

CRNN_Analyse_Predictions

April 16, 2023

```
[ ]: %load_ext autoreload
      %autoreload 2
      %matplotlib inline
```

```
[ ]: import os

import sys
sys.path.append("../project_functions/")
import ad_functions as adfns
import ad_crnn_functions as adcrn

from matplotlib import pyplot as plt
import pandas as pd
import numpy as np
import cv2
from sklearn.model_selection import train_test_split
from tensorflow.keras.models import Model, load_model
```

```
[ ]: import os
import matplotlib.pyplot as plt
from PIL import Image

# Set the path to the folder containing the images
image_folder = './cropped_images/9'
image_files = os.listdir(image_folder)

# Set the grid dimensions
rows = 5
columns = 4

# Initialize the figure and axes
fig, axes = plt.subplots(rows, columns, figsize=(15, 15))

# Set the background color
fig.patch.set_facecolor('gray')

# Title
fig.suptitle('Images in SIPA 9 (Cropped)', fontsize=20, y=1.02)
```

```

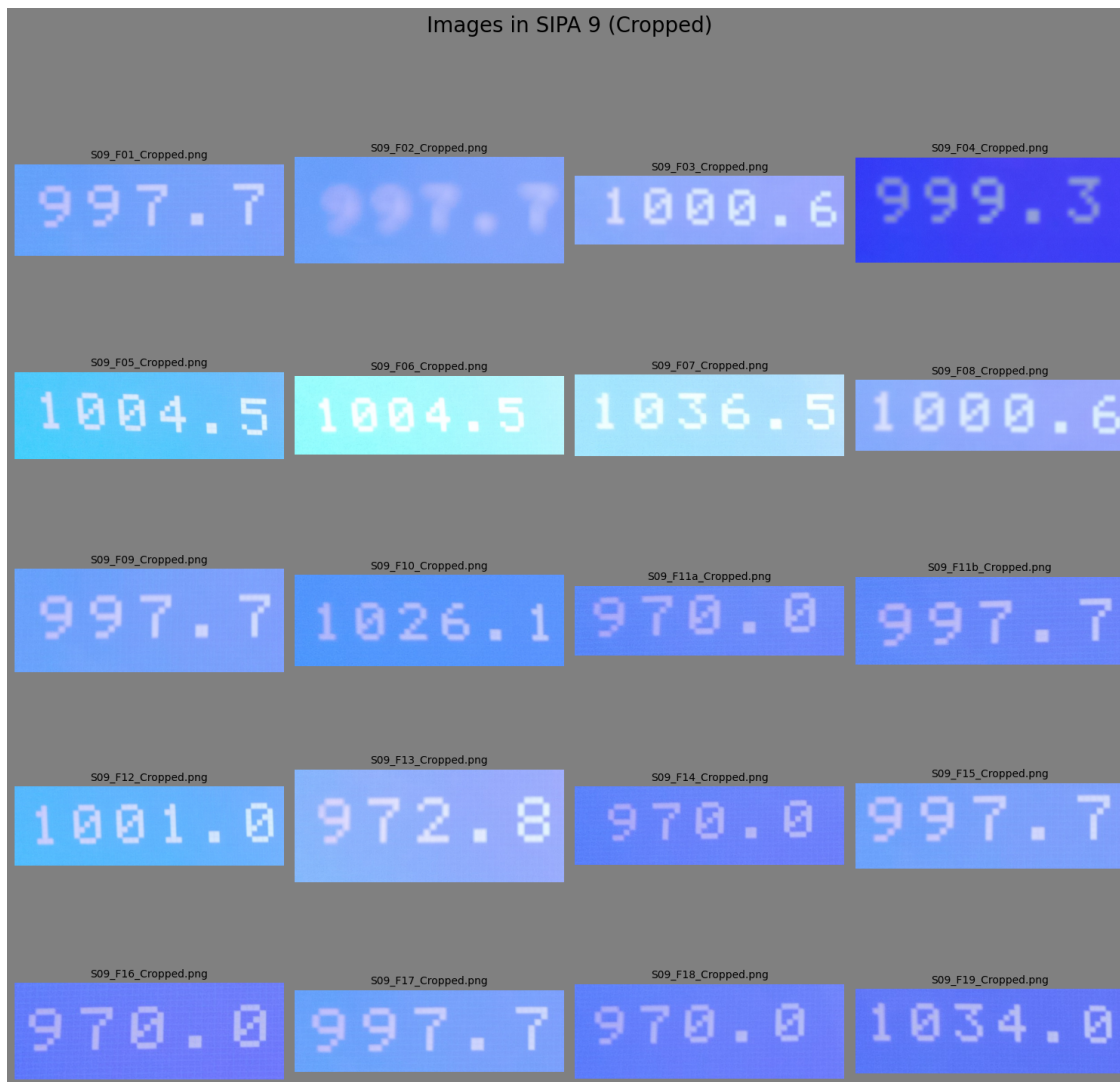
# Iterate through the rows and columns
for i in range(rows):
    for j in range(columns):
        # Get the image file path and open the image
        image_path = os.path.join(image_folder, image_files[i*columns + j])
        img = Image.open(image_path)

        # Display the image in the grid
        axes[i, j].imshow(img)
        axes[i, j].axis('off')

        # Set the title (file name) for each image
        axes[i, j].set_title(image_files[i*columns + j], fontsize=10)

# Show the final grid
plt.tight_layout()
plt.show()

```



0.1 Load the CRNN_digits_model_bw_600k Model

```
[ ]: model_file = "CRNN_digits_model_bw_600k.h5"
      model_file_el = "CRNN_digits_model_bw_600k_extra_layers.h5"

      crnn_model_bw_600k = load_model(model_file)
      crnn_model_bw_600k_el = load_model(model_file_el)
```

```
[ ]: # Define the structuring element for dilation
      kernel_size = 2
      kernel = cv2.getStructuringElement(cv2.MORPH_RECT, (kernel_size, kernel_size))
```

```

image_path = "./cropped_images/9/S09_F14_Cropped.png"

image = cv2.imread(image_path)
adfns.show_img(image, size=3, title="Original Image")

# Apply a binary threshold to create a binary image with black digits on a
↳white background
ret, binary_image = cv2.threshold(image, 127, 255, cv2.THRESH_BINARY)
adfns.show_img(binary_image, size=3, title="Binary Image")

# Apply dilation to thicken the digits in the binary image
dilated_image = cv2.dilate(binary_image, kernel, iterations=1)
# dilated_image = cv2.dilate(inverted_image, kernel, iterations=1)
adfns.show_img(dilated_image, size=3, title="Dilated Image")

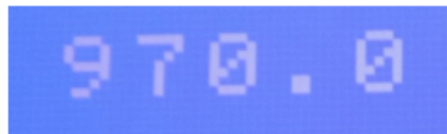
img = adfns.invert_thresh(dilated_image)
adfns.show_img(img, size=3, title="Inverted Image")

preprocess_image = adcrn.preprocess_image(img)
adfns.show_img(preprocess_image, size=3, title="Preprocessed Image")

inverted_image = cv2.bitwise_not(preprocess_image)
adfns.show_img(inverted_image, 3, title="Inverted image")

```

Original Image



Binary Image



Dilated Image



Inverted Image



Preprocessed Image



Inverted image



0.1.1 Analyse an individual digit

```
[ ]: image_path = "./cropped_images/9/S09_F14_Cropped.png"
digit_to_analyse = 0

# img = cv2.imread(image_path)
# # adfns.show_img(img, 3, title="Original image")

# img = adfns.invert_thresh(img)
# preprocess_image = adcrn.preprocess_image(img)
# # adfns.show_img(preprocess_image, 3, title="After preprocessing")
```

```

# inverted_image = cv2.bitwise_not(preprocess_image)
# adfns.show_img(inverted_image, 3, title="Inverted image")

# # Apply a binary threshold to create a binary image
# ret, binary_image = cv2.threshold(inverted_image, 127, 255, cv2.
    ↪ THRESH_BINARY_INV)
# ret, binary_image = cv2.threshold(binary_image, 127, 255, cv2.
    ↪ THRESH_BINARY_INV)
# adfns.show_img(binary_image, 3, title="Binary image")

# kernel_size = 3 # The size of the kernel to use for dilation
# kernel = cv2.getStructuringElement(cv2.MORPH_RECT, (kernel_size, kernel_size))

# # Apply dilation to thicken the digits in the binary image
# dilated_image = cv2.dilate(inverted_image, kernel, iterations=3)

# adfns.show_img(dilated_image, 3, title="Dilated image")

# Define the structuring element for dilation
kernel_size = 2
kernel = cv2.getStructuringElement(cv2.MORPH_RECT, (kernel_size, kernel_size))

image = cv2.imread(image_path)
ret, binary_image = cv2.threshold(image, 127, 255, cv2.THRESH_BINARY)
dilated_image = cv2.dilate(binary_image, kernel, iterations=1)
inverted_thresh = adfns.invert_thresh(dilated_image)
preprocess_image = adcrn.preprocess_image(inverted_thresh)
inverted_image = cv2.bitwise_not(preprocess_image)

# digit_images = adcrn.extract_digits_bow(inverted_image)
digit_images = adcrn.extract_digits_bow(inverted_image)
# adfns.show_img(digit_images[digit_to_analyse], size=.1, title=f"Digit_
    ↪ {digit_to_analyse+1}")

preprocessed_digit = adcrn.preprocess_digit(digit_images[digit_to_analyse])
prediction = crnn_model_bw_600k_el.predict(preprocessed_digit)

digit_prediction = np.argmax(prediction)
print("Predicted digit:", digit_prediction)

predicted_probabilities = prediction[0]
# print("predicted_probabilities:", predicted_probabilities)

sorted_indices = np.argsort(predicted_probabilities)[::-1]

```

```

print("sorted_indices:", sorted_indices)

n = 2 # The number of top predictions to show
top_n_indices = sorted_indices[:n]
top_n_probabilities = predicted_probabilities[top_n_indices]
print("top_n_indices:", top_n_indices)
print("top_n_probabilities:", top_n_probabilities)

threshold = 0.4 # The threshold for the difference between the top two
↪ predictions
close_matches = False
for i in range(n - 1):
    if abs(top_n_probabilities[i] - top_n_probabilities[i + 1]) < threshold:
        print("Close match found")
        close_matches = True
        break

# Create a bar chart for the predicted probabilities
digits = list(range(len(predicted_probabilities))) # Assuming your labels are
↪ digits from 0 to 9 or similar
plt.bar(digits, predicted_probabilities)
plt.xlabel("Digits")
plt.ylabel("Probability")
plt.title("Predicted Probabilities for Each Digit")
# plt.figure(figsize=(.4, .4))

# Display all digits on the x-axis
plt.xticks(digits)

bars = plt.bar(digits, predicted_probabilities)

# Set the threshold for displaying percentages
percentage_threshold = 0.05 # Change this value as needed

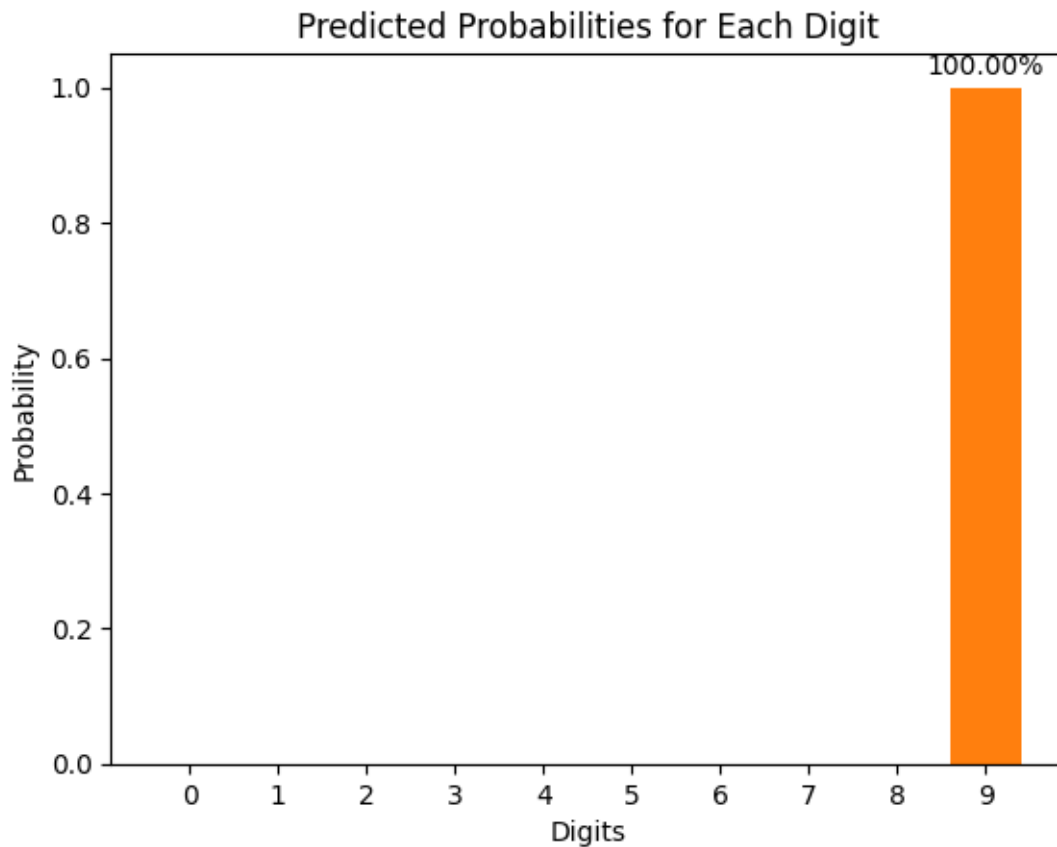
# Add probability percentage labels within each bar if above the threshold
for bar, probability in zip(bars, predicted_probabilities):
    if probability > percentage_threshold:
        plt.gca().annotate(f'{probability*100:.2f}%',
                           xy=(bar.get_x() + bar.get_width() / 2, probability),
                           xytext=(0, 3), # 3 points vertical offset
                           textcoords="offset points",
                           ha='center', va='bottom')

plt.show()

```

1/1 [=====] - 0s 15ms/step

Predicted digit: 9
sorted_indices: [9 1 0 8 3 4 5 7 6 2]
top_n_indices: [9 1]
top_n_probabilities: [1.0000000e+00 5.7097806e-21]



```
[ ]: def analyse_digits(image_path, model, digit_label):  
    """Analyse the digits in the image and return the predicted digits and  
    probabilities"""  
    img = cv2.imread(image_path)  
    img = adfns.invert_thresh(img)  
    preprocess_image = adcrn.preprocess_image(img)  
    inverted_image = cv2.bitwise_not(preprocess_image)  
    adfns.show_img(inverted_image, 3, title="Inverted image")  
  
    digit_images = adcrn.extract_digits_bow(inverted_image)  
    predicted_digits = []  
    predicted_probabilities = []  
    for digit_to_analyse, digit_image in enumerate(digit_images):  
        preprocessed_digit = adcrn.preprocess_digit(digit_image)
```



```

prediction = model.predict(preprocessed_digit, verbose=0)
digit_prediction = np.argmax(prediction)
predicted_digits.append(digit_prediction)
predicted_probabilities.append(prediction[0])
probability_list = prediction[0]

sorted_indices = np.argsort(probability_list)[::-1]
# print("sorted_indices:", sorted_indices)

n = 2 # The number of top predictions to show
top_n_indices = sorted_indices[:n]
top_n_probabilities = probability_list[top_n_indices]
adfs.show_img(digit_image, size=.1, title=f"Digit_{
↪{digit_to_analyse+1}")
    print("Top 2 Predictions:", top_n_indices)
    print("Top 2 Probability :", top_n_probabilities)

print("-----\n\n")
print("Predicted Digits Array:", predicted_digits)
predicted_number = int(''.join(map(str, predicted_digits)))
print("Predicted Number:", predicted_number)
print("Digit Label Value:", digit_label)
# print("digit_label_type:", type(digit_label))
# print("Predicted number type:", type(predicted_number))

digit_label_str = str(digit_label)
digit_label_no_decimal = digit_label_str.replace('.', '')
digit_label_int = int(digit_label_no_decimal)

# Convert both numbers to strings
digit_label_str = str(digit_label_int)
predicted_number_str = str(predicted_number)

if digit_label_int == predicted_number:
    print("The values are the same.")
else:
    print("The values are different.")
    for i, (label_digit, predicted_digit) in enumerate(zip(digit_label_str,
↪predicted_number_str)):
        if label_digit != predicted_digit:
            print(f"Digit {i + 1} is different: {label_digit} (label) vs_
↪{predicted_digit} (predicted)")


return predicted_digits, predicted_probabilities

```

```
[ ]: df = pd.read_csv('cropped_files_labelled.txt', header=None, names=['file_name',  
    ↪ 'label'], delimiter=',')  
  
for index, row in df.iterrows():  
    image_path = os.path.join("./cropped_images/9/",row['file_name'])  
    print(f"File Name: {image_path}")  
    predicted_digits, predicted_probabilities = analyse_digits(image_path,  
    ↪ crnn_model_bw_600k_el, row['label'])  
      
    ↪ print("*****\n\n\n")  
    # print(row['file_name'], row['label'])
```

File Name: ./cropped_images/9/S09_F01_Cropped.png

Inverted image



Digit 1
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.000000e+00 1.833014e-21]

Digit 2
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.000000e+00 1.4744253e-21]

Digit 3
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 1.4022761e-15]

Digit 4
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 1.0924853e-15]

Predicted Digits Array: [9, 9, 7, 7]
Predicted Number: 9977
Digit Label Value: 997.7
The values are the same.

File Name: ./cropped_images/9/S09_F02_Cropped.png

Inverted image



Digit 1
,

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 1.7769161e-10]

Digit 2
,

Top 2 Predictions: [9 0]
Top 2 Probability : [1.0000000e+00 2.2361933e-08]

Digit 3
7

Top 2 Predictions: [7 1]
Top 2 Probability : [0.9926346 0.00427026]

Digit 4
•

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 9.359582e-15]

Digit 5
7

Top 2 Predictions: [1 7]
Top 2 Probability : [0.47011596 0.4078335]

Predicted Digits Array: [9, 9, 7, 0, 1]
Predicted Number: 99701
Digit Label Value: 997.7
The values are different.
Digit 4 is different: 7 (label) vs 0 (predicted)

File Name: ./cropped_images/9/S09_F03_Cropped.png

Inverted image
1000.6

Digit 1
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.0000000e+00 1.0546083e-11]

Digit 2
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 7.500336e-19]

Digit 3
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 2.725451e-19]

Digit 4
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 2.5934312e-19]

Digit 5
6

Top 2 Predictions: [6 4]
Top 2 Probability : [1.0000000e+00 7.6381634e-23]

Predicted Digits Array: [1, 0, 0, 0, 6]

Predicted Number: 10006

Digit Label Value: 1000.6

The values are the same.

File Name: ./cropped_images/9/S09_F04_Cropped.png

Inverted image

999.3

Digit 1

9

Top 2 Predictions: [9 1]

Top 2 Probability : [1.000000e+00 7.196014e-20]

Digit 2

9

Top 2 Predictions: [9 1]

Top 2 Probability : [1.000000e+00 9.439881e-19]

Digit 3

9

Top 2 Predictions: [9 1]

Top 2 Probability : [1.000000e+00 3.268803e-18]

Digit 4
3

Top 2 Predictions: [3 8]
Top 2 Probability : [1.0000000e+00 4.5583253e-17]

Predicted Digits Array: [9, 9, 9, 3]
Predicted Number: 9993
Digit Label Value: 999.3
The values are the same.

File Name: ./cropped_images/9/S09_F05_Cropped.png

Inverted image

1 0 0 4 . 5

Digit 1
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.0000000e+00 2.5676163e-15]

Digit 2
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 8.040296e-21]

Digit 3
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.00000000e+00 1.05432384e-20]

Digit 4
4

Top 2 Predictions: [4 0]
Top 2 Probability : [1.00000000e+00 1.4341123e-15]

Digit 5
5

Top 2 Predictions: [5 3]
Top 2 Probability : [1.00000000e+00 2.7688911e-17]

Predicted Digits Array: [1, 0, 0, 4, 5]
Predicted Number: 10045
Digit Label Value: 1004.5
The values are the same.

File Name: ./cropped_images/9/S09_F06_Cropped.png

Inverted image
1004.5

Digit 1
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.00000e+00 6.81564e-15]

Digit 2
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.000000e+00 4.489695e-16]

Digit 3
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 1.0843309e-15]

Digit 4
4

Top 2 Predictions: [4 0]
Top 2 Probability : [1.000000e+00 7.909508e-15]

Digit 5
5

Top 2 Predictions: [5 3]
Top 2 Probability : [1.000000e+00 3.335669e-16]

Predicted Digits Array: [1, 0, 0, 4, 5]
Predicted Number: 10045
Digit Label Value: 1004.5

The values are the same.

File Name: ./cropped_images/9/S09_F07_Cropped.png

Inverted image

1 0 3 6 . 5

Digit 1

1

Top 2 Predictions: [1 6]

Top 2 Probability : [1.000000e+00 5.672907e-13]

Digit 2

0

Top 2 Predictions: [0 5]

Top 2 Probability : [1.000000e+00 2.999642e-20]

Digit 3

3

Top 2 Predictions: [3 8]

Top 2 Probability : [1.000000e+00 2.4822804e-19]

Digit 4

6

Top 2 Predictions: [6 4]
Top 2 Probability : [1.0000000e+00 2.8731258e-23]

Digit 5
5

Top 2 Predictions: [5 3]
Top 2 Probability : [1.0000000e+00 1.8327669e-16]

Predicted Digits Array: [1, 0, 3, 6, 5]
Predicted Number: 10365
Digit Label Value: 1036.5
The values are the same.

File Name: ./cropped_images/9/S09_F08_Cropped.png

Inverted image
1 0 0 0 . 6

Digit 1
1

Top 2 Predictions: [1 2]
Top 2 Probability : [1.0000000e+00 5.708876e-10]

Digit 2
0

Top 2 Predictions: [0 5]

Top 2 Probability : [1.000000e+00 4.693861e-18]

Digit 3
0

Top 2 Predictions: [0 5]

Top 2 Probability : [1.000000e+00 3.046230e-19]

Digit 4
0

Top 2 Predictions: [0 5]

Top 2 Probability : [1.000000e+00 3.431926e-19]

Digit 5
6

Top 2 Predictions: [6 4]

Top 2 Probability : [1.000000e+00 5.801107e-23]

Predicted Digits Array: [1, 0, 0, 0, 6]

Predicted Number: 10006

Digit Label Value: 1000.6

The values are the same.

File Name: ./cropped_images/9/S09_F09_Cropped.png

Inverted image

997.7

Digit 1
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 3.1396414e-21]

Digit 2
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 1.358476e-20]

Digit 3
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 1.5081805e-15]

Digit 4
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 1.3430419e-15]

Predicted Digits Array: [9, 9, 7, 7]

Predicted Number: 9977

Digit Label Value: 997.7

The values are the same.

File Name: ./cropped_images/9/S09_F10_Cropped.png

Inverted image

1 0 2 6 . 1

Digit 1
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.0000000e+00 1.7343348e-13]

Digit 2
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 6.379722e-19]

Digit 3
2

Top 2 Predictions: [2 0]
Top 2 Probability : [1.0000000e+00 1.5867977e-18]

Digit 4
6

Top 2 Predictions: [6 4]
Top 2 Probability : [1.0000000e+00 1.0348734e-22]

Digit 5
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.0000000e+00 3.1755487e-13]

Predicted Digits Array: [1, 0, 2, 6, 1]
Predicted Number: 10261
Digit Label Value: 1026.1
The values are the same.

File Name: ./cropped_images/9/S09_F11a_Cropped.png

Inverted image
970.0

Digit 1
9

Top 2 Predictions: [0 4]
Top 2 Probability : [9.9997890e-01 2.1143089e-05]

Digit 2
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 6.408419e-15]

Digit 3
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 2.1041851e-20]

Digit 4

■

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 7.103635e-13]

Digit 5

■

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 3.8312308e-21]

Predicted Digits Array: [0, 7, 0, 0, 0]

Predicted Number: 7000

Digit Label Value: 970.0

The values are different.

Digit 1 is different: 9 (label) vs 7 (predicted)

Digit 2 is different: 7 (label) vs 0 (predicted)

File Name: ./cropped_images/9/S09_F11b_Cropped.png

Inverted image

997.7

Digit 1

9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 1.0017112e-21]

Digit 2
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 1.4421944e-21]

Digit 3
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 3.9250016e-15]

Digit 4
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 2.725831e-15]

Predicted Digits Array: [9, 9, 7, 7]

Predicted Number: 9977

Digit Label Value: 997.7

The values are the same.

File Name: ./cropped_images/9/S09_F12_Cropped.png

Inverted image

1 0 0 1 . 0

Digit 1
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.0000000e+00 1.1246053e-14]

Digit 2
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 2.0342936e-21]

Digit 3
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 3.962177e-21]

Digit 4
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.0000000e+00 1.2602575e-14]

Digit 5
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 4.3487296e-21]

Predicted Digits Array: [1, 0, 0, 1, 0]
Predicted Number: 10010
Digit Label Value: 1001.0
The values are the same.

File Name: ./cropped_images/9/S09_F13_Cropped.png

Inverted image

972.8

Digit 1

9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 2.4086795e-21]

Digit 2

7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 1.6019871e-15]

Digit 3

2

Top 2 Predictions: [2 0]
Top 2 Probability : [1.000000e+00 8.914547e-20]

Digit 4
8

Top 2 Predictions: [8 0]
Top 2 Probability : [9.9996436e-01 3.2148349e-05]

Predicted Digits Array: [9, 7, 2, 8]

Predicted Number: 9728

Digit Label Value: 972.8

The values are the same.

File Name: ./cropped_images/9/S09_F14_Cropped.png

Inverted image

970.0

Digit 1
9

Top 2 Predictions: [0 4]
Top 2 Probability : [9.9999535e-01 4.6103996e-06]

Digit 2
1

Top 2 Predictions: [5 0]
Top 2 Probability : [0.96122414 0.03521982]

Digit 3

1

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 2.0802197e-11]

Digit 4

0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 1.2198122e-21]

Digit 5

■

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 4.4821234e-12]

Digit 6

0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 2.8170631e-21]

Predicted Digits Array: [0, 5, 0, 0, 0, 0]

Predicted Number: 50000

Digit Label Value: 970.0

The values are different.

Digit 1 is different: 9 (label) vs 5 (predicted)

Digit 2 is different: 7 (label) vs 0 (predicted)

File Name: ./cropped_images/9/S09_F15_Cropped.png

Inverted image

997.7

Digit 1
9

Top 2 Predictions: [9 1]

Top 2 Probability : [1.0000000e+00 1.5639294e-21]

Digit 2
9

Top 2 Predictions: [9 1]

Top 2 Probability : [1.0000000e+00 1.6003637e-21]

Digit 3
7

Top 2 Predictions: [7 9]

Top 2 Probability : [1.0000000e+00 1.2190484e-15]

Digit 4
7

Top 2 Predictions: [7 9]

Top 2 Probability : [1.0000000e+00 2.1565317e-15]

Predicted Digits Array: [9, 9, 7, 7]

Predicted Number: 9977

Digit Label Value: 997.7

The values are the same.

File Name: ./cropped_images/9/S09_F16_Cropped.png

Inverted image

970.0

Digit 1

9

Top 2 Predictions: [0 4]

Top 2 Probability : [9.999920e-01 7.982251e-06]

Digit 2

7

Top 2 Predictions: [7 9]

Top 2 Probability : [1.000000e+00 3.180394e-15]

Digit 3

0

Top 2 Predictions: [0 5]

Top 2 Probability : [1.000000e+00 7.678749e-21]

Digit 4
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 2.4091666e-21]

Predicted Digits Array: [0, 7, 0, 0]
Predicted Number: 700
Digit Label Value: 970.0
The values are different.
Digit 1 is different: 9 (label) vs 7 (predicted)
Digit 2 is different: 7 (label) vs 0 (predicted)

File Name: ./cropped_images/9/S09_F17_Cropped.png

Inverted image
997.7

Digit 1
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 1.628371e-21]

Digit 2
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 8.707866e-22]

Digit 3
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 1.5535108e-15]

Digit 4
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.0000000e+00 5.9851385e-16]

Predicted Digits Array: [9, 9, 7, 7]
Predicted Number: 9977
Digit Label Value: 997.7
The values are the same.

File Name: ./cropped_images/9/S09_F18_Cropped.png

Inverted image

970.0

Digit 1
9

Top 2 Predictions: [9 1]
Top 2 Probability : [1.0000000e+00 3.5181635e-21]

Digit 2
7

Top 2 Predictions: [7 9]
Top 2 Probability : [1.000000e+00 8.549575e-15]

Digit 3
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.000000e+00 7.082257e-21]

Digit 4
0

Top 2 Predictions: [0 3]
Top 2 Probability : [1.000000e+00 3.4402987e-21]

Predicted Digits Array: [9, 7, 0, 0]
Predicted Number: 9700
Digit Label Value: 970.0
The values are the same.

File Name: ./cropped_images/9/S09_F19_Cropped.png

Inverted image
1 0 3 4 . 0

Digit 1
1

Top 2 Predictions: [1 6]
Top 2 Probability : [1.0000000e+00 3.4719792e-14]

Digit 2
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.0000000e+00 1.5640683e-19]

Digit 3
3

Top 2 Predictions: [3 8]
Top 2 Probability : [1.0000000e+00 8.322504e-19]

Digit 4
4

Top 2 Predictions: [4 0]
Top 2 Probability : [1.0000000e+00 1.0292198e-15]

Digit 5
0

Top 2 Predictions: [0 5]
Top 2 Probability : [1.000000e+00 1.13907e-20]

Predicted Digits Array: [1, 0, 3, 4, 0]
Predicted Number: 10340
Digit Label Value: 1034.0

The values are the same.
