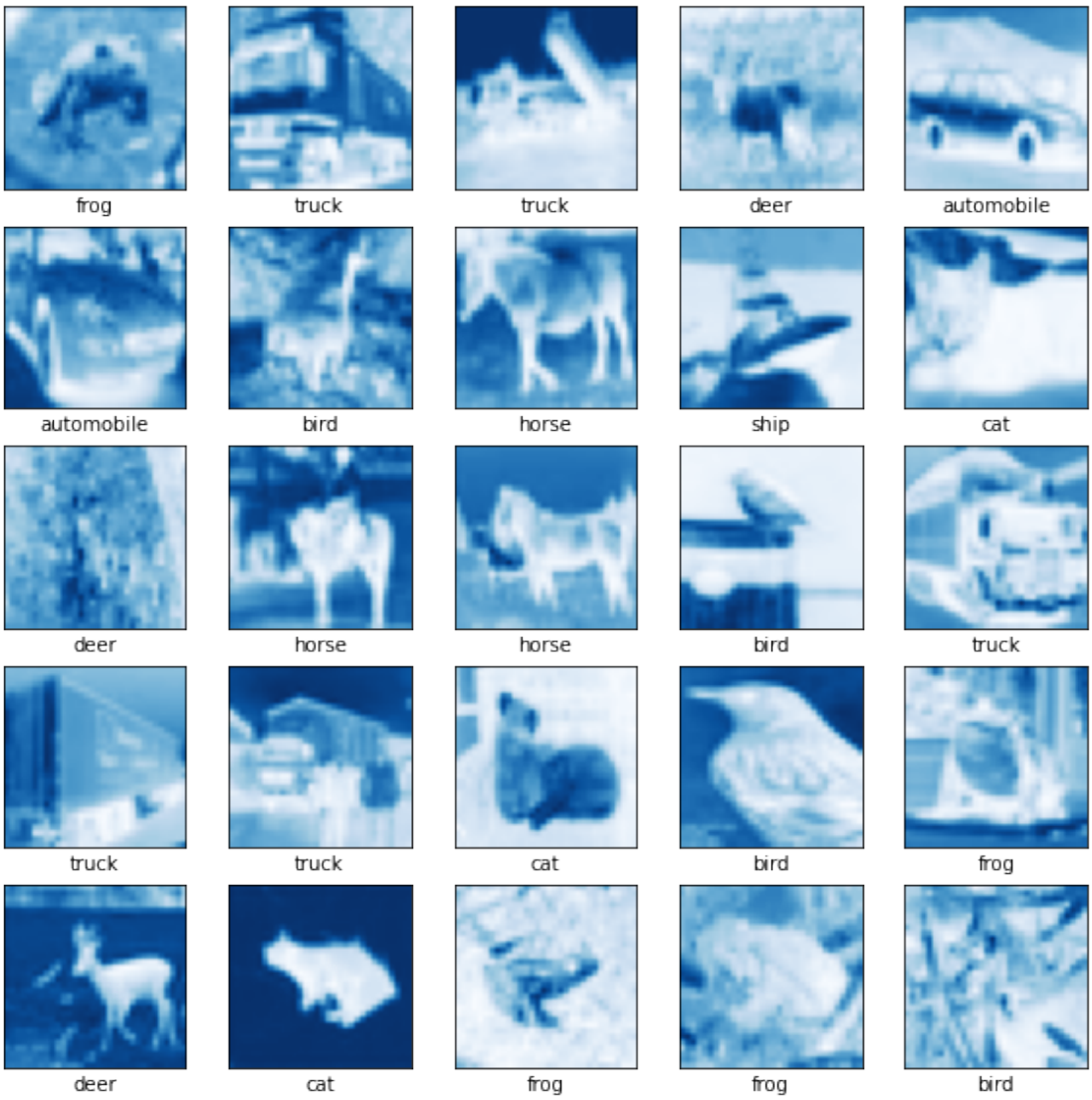
[66]:
```
numpy.ndarray
```

[67]:
```
train_images.shape
```

[67]:
```
(50000, 32, 32, 3)
```

[126]:
```
class_names = ['airplane', 'automobile', 'bird', 'cat', 'deer',
               'dog', 'frog', 'horse', 'ship', 'truck']

plt.figure(figsize=(10,10))
for i in range(25):
    plt.subplot(5,5,i+1)
    plt.xticks([])
    plt.yticks([])
    plt.grid(False)
    plt.imshow(train_images[i,:,:,0] , cmap='Blues')
    # The CIFAR labels happen to be arrays,
    # which is why you need the extra index
    plt.xlabel(class_names[train_labels[i][0]])
plt.show()
```



5 Exercício

Altere o código acima para exibir somente uma componente RGB das imagens.