```python
import numpy as np
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import SimpleRNN, Dense

# Funkcja do generowania danych wejściowych i wyjściowych
def generate_data(num_samples, seq_length):
    X = np.random.choice([0, 0.5, 1], size=(num_samples, seq_length))
    y = np.sum(X == 0.5, axis=1)
    return X, y

# Parametry
num_samples = 30
seq_length = 20
input_dim = 1  # Każdy krok czasowy zawiera jedną wartość (0, 0.5, lub 1)
output_dim = 1  # Jeden wynik na koniec sekwencji

# Generowanie danych
X_train, y_train = generate_data(num_samples, seq_length)

# Konfiguracja modelu RNN
model = Sequential()
model.add(SimpleRNN(units=10, input_shape=(seq_length, input_dim)))
model.add(Dense(units=output_dim, activation='linear'))

# Kompilacja modelu
model.compile(optimizer='adam', loss='mean_squared_error',
metrics=['accuracy'])

# Trenowanie modelu
model.fit(X_train, y_train, epochs=100, batch_size=1, verbose=2)

# Testowanie modelu na nowych danych
X_test, y_test = generate_data(5, seq_length)
predictions = model.predict(X_test)

# Wyświetlenie wyników
for i in range(len(X_test)):
    print("Input:", X_test[i].flatten())
    print("True Output:", y_test[i])
    print("Predicted Output:", predictions[i][0])
    print("\n")
```

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WARNING:tensorflow:From c:\Python39\lib\site-packages\keras\src\
losses.py:2976: The name tf.losses.sparse_softmax_cross_entropy is
deprecated. Please use
tf.compat.v1.losses.sparse_softmax_cross_entropy instead.

WARNING:tensorflow:From c:\Python39\lib\site-packages\keras\src\
```

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backend.py:873: The name tf.get_default_graph is deprecated. Please
use tf.compat.v1.get_default_graph instead.

WARNING:tensorflow:From c:\Python39\lib\site-packages\keras\src\
optimizers\__init__.py:309: The name tf.train.Optimizer is deprecated.
Please use tf.compat.v1.train.Optimizer instead.

Epoch 1/100
WARNING:tensorflow:From c:\Python39\lib\site-packages\keras\src\utils\
tf_utils.py:492: The name tf.ragged.RaggedTensorValue is deprecated.
Please use tf.compat.v1.ragged.RaggedTensorValue instead.

WARNING:tensorflow:From c:\Python39\lib\site-packages\keras\src\
engine\base_layer_utils.py:384: The name
tf.executing_eagerly_outside_functions is deprecated. Please use
tf.compat.v1.executing_eagerly_outside_functions instead.

30/30 - 1s - loss: 30.7383 - accuracy: 0.0000e+00 - 997ms/epoch -
33ms/step
Epoch 2/100
30/30 - 0s - loss: 27.1312 - accuracy: 0.0000e+00 - 61ms/epoch -
2ms/step
Epoch 3/100
30/30 - 0s - loss: 22.3640 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 4/100
30/30 - 0s - loss: 17.0916 - accuracy: 0.0000e+00 - 63ms/epoch -
2ms/step
Epoch 5/100
30/30 - 0s - loss: 12.7592 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 6/100
30/30 - 0s - loss: 9.8766 - accuracy: 0.0000e+00 - 62ms/epoch -
2ms/step
Epoch 7/100
30/30 - 0s - loss: 7.9260 - accuracy: 0.0000e+00 - 63ms/epoch -
2ms/step
Epoch 8/100
30/30 - 0s - loss: 6.4931 - accuracy: 0.0000e+00 - 63ms/epoch -
2ms/step
Epoch 9/100
30/30 - 0s - loss: 5.5229 - accuracy: 0.0000e+00 - 64ms/epoch -
2ms/step
Epoch 10/100
30/30 - 0s - loss: 4.7586 - accuracy: 0.0000e+00 - 62ms/epoch -
2ms/step
Epoch 11/100
30/30 - 0s - loss: 4.3260 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 12/100
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30/30 - 0s - loss: 3.9059 - accuracy: 0.0000e+00 - 64ms/epoch -
2ms/step
Epoch 13/100
30/30 - 0s - loss: 3.6453 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 14/100
30/30 - 0s - loss: 3.4763 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 15/100
30/30 - 0s - loss: 3.3759 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 16/100
30/30 - 0s - loss: 3.2619 - accuracy: 0.0000e+00 - 63ms/epoch -
2ms/step
Epoch 17/100
30/30 - 0s - loss: 3.2230 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 18/100
30/30 - 0s - loss: 3.1729 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 19/100
30/30 - 0s - loss: 3.1441 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 20/100
30/30 - 0s - loss: 3.1506 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 21/100
30/30 - 0s - loss: 3.1125 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 22/100
30/30 - 0s - loss: 3.1089 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 23/100
30/30 - 0s - loss: 3.0990 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 24/100
30/30 - 0s - loss: 3.0872 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 25/100
30/30 - 0s - loss: 3.0858 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 26/100
30/30 - 0s - loss: 3.0744 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 27/100
30/30 - 0s - loss: 3.0677 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 28/100
30/30 - 0s - loss: 3.0719 - accuracy: 0.0000e+00 - 58ms/epoch -
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2ms/step
Epoch 29/100
30/30 - 0s - loss: 3.0593 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 30/100
30/30 - 0s - loss: 3.0663 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 31/100
30/30 - 0s - loss: 3.0508 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 32/100
30/30 - 0s - loss: 3.0527 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 33/100
30/30 - 0s - loss: 3.0750 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 34/100
30/30 - 0s - loss: 3.0427 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 35/100
30/30 - 0s - loss: 3.0524 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 36/100
30/30 - 0s - loss: 3.0396 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 37/100
30/30 - 0s - loss: 3.0257 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 38/100
30/30 - 0s - loss: 3.0187 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 39/100
30/30 - 0s - loss: 3.0158 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 40/100
30/30 - 0s - loss: 3.0325 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 41/100
30/30 - 0s - loss: 3.0111 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 42/100
30/30 - 0s - loss: 3.0248 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 43/100
30/30 - 0s - loss: 3.0226 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 44/100
30/30 - 0s - loss: 2.9924 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
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Epoch 45/100
30/30 - 0s - loss: 3.0071 - accuracy: 0.0000e+00 - 61ms/epoch -
2ms/step
Epoch 46/100
30/30 - 0s - loss: 2.9960 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 47/100
30/30 - 0s - loss: 2.9984 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 48/100
30/30 - 0s - loss: 2.9938 - accuracy: 0.0000e+00 - 66ms/epoch -
2ms/step
Epoch 49/100
30/30 - 0s - loss: 2.9816 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 50/100
30/30 - 0s - loss: 2.9883 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 51/100
30/30 - 0s - loss: 2.9920 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 52/100
30/30 - 0s - loss: 2.9734 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 53/100
30/30 - 0s - loss: 3.0118 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 54/100
30/30 - 0s - loss: 2.9805 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 55/100
30/30 - 0s - loss: 2.9813 - accuracy: 0.0000e+00 - 62ms/epoch -
2ms/step
Epoch 56/100
30/30 - 0s - loss: 2.9691 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 57/100
30/30 - 0s - loss: 2.9689 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 58/100
30/30 - 0s - loss: 2.9601 - accuracy: 0.0000e+00 - 70ms/epoch -
2ms/step
Epoch 59/100
30/30 - 0s - loss: 2.9569 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 60/100
30/30 - 0s - loss: 2.9462 - accuracy: 0.0000e+00 - 56ms/epoch -
2ms/step
Epoch 61/100
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30/30 - 0s - loss: 2.9499 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 62/100
30/30 - 0s - loss: 2.9360 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 63/100
30/30 - 0s - loss: 2.9294 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 64/100
30/30 - 0s - loss: 2.9404 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 65/100
30/30 - 0s - loss: 2.9669 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 66/100
30/30 - 0s - loss: 2.9260 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 67/100
30/30 - 0s - loss: 2.9413 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 68/100
30/30 - 0s - loss: 2.9370 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 69/100
30/30 - 0s - loss: 2.9445 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 70/100
30/30 - 0s - loss: 2.9136 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 71/100
30/30 - 0s - loss: 2.9009 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 72/100
30/30 - 0s - loss: 2.9221 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 73/100
30/30 - 0s - loss: 2.9200 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 74/100
30/30 - 0s - loss: 2.8921 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 75/100
30/30 - 0s - loss: 2.9201 - accuracy: 0.0000e+00 - 57ms/epoch -
2ms/step
Epoch 76/100
30/30 - 0s - loss: 2.8808 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 77/100
30/30 - 0s - loss: 2.9186 - accuracy: 0.0000e+00 - 59ms/epoch -
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2ms/step
Epoch 78/100
30/30 - 0s - loss: 2.8734 - accuracy: 0.0000e+00 - 56ms/epoch -
2ms/step
Epoch 79/100
30/30 - 0s - loss: 2.8781 - accuracy: 0.0000e+00 - 63ms/epoch -
2ms/step
Epoch 80/100
30/30 - 0s - loss: 2.9321 - accuracy: 0.0000e+00 - 62ms/epoch -
2ms/step
Epoch 81/100
30/30 - 0s - loss: 2.8841 - accuracy: 0.0000e+00 - 61ms/epoch -
2ms/step
Epoch 82/100
30/30 - 0s - loss: 2.8991 - accuracy: 0.0000e+00 - 61ms/epoch -
2ms/step
Epoch 83/100
30/30 - 0s - loss: 2.8750 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 84/100
30/30 - 0s - loss: 2.8725 - accuracy: 0.0000e+00 - 82ms/epoch -
3ms/step
Epoch 85/100
30/30 - 0s - loss: 2.8869 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 86/100
30/30 - 0s - loss: 2.8452 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 87/100
30/30 - 0s - loss: 2.8581 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 88/100
30/30 - 0s - loss: 2.8386 - accuracy: 0.0000e+00 - 63ms/epoch -
2ms/step
Epoch 89/100
30/30 - 0s - loss: 2.8502 - accuracy: 0.0000e+00 - 64ms/epoch -
2ms/step
Epoch 90/100
30/30 - 0s - loss: 2.8414 - accuracy: 0.0000e+00 - 62ms/epoch -
2ms/step
Epoch 91/100
30/30 - 0s - loss: 2.8295 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 92/100
30/30 - 0s - loss: 2.8238 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 93/100
30/30 - 0s - loss: 2.8229 - accuracy: 0.0000e+00 - 61ms/epoch -
2ms/step
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Epoch 94/100
30/30 - 0s - loss: 2.8619 - accuracy: 0.0000e+00 - 61ms/epoch -
2ms/step
Epoch 95/100
30/30 - 0s - loss: 2.8099 - accuracy: 0.0000e+00 - 61ms/epoch -
2ms/step
Epoch 96/100
30/30 - 0s - loss: 2.8493 - accuracy: 0.0000e+00 - 60ms/epoch -
2ms/step
Epoch 97/100
30/30 - 0s - loss: 2.8361 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
Epoch 98/100
30/30 - 0s - loss: 2.8147 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 99/100
30/30 - 0s - loss: 2.8547 - accuracy: 0.0000e+00 - 59ms/epoch -
2ms/step
Epoch 100/100
30/30 - 0s - loss: 2.7915 - accuracy: 0.0000e+00 - 58ms/epoch -
2ms/step
1/1 [==============================] - 0s 139ms/step
Input: [0.  0.  0.5 0.5 1.  1.  0.  1.  1.  0.  0.  0.  0.5 1.  1.
0.5 0.5 0.
 0.  1. ]
True Output: 5
Predicted Output: 5.7012615


Input: [0.5 0.  0.5 0.5 1.  0.5 0.  0.  0.  0.  0.  0.5 0.5 1.  1.  0.
1.  0.5
 1.  0.5]
True Output: 8
Predicted Output: 5.540389


Input: [0.5 0.5 0.  1.  1.  0.  0.  0.  0.5 0.5 1.  1.  0.5 1.  1.  1.
0.  1.
 0.5 0.5]
True Output: 7
Predicted Output: 5.8191285


Input: [0.5 0.5 1.  1.  0.5 0.5 1.  0.5 0.5 0.5 0.  0.5 1.  0.5 0.5 1.
1.  0.
 1.  0. ]
True Output: 10
Predicted Output: 5.956077
```

```
Input: [1.  1.  1.  0.5 0.  0.  0.5 1.  0.  0.5 0.5 1.  0.  0.  0.5 1.
0.5 0.
 0.5 0.5]
True Output: 8
Predicted Output: 5.8964515
```