```python
#Matematyka Konkretna
#Laboratorium 8
#Zboś Maciej https://github.com/Myriks123/MK
#Wariant 1

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

def generate_data_count(num_samples, seq_length):
    X = np.random.choice([0, 0.5, 1], size=(num_samples, seq_length,
1))
    y = np.sum(X == 0.5, axis=1)
    return X, y

num_samples = 30
seq_length = 20
input_dim = 1
output_dim = 1

X_train, y_train = generate_data_count(num_samples, seq_length)

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

model.compile(optimizer='adam', loss='mean_squared_error',
metrics=['mae'])

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

X_test, y_test = generate_data_count(3, seq_length)
predictions = model.predict(X_test)

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:\Users\macie\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\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:\Users\macie\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\keras\src\backend.py:873: The name
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tf.get_default_graph is deprecated. Please use
tf.compat.v1.get_default_graph instead.

WARNING:tensorflow:From C:\Users\macie\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\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:\Users\macie\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\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:\Users\macie\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\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: 55.3172 - mae: 7.1036 - 918ms/epoch - 31ms/step
Epoch 2/100
30/30 - 0s - loss: 49.5340 - mae: 6.6706 - 57ms/epoch - 2ms/step
Epoch 3/100
30/30 - 0s - loss: 44.3841 - mae: 6.2863 - 59ms/epoch - 2ms/step
Epoch 4/100
30/30 - 0s - loss: 39.0200 - mae: 5.8315 - 57ms/epoch - 2ms/step
Epoch 5/100
30/30 - 0s - loss: 32.9887 - mae: 5.2836 - 58ms/epoch - 2ms/step
Epoch 6/100
30/30 - 0s - loss: 27.3692 - mae: 4.7422 - 62ms/epoch - 2ms/step
Epoch 7/100
30/30 - 0s - loss: 22.9913 - mae: 4.2404 - 62ms/epoch - 2ms/step
Epoch 8/100
30/30 - 0s - loss: 19.5384 - mae: 3.8558 - 77ms/epoch - 3ms/step
Epoch 9/100
30/30 - 0s - loss: 16.8781 - mae: 3.5484 - 56ms/epoch - 2ms/step
Epoch 10/100
30/30 - 0s - loss: 14.6579 - mae: 3.2523 - 56ms/epoch - 2ms/step
Epoch 11/100
30/30 - 0s - loss: 12.8333 - mae: 3.0181 - 57ms/epoch - 2ms/step
Epoch 12/100
30/30 - 0s - loss: 11.2171 - mae: 2.8058 - 55ms/epoch - 2ms/step
Epoch 13/100
30/30 - 0s - loss: 9.9231 - mae: 2.5939 - 58ms/epoch - 2ms/step
Epoch 14/100
30/30 - 0s - loss: 8.8619 - mae: 2.4241 - 58ms/epoch - 2ms/step
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Epoch 15/100
30/30 - 0s - loss: 7.9888 - mae: 2.2747 - 57ms/epoch - 2ms/step
Epoch 16/100
30/30 - 0s - loss: 7.3398 - mae: 2.1664 - 60ms/epoch - 2ms/step
Epoch 17/100
30/30 - 0s - loss: 6.8244 - mae: 2.0326 - 55ms/epoch - 2ms/step
Epoch 18/100
30/30 - 0s - loss: 6.4019 - mae: 1.9506 - 54ms/epoch - 2ms/step
Epoch 19/100
30/30 - 0s - loss: 6.1169 - mae: 1.8961 - 55ms/epoch - 2ms/step
Epoch 20/100
30/30 - 0s - loss: 5.8759 - mae: 1.8668 - 55ms/epoch - 2ms/step
Epoch 21/100
30/30 - 0s - loss: 5.6740 - mae: 1.8415 - 53ms/epoch - 2ms/step
Epoch 22/100
30/30 - 0s - loss: 5.5563 - mae: 1.8224 - 54ms/epoch - 2ms/step
Epoch 23/100
30/30 - 0s - loss: 5.4092 - mae: 1.8049 - 55ms/epoch - 2ms/step
Epoch 24/100
30/30 - 0s - loss: 5.3260 - mae: 1.7861 - 56ms/epoch - 2ms/step
Epoch 25/100
30/30 - 0s - loss: 5.2572 - mae: 1.7780 - 53ms/epoch - 2ms/step
Epoch 26/100
30/30 - 0s - loss: 5.2023 - mae: 1.7656 - 54ms/epoch - 2ms/step
Epoch 27/100
30/30 - 0s - loss: 5.1585 - mae: 1.7569 - 83ms/epoch - 3ms/step
Epoch 28/100
30/30 - 0s - loss: 5.1245 - mae: 1.7460 - 66ms/epoch - 2ms/step
Epoch 29/100
30/30 - 0s - loss: 5.1026 - mae: 1.7374 - 54ms/epoch - 2ms/step
Epoch 30/100
30/30 - 0s - loss: 5.0806 - mae: 1.7293 - 55ms/epoch - 2ms/step
Epoch 31/100
30/30 - 0s - loss: 5.0795 - mae: 1.7235 - 55ms/epoch - 2ms/step
Epoch 32/100
30/30 - 0s - loss: 5.0653 - mae: 1.7205 - 52ms/epoch - 2ms/step
Epoch 33/100
30/30 - 0s - loss: 5.0647 - mae: 1.7172 - 53ms/epoch - 2ms/step
Epoch 34/100
30/30 - 0s - loss: 5.0416 - mae: 1.7075 - 54ms/epoch - 2ms/step
Epoch 35/100
30/30 - 0s - loss: 5.0397 - mae: 1.7055 - 55ms/epoch - 2ms/step
Epoch 36/100
30/30 - 0s - loss: 5.0267 - mae: 1.7017 - 54ms/epoch - 2ms/step
Epoch 37/100
30/30 - 0s - loss: 5.0335 - mae: 1.7029 - 54ms/epoch - 2ms/step
Epoch 38/100
30/30 - 0s - loss: 5.0187 - mae: 1.7042 - 54ms/epoch - 2ms/step
Epoch 39/100
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30/30 - 0s - loss: 5.0243 - mae: 1.7040 - 54ms/epoch - 2ms/step
Epoch 40/100
30/30 - 0s - loss: 5.0359 - mae: 1.7123 - 54ms/epoch - 2ms/step
Epoch 41/100
30/30 - 0s - loss: 5.0228 - mae: 1.7100 - 55ms/epoch - 2ms/step
Epoch 42/100
30/30 - 0s - loss: 5.0180 - mae: 1.7098 - 54ms/epoch - 2ms/step
Epoch 43/100
30/30 - 0s - loss: 5.0286 - mae: 1.7124 - 55ms/epoch - 2ms/step
Epoch 44/100
30/30 - 0s - loss: 5.0198 - mae: 1.7146 - 65ms/epoch - 2ms/step
Epoch 45/100
30/30 - 0s - loss: 5.0402 - mae: 1.7148 - 59ms/epoch - 2ms/step
Epoch 46/100
30/30 - 0s - loss: 5.0136 - mae: 1.7081 - 55ms/epoch - 2ms/step
Epoch 47/100
30/30 - 0s - loss: 5.0365 - mae: 1.7252 - 54ms/epoch - 2ms/step
Epoch 48/100
30/30 - 0s - loss: 5.0126 - mae: 1.7189 - 53ms/epoch - 2ms/step
Epoch 49/100
30/30 - 0s - loss: 5.0269 - mae: 1.7270 - 54ms/epoch - 2ms/step
Epoch 50/100
30/30 - 0s - loss: 5.0137 - mae: 1.7167 - 54ms/epoch - 2ms/step
Epoch 51/100
30/30 - 0s - loss: 5.0312 - mae: 1.7199 - 63ms/epoch - 2ms/step
Epoch 52/100
30/30 - 0s - loss: 5.0267 - mae: 1.7253 - 59ms/epoch - 2ms/step
Epoch 53/100
30/30 - 0s - loss: 5.0132 - mae: 1.7180 - 60ms/epoch - 2ms/step
Epoch 54/100
30/30 - 0s - loss: 5.0114 - mae: 1.7171 - 53ms/epoch - 2ms/step
Epoch 55/100
30/30 - 0s - loss: 5.0226 - mae: 1.7219 - 58ms/epoch - 2ms/step
Epoch 56/100
30/30 - 0s - loss: 5.0178 - mae: 1.7242 - 54ms/epoch - 2ms/step
Epoch 57/100
30/30 - 0s - loss: 5.0174 - mae: 1.7220 - 54ms/epoch - 2ms/step
Epoch 58/100
30/30 - 0s - loss: 5.0272 - mae: 1.7225 - 54ms/epoch - 2ms/step
Epoch 59/100
30/30 - 0s - loss: 5.0299 - mae: 1.7195 - 53ms/epoch - 2ms/step
Epoch 60/100
30/30 - 0s - loss: 5.0135 - mae: 1.7184 - 55ms/epoch - 2ms/step
Epoch 61/100
30/30 - 0s - loss: 5.0215 - mae: 1.7272 - 53ms/epoch - 2ms/step
Epoch 62/100
30/30 - 0s - loss: 5.0215 - mae: 1.7161 - 54ms/epoch - 2ms/step
Epoch 63/100
30/30 - 0s - loss: 5.0151 - mae: 1.7214 - 53ms/epoch - 2ms/step
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Epoch 64/100
30/30 - 0s - loss: 5.0219 - mae: 1.7278 - 54ms/epoch - 2ms/step
Epoch 65/100
30/30 - 0s - loss: 5.0366 - mae: 1.7195 - 59ms/epoch - 2ms/step
Epoch 66/100
30/30 - 0s - loss: 5.0040 - mae: 1.7102 - 64ms/epoch - 2ms/step
Epoch 67/100
30/30 - 0s - loss: 5.0161 - mae: 1.7216 - 58ms/epoch - 2ms/step
Epoch 68/100
30/30 - 0s - loss: 5.0195 - mae: 1.7120 - 56ms/epoch - 2ms/step
Epoch 69/100
30/30 - 0s - loss: 5.0340 - mae: 1.7258 - 55ms/epoch - 2ms/step
Epoch 70/100
30/30 - 0s - loss: 5.0072 - mae: 1.7197 - 61ms/epoch - 2ms/step
Epoch 71/100
30/30 - 0s - loss: 5.0051 - mae: 1.7164 - 54ms/epoch - 2ms/step
Epoch 72/100
30/30 - 0s - loss: 5.0044 - mae: 1.7168 - 53ms/epoch - 2ms/step
Epoch 73/100
30/30 - 0s - loss: 5.0102 - mae: 1.7128 - 55ms/epoch - 2ms/step
Epoch 74/100
30/30 - 0s - loss: 5.0021 - mae: 1.7150 - 53ms/epoch - 2ms/step
Epoch 75/100
30/30 - 0s - loss: 5.0089 - mae: 1.7123 - 52ms/epoch - 2ms/step
Epoch 76/100
30/30 - 0s - loss: 5.0144 - mae: 1.7148 - 53ms/epoch - 2ms/step
Epoch 77/100
30/30 - 0s - loss: 5.0088 - mae: 1.7134 - 53ms/epoch - 2ms/step
Epoch 78/100
30/30 - 0s - loss: 5.0032 - mae: 1.7119 - 53ms/epoch - 2ms/step
Epoch 79/100
30/30 - 0s - loss: 5.0238 - mae: 1.7242 - 53ms/epoch - 2ms/step
Epoch 80/100
30/30 - 0s - loss: 5.0023 - mae: 1.7135 - 55ms/epoch - 2ms/step
Epoch 81/100
30/30 - 0s - loss: 5.0095 - mae: 1.7212 - 58ms/epoch - 2ms/step
Epoch 82/100
30/30 - 0s - loss: 4.9954 - mae: 1.7136 - 57ms/epoch - 2ms/step
Epoch 83/100
30/30 - 0s - loss: 4.9981 - mae: 1.7167 - 55ms/epoch - 2ms/step
Epoch 84/100
30/30 - 0s - loss: 5.0062 - mae: 1.7144 - 54ms/epoch - 2ms/step
Epoch 85/100
30/30 - 0s - loss: 5.0096 - mae: 1.7193 - 53ms/epoch - 2ms/step
Epoch 86/100
30/30 - 0s - loss: 4.9962 - mae: 1.7115 - 54ms/epoch - 2ms/step
Epoch 87/100
30/30 - 0s - loss: 4.9960 - mae: 1.7108 - 53ms/epoch - 2ms/step
Epoch 88/100
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30/30 - 0s - loss: 4.9971 - mae: 1.7095 - 53ms/epoch - 2ms/step
Epoch 89/100
30/30 - 0s - loss: 4.9887 - mae: 1.7110 - 55ms/epoch - 2ms/step
Epoch 90/100
30/30 - 0s - loss: 5.0066 - mae: 1.7107 - 57ms/epoch - 2ms/step
Epoch 91/100
30/30 - 0s - loss: 5.0072 - mae: 1.7224 - 57ms/epoch - 2ms/step
Epoch 92/100
30/30 - 0s - loss: 4.9856 - mae: 1.7139 - 62ms/epoch - 2ms/step
Epoch 93/100
30/30 - 0s - loss: 5.0014 - mae: 1.7163 - 58ms/epoch - 2ms/step
Epoch 94/100
30/30 - 0s - loss: 5.0239 - mae: 1.7162 - 59ms/epoch - 2ms/step
Epoch 95/100
30/30 - 0s - loss: 5.0122 - mae: 1.7155 - 59ms/epoch - 2ms/step
Epoch 96/100
30/30 - 0s - loss: 5.0275 - mae: 1.7278 - 54ms/epoch - 2ms/step
Epoch 97/100
30/30 - 0s - loss: 4.9954 - mae: 1.7182 - 52ms/epoch - 2ms/step
Epoch 98/100
30/30 - 0s - loss: 5.0146 - mae: 1.7159 - 59ms/epoch - 2ms/step
Epoch 99/100
30/30 - 0s - loss: 5.0222 - mae: 1.7270 - 53ms/epoch - 2ms/step
Epoch 100/100
30/30 - 0s - loss: 4.9841 - mae: 1.7196 - 54ms/epoch - 2ms/step
1/1 [==============================] - 0s 147ms/step
Input: [0.  0.  0.  0.  0.  0.5 1.  0.  0.  0.5 0.  1.  0.5 0.5 0.5 0.
1.  1.
 1.  0. ]
True Output: [5]
Predicted Output: 7.0042553


Input: [1.  0.5 0.5 1.  0.  0.5 0.  0.5 0.  1.  1.  0.5 0.5 0.5 1.  1.
0.  0.5
 1.  1. ]
True Output: [8]
Predicted Output: 7.2036476


Input: [1.  0.5 0.5 1.  0.5 1.  1.  0.  0.  0.  1.  0.5 0.  1.  1.  1.
1.  1.
 1.  0.5]
True Output: [5]
Predicted Output: 7.132779
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