SINGULARIS LAB

Машинное обучение в OpenCV. Практика

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База MNIST

Подготовка данных

```
import datetime
import numpy as np
import cv2
from matplotlib import pyplot as plt

images_with_labels = []

digits_file_name = "digits.npy"
images_with_labels = np.load(digits_file_name )
```

Подготовка данных

```
width = images_with_labels[0][0].shape[1]
height = images_with_labels[0][0].shape[0]
train_count = 70
test_count = 100 - train_count
```

Подготовка данных

```
train = []
test = []
for i in range(0, len(images_with_labels) -
len(images_with_labels) % 100, 100):
    train.extend(images_with_labels[i:i+train_count])
    test.extend(images_with_labels[i+train_count:i + 100])

train, train_labels = zip(*train)
test, test_labels = zip(*test)
```

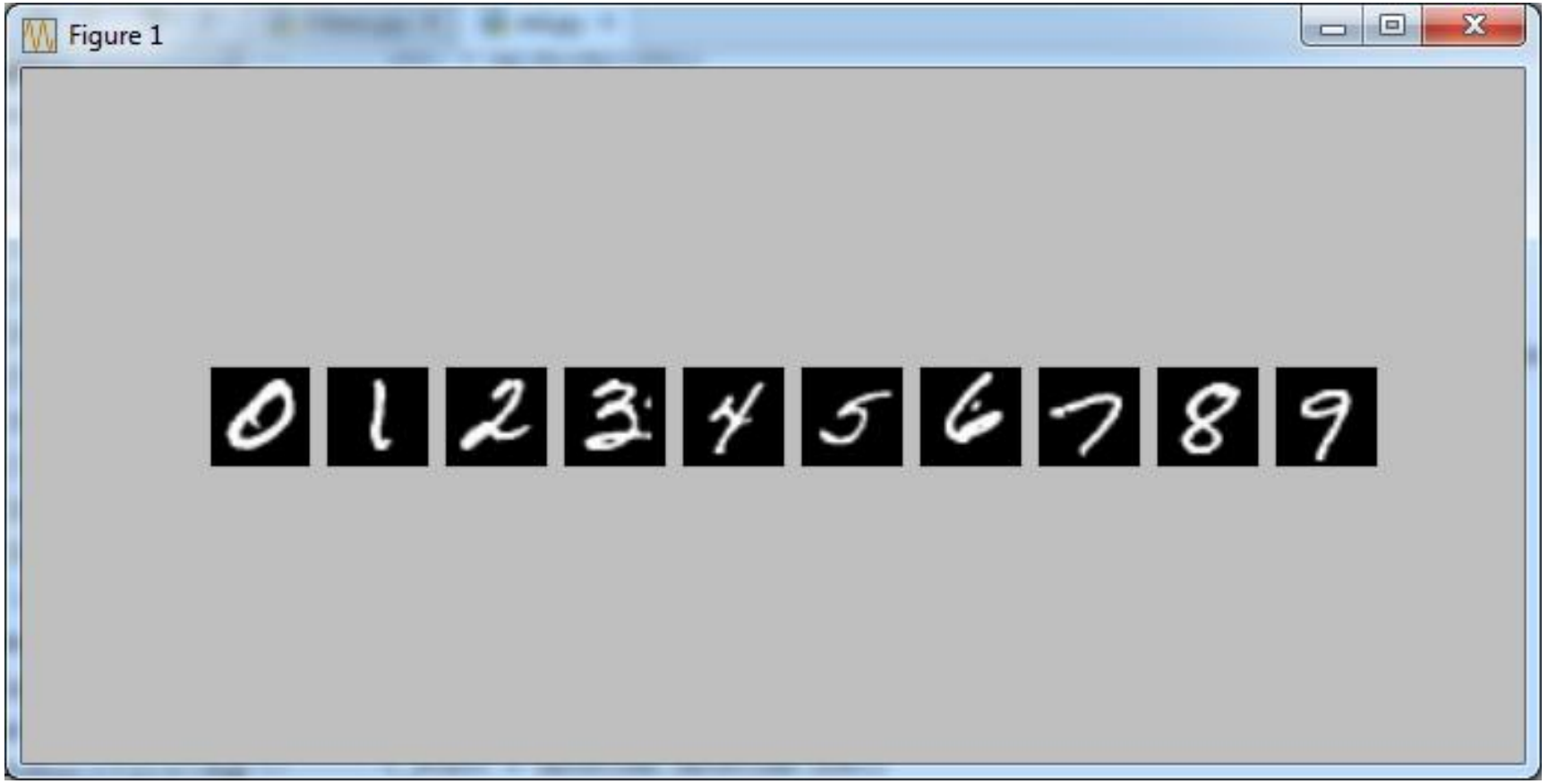
Подготовка данных

```
train = np.array(train)
test = np.array(test)

train_labels = np.array(train_labels).reshape(-1,1)
test_labels = np.array(test_labels).reshape(-1,1)

print('Train size: ' + str(train.shape[0]))
print('Test size: ' + str(test.shape[0]))
```

Визуализация

```
test_subset = [next(index for index in
range(len(test)) if test_labels[index] == num) for
num in range(10)]

for i in range(10):
    plt.subplot(1, 10, i + 1)
    plt.imshow(test[test_subset[i]], cmap='gray')
    plt.xticks([]), plt.yticks([])
plt.show()
```

Визуализация



Обучение

```
train_data = train.reshape((-1,
width*height)).astype(np.float32)

knn = cv2.ml.KNearest_create()
t_start = datetime.datetime.now()
knn.train(train_data, cv2.ml.ROW_SAMPLE, train_labels)
t_elapsed = datetime.datetime.now() - t_start

print("Training time: " + str(t_elapsed.total_seconds()))
```

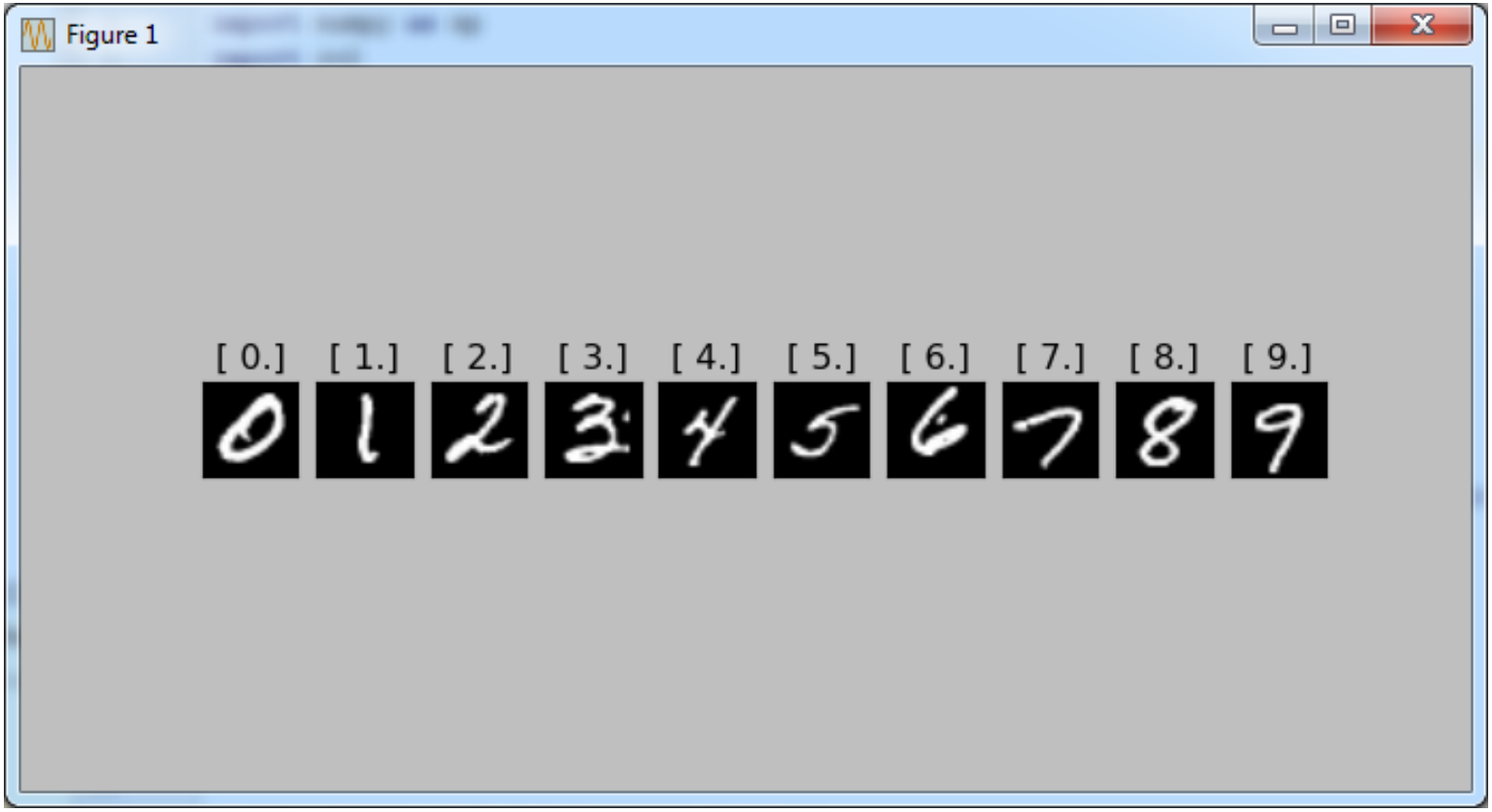
Тестирование

```
test_data = test.reshape((-1,
width*height)).astype(np.float32)
t_start = datetime.datetime.now()
ret, result,neighbours, dist = knn.findNearest(test_data,
k=3)
t_elapsed = datetime.datetime.now() - t_start

correct = np.count_nonzero(result==test_labels)

print("kNN accuracy = " + str(correct*100/result.size))
print("Test time: " + str(t_elapsed.total_seconds()))
```

Визуализация результата

```
for i in range(10):
    plt.subplot(1, 10, i + 1)
    plt.imshow(test[test_subset[i]], cmap='gray')
    plt.xticks([]), plt.yticks([])
    plt.title(result[test_subset[i]])
plt.show()
```

Визуализация результата



Спасибо за внимание

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