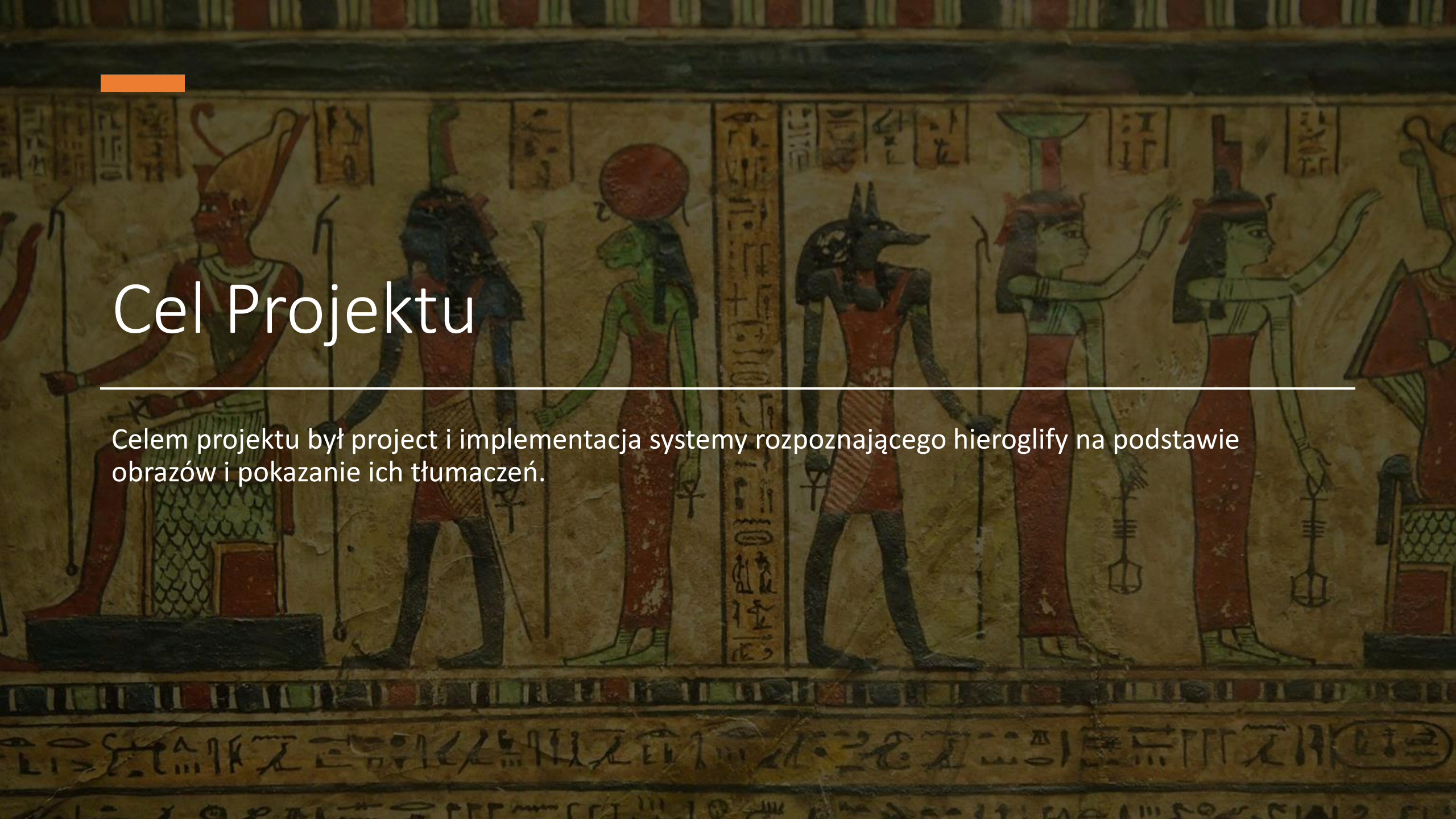


System do
odczytywania
hieroglifów przy
użyciu biblioteki
scikit-image


RS



The background is a photograph of an ancient Egyptian wall painting. It features a row of figures in traditional attire, including a man with a large headdress, a woman with a red sun disk, a man with a jackal head (Anubis), and two women with long dresses and headdresses. Hieroglyphs are visible in columns between the figures and in a register at the bottom. An orange horizontal bar is located in the top left corner.

Cel Projektu

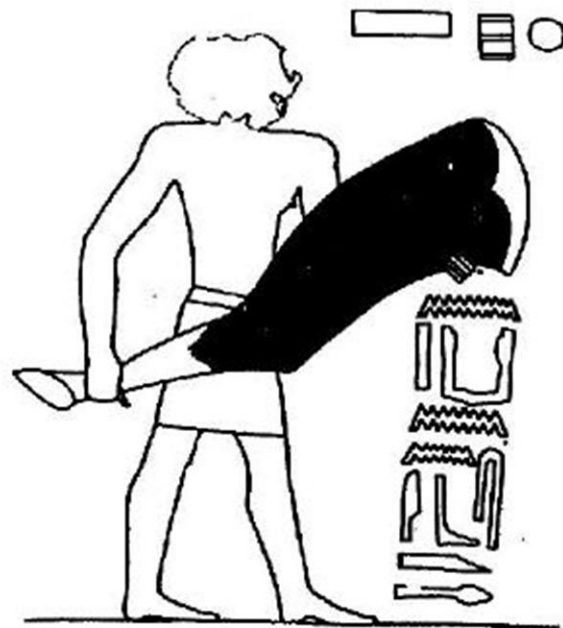
Celem projektu był project i implementacja systemu rozpoznającego hieroglify na podstawie obrazów i pokazanie ich tłumaczeń.

The background of the slide is a photograph of an ancient Egyptian wall. The left side is covered in columns of hieroglyphs. On the right, there is a relief of two standing figures, likely a man and a woman, wearing traditional Egyptian attire. The overall lighting is warm and slightly dim, highlighting the texture of the stone.

Jak trudno jest czytać hieroglify?

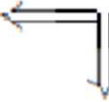
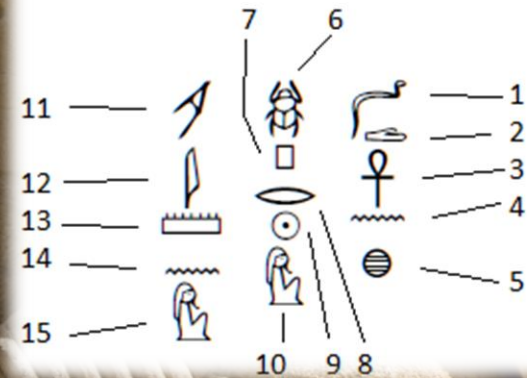
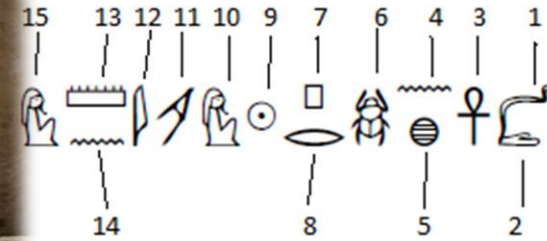
- Kolejność czytania
- Wizja artystyczna
- Konteksts: fonogramy lub ideogramy

Kolejność czytania





















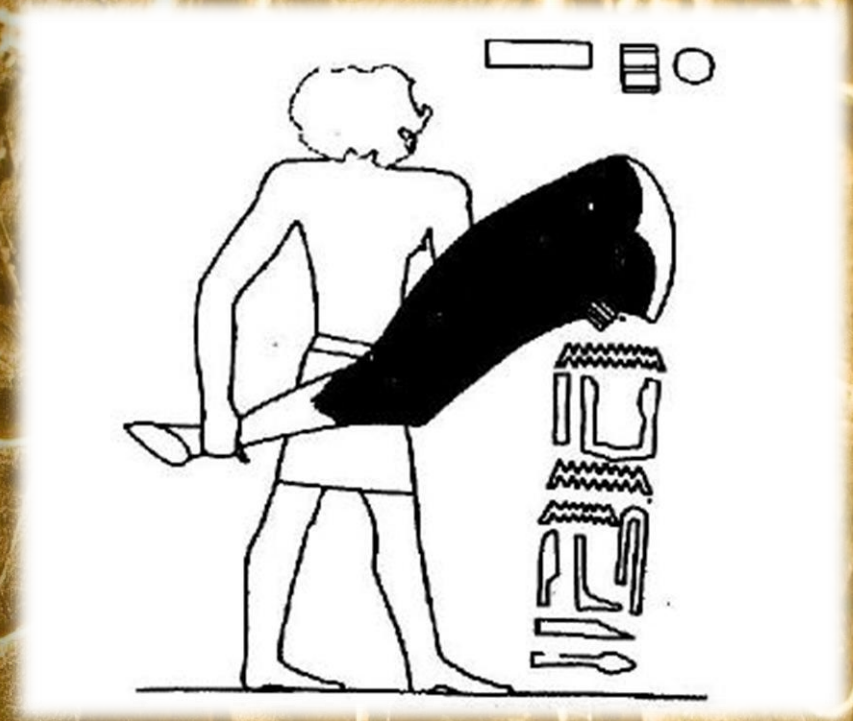
KOLEJNOŚĆ CZYTANIA ZNAKÓW

KIERUNEK CZYTANIA



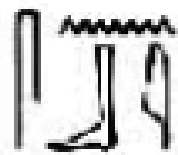
Kontekst i wizja artystyczna

y	¹  ² 	Like <i>y</i> in <i>yes</i>
r		Called <i>ayin</i> . A
w	¹  ² 	Called <i>waw</i> . Li
b		Like <i>b</i> in <i>bet</i>
p		Like <i>p</i> in <i>pet</i>
f		Like <i>f</i> in <i>fit</i>
m		Like <i>m</i> in <i>met</i>
n		Like <i>n</i> in <i>net</i>
r		Like <i>r</i> in <i>rain</i> ,
h		Like <i>h</i> in <i>home</i>
h		Emphatic <i>h</i> p
h		Like Scots <i>ch</i> i
h		Slightly softer
s	¹  ² 	Like <i>s</i> in <i>soap</i>
š		Like <i>sh</i> in <i>shin</i>



B39  foreleg of ox

Posążek
Senbi



snbi

Senbi (name)



Sposób działania programu

- Wczytanie obrazów i przygotowanie etykiet w formacie fonem_znaczenie.jpg
- Przetwarzanie obrazów: konwersja do skali szarości, progowanie, usuwanie szumów, skalowanie do stałego rozmiaru
- Budowa i trenowanie sieci neuronowej
- Próba odczytu znaczenia z dostarczonego obrazu

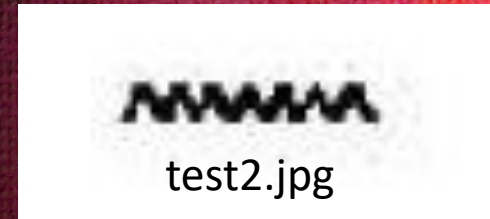
Uczenie sieci i wygląd próbki danych wejściowych



sny_hair.jpg

```
Epoch 3/10
1/1 [=====] - 1s 12ms/step - loss: 2.7702 - accuracy: 0.2353
Epoch 4/10
1/1 [=====] - 0s 22ms/step - loss: 2.7359 - accuracy: 0.5294
Epoch 5/10
1/1 [=====] - 0s 20ms/step - loss: 2.7005 - accuracy: 0.7059
Epoch 6/10
1/1 [=====] - 0s 13ms/step - loss: 2.6612 - accuracy: 0.7647
Epoch 7/10
1/1 [=====] - 0s 12ms/step - loss: 2.6176 - accuracy: 0.8235
Epoch 8/10
1/1 [=====] - 0s 13ms/step - loss: 2.5683 - accuracy: 0.8824
Epoch 9/10
1/1 [=====] - 0s 10ms/step - loss: 2.5111 - accuracy: 0.9412
Epoch 10/10
1/1 [=====] - 0s 11ms/step - loss: 2.4104 - accuracy: 0.9412
```


Obrazy kontrolne



```
def readHiero(imageName):
    test_image = io.imread(imageName)
    test_image = transform.resize(test_image, (32, 32))
    test_image_gray = rgb2gray(test_image)
    thresh = threshold_otsu(test_image_gray)
    test_image_binary = test_image_gray > thresh
    test_image_cleaned = remove_small_objects(test_image_binary, min_size=10, connectivity=1)
    test_image_apl = test_image_cleaned.reshape(-1, 32, 32, 1)

    prediction = model.predict(test_image_apl)

    predicted_class = np.argmax(prediction)
    predicted_hieroglyph = files[predicted_class]
    predicted_hieroglyph = predicted_hieroglyph[:predicted_hieroglyph.find('.jpg')]
    print("Predicted hieroglyph: ", predicted_hieroglyph)
```

```
print("should be b")
readHiero("test1.jpg")
print("should be n")
readHiero("test2.jpg")
print("should be s")
readHiero("test3.jpg")
print("should be y")
readHiero("test4.jpg")
print("should be s")
readHiero("test83.jpg")
print("should be y")
readHiero("test99.jpg")
print("should be b")
readHiero("test84.jpg")
print("should be s")
readHiero("test10.jpg")
```

```
should be b
1/1 [=====] - 0s 87ms/step
Predicted hieroglyph: b_x
should be n
1/1 [=====] - 0s 21ms/step
Predicted hieroglyph: n_x
should be s
1/1 [=====] - 0s 22ms/step
Predicted hieroglyph: s_x
should be y
1/1 [=====] - 0s 19ms/step
Predicted hieroglyph: y_x
should be s
1/1 [=====] - 0s 90ms/step
Predicted hieroglyph: s_x
should be y
1/1 [=====] - 0s 63ms/step
Predicted hieroglyph: y_x
should be b
1/1 [=====] - 0s 21ms/step
Predicted hieroglyph: b_x
should be s
1/1 [=====] - 0s 32ms/step
Predicted hieroglyph: s_x

Process finished with exit code 0
```

Wyniki odczytu hieroglifów

Bibliografia:

- *M. Collier, B. Manley (1998). "How to Read Egyptian Hieroglyphs: A Step-by-Step Guide to Teach Yourself." London: British Museum Press.*
- <https://www.egyptianhieroglyphs.net/gardiners-sign-list/>
- https://commons.wikimedia.org/wiki/Category:Gardiner%27s_list

Użyte biblioteki:

- scikit-image: przygotowanie obrazu do przetwarzania
- Tensorflow: tworzenie sieci neuronowej
- Numpy: obliczenia numeryczne
- Os: zarządzanie plikami