```python
#Matematyka Konkretna
#Laboratorium 8
#Biegun Daniel https://github.com/S1Daniel/MK
#Wariant 2

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([0.33, 0.66, 1], size=(num_samples,
seq_length, 1))
    y = np.sum(X == 0.33, 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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Epoch 1/100
30/30 - 1s - loss: 42.4298 - mae: 6.0452 - 766ms/epoch - 26ms/step
Epoch 2/100
30/30 - 0s - loss: 35.3685 - mae: 5.4364 - 58ms/epoch - 2ms/step
Epoch 3/100
30/30 - 0s - loss: 30.1997 - mae: 4.9414 - 58ms/epoch - 2ms/step
Epoch 4/100
30/30 - 0s - loss: 25.6152 - mae: 4.4521 - 57ms/epoch - 2ms/step
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Epoch 5/100
30/30 - 0s - loss: 21.4205 - mae: 3.9471 - 54ms/epoch - 2ms/step
Epoch 6/100
30/30 - 0s - loss: 17.8584 - mae: 3.4764 - 53ms/epoch - 2ms/step
Epoch 7/100
30/30 - 0s - loss: 15.0392 - mae: 3.1359 - 53ms/epoch - 2ms/step
Epoch 8/100
30/30 - 0s - loss: 12.8275 - mae: 2.9227 - 52ms/epoch - 2ms/step
Epoch 9/100
30/30 - 0s - loss: 11.2528 - mae: 2.7068 - 53ms/epoch - 2ms/step
Epoch 10/100
30/30 - 0s - loss: 10.0345 - mae: 2.5768 - 55ms/epoch - 2ms/step
Epoch 11/100
30/30 - 0s - loss: 9.0408 - mae: 2.4573 - 56ms/epoch - 2ms/step
Epoch 12/100
30/30 - 0s - loss: 8.3306 - mae: 2.3604 - 53ms/epoch - 2ms/step
Epoch 13/100
30/30 - 0s - loss: 7.7421 - mae: 2.2731 - 54ms/epoch - 2ms/step
Epoch 14/100
30/30 - 0s - loss: 7.2643 - mae: 2.1903 - 53ms/epoch - 2ms/step
Epoch 15/100
30/30 - 0s - loss: 6.9325 - mae: 2.1771 - 52ms/epoch - 2ms/step
Epoch 16/100
30/30 - 0s - loss: 6.6034 - mae: 2.1399 - 54ms/epoch - 2ms/step
Epoch 17/100
30/30 - 0s - loss: 6.4052 - mae: 2.1293 - 53ms/epoch - 2ms/step
Epoch 18/100
30/30 - 0s - loss: 6.2174 - mae: 2.1162 - 67ms/epoch - 2ms/step
Epoch 19/100
30/30 - 0s - loss: 6.0840 - mae: 2.1036 - 63ms/epoch - 2ms/step
Epoch 20/100
30/30 - 0s - loss: 5.9973 - mae: 2.0940 - 53ms/epoch - 2ms/step
Epoch 21/100
30/30 - 0s - loss: 5.8796 - mae: 2.0760 - 53ms/epoch - 2ms/step
Epoch 22/100
30/30 - 0s - loss: 5.8318 - mae: 2.0685 - 53ms/epoch - 2ms/step
Epoch 23/100
30/30 - 0s - loss: 5.7734 - mae: 2.0610 - 53ms/epoch - 2ms/step
Epoch 24/100
30/30 - 0s - loss: 5.7503 - mae: 2.0558 - 54ms/epoch - 2ms/step
Epoch 25/100
30/30 - 0s - loss: 5.7098 - mae: 2.0483 - 52ms/epoch - 2ms/step
Epoch 26/100
30/30 - 0s - loss: 5.7116 - mae: 2.0477 - 55ms/epoch - 2ms/step
Epoch 27/100
30/30 - 0s - loss: 5.6747 - mae: 2.0461 - 59ms/epoch - 2ms/step
Epoch 28/100
30/30 - 0s - loss: 5.6727 - mae: 2.0434 - 56ms/epoch - 2ms/step
Epoch 29/100
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30/30 - 0s - loss: 5.6458 - mae: 2.0409 - 75ms/epoch - 3ms/step
Epoch 30/100
30/30 - 0s - loss: 5.6564 - mae: 2.0409 - 65ms/epoch - 2ms/step
Epoch 31/100
30/30 - 0s - loss: 5.6494 - mae: 2.0460 - 61ms/epoch - 2ms/step
Epoch 32/100
30/30 - 0s - loss: 5.6614 - mae: 2.0501 - 57ms/epoch - 2ms/step
Epoch 33/100
30/30 - 0s - loss: 5.6293 - mae: 2.0405 - 56ms/epoch - 2ms/step
Epoch 34/100
30/30 - 0s - loss: 5.6342 - mae: 2.0421 - 54ms/epoch - 2ms/step
Epoch 35/100
30/30 - 0s - loss: 5.6165 - mae: 2.0383 - 53ms/epoch - 2ms/step
Epoch 36/100
30/30 - 0s - loss: 5.6157 - mae: 2.0388 - 57ms/epoch - 2ms/step
Epoch 37/100
30/30 - 0s - loss: 5.6181 - mae: 2.0387 - 54ms/epoch - 2ms/step
Epoch 38/100
30/30 - 0s - loss: 5.6177 - mae: 2.0400 - 53ms/epoch - 2ms/step
Epoch 39/100
30/30 - 0s - loss: 5.6153 - mae: 2.0384 - 52ms/epoch - 2ms/step
Epoch 40/100
30/30 - 0s - loss: 5.6175 - mae: 2.0396 - 71ms/epoch - 2ms/step
Epoch 41/100
30/30 - 0s - loss: 5.6140 - mae: 2.0398 - 53ms/epoch - 2ms/step
Epoch 42/100
30/30 - 0s - loss: 5.6030 - mae: 2.0372 - 56ms/epoch - 2ms/step
Epoch 43/100
30/30 - 0s - loss: 5.6072 - mae: 2.0381 - 52ms/epoch - 2ms/step
Epoch 44/100
30/30 - 0s - loss: 5.6175 - mae: 2.0396 - 54ms/epoch - 2ms/step
Epoch 45/100
30/30 - 0s - loss: 5.6018 - mae: 2.0366 - 52ms/epoch - 2ms/step
Epoch 46/100
30/30 - 0s - loss: 5.6226 - mae: 2.0405 - 52ms/epoch - 2ms/step
Epoch 47/100
30/30 - 0s - loss: 5.6185 - mae: 2.0395 - 54ms/epoch - 2ms/step
Epoch 48/100
30/30 - 0s - loss: 5.6008 - mae: 2.0373 - 54ms/epoch - 2ms/step
Epoch 49/100
30/30 - 0s - loss: 5.6070 - mae: 2.0397 - 55ms/epoch - 2ms/step
Epoch 50/100
30/30 - 0s - loss: 5.6060 - mae: 2.0356 - 57ms/epoch - 2ms/step
Epoch 51/100
30/30 - 0s - loss: 5.6076 - mae: 2.0396 - 53ms/epoch - 2ms/step
Epoch 52/100
30/30 - 0s - loss: 5.5933 - mae: 2.0358 - 54ms/epoch - 2ms/step
Epoch 53/100
30/30 - 0s - loss: 5.5931 - mae: 2.0363 - 55ms/epoch - 2ms/step
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Epoch 54/100
30/30 - 0s - loss: 5.6032 - mae: 2.0383 - 58ms/epoch - 2ms/step
Epoch 55/100
30/30 - 0s - loss: 5.6094 - mae: 2.0376 - 52ms/epoch - 2ms/step
Epoch 56/100
30/30 - 0s - loss: 5.5859 - mae: 2.0353 - 52ms/epoch - 2ms/step
Epoch 57/100
30/30 - 0s - loss: 5.5878 - mae: 2.0365 - 54ms/epoch - 2ms/step
Epoch 58/100
30/30 - 0s - loss: 5.5855 - mae: 2.0343 - 59ms/epoch - 2ms/step
Epoch 59/100
30/30 - 0s - loss: 5.5816 - mae: 2.0340 - 58ms/epoch - 2ms/step
Epoch 60/100
30/30 - 0s - loss: 5.5836 - mae: 2.0337 - 56ms/epoch - 2ms/step
Epoch 61/100
30/30 - 0s - loss: 5.5890 - mae: 2.0339 - 57ms/epoch - 2ms/step
Epoch 62/100
30/30 - 0s - loss: 5.5726 - mae: 2.0346 - 54ms/epoch - 2ms/step
Epoch 63/100
30/30 - 0s - loss: 5.5936 - mae: 2.0388 - 55ms/epoch - 2ms/step
Epoch 64/100
30/30 - 0s - loss: 5.5862 - mae: 2.0335 - 56ms/epoch - 2ms/step
Epoch 65/100
30/30 - 0s - loss: 5.5969 - mae: 2.0382 - 52ms/epoch - 2ms/step
Epoch 66/100
30/30 - 0s - loss: 5.5801 - mae: 2.0355 - 55ms/epoch - 2ms/step
Epoch 67/100
30/30 - 0s - loss: 5.5627 - mae: 2.0315 - 55ms/epoch - 2ms/step
Epoch 68/100
30/30 - 0s - loss: 5.5682 - mae: 2.0308 - 55ms/epoch - 2ms/step
Epoch 69/100
30/30 - 0s - loss: 5.5783 - mae: 2.0362 - 54ms/epoch - 2ms/step
Epoch 70/100
30/30 - 0s - loss: 5.5464 - mae: 2.0267 - 55ms/epoch - 2ms/step
Epoch 71/100
30/30 - 0s - loss: 5.5495 - mae: 2.0296 - 53ms/epoch - 2ms/step
Epoch 72/100
30/30 - 0s - loss: 5.5470 - mae: 2.0289 - 53ms/epoch - 2ms/step
Epoch 73/100
30/30 - 0s - loss: 5.5712 - mae: 2.0363 - 51ms/epoch - 2ms/step
Epoch 74/100
30/30 - 0s - loss: 5.5672 - mae: 2.0354 - 52ms/epoch - 2ms/step
Epoch 75/100
30/30 - 0s - loss: 5.5225 - mae: 2.0252 - 54ms/epoch - 2ms/step
Epoch 76/100
30/30 - 0s - loss: 5.5297 - mae: 2.0254 - 54ms/epoch - 2ms/step
Epoch 77/100
30/30 - 0s - loss: 5.5301 - mae: 2.0235 - 54ms/epoch - 2ms/step
Epoch 78/100
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30/30 - 0s - loss: 5.5167 - mae: 2.0233 - 54ms/epoch - 2ms/step
Epoch 79/100
30/30 - 0s - loss: 5.5254 - mae: 2.0257 - 53ms/epoch - 2ms/step
Epoch 80/100
30/30 - 0s - loss: 5.5094 - mae: 2.0213 - 53ms/epoch - 2ms/step
Epoch 81/100
30/30 - 0s - loss: 5.5015 - mae: 2.0219 - 56ms/epoch - 2ms/step
Epoch 82/100
30/30 - 0s - loss: 5.4997 - mae: 2.0217 - 51ms/epoch - 2ms/step
Epoch 83/100
30/30 - 0s - loss: 5.4801 - mae: 2.0178 - 52ms/epoch - 2ms/step
Epoch 84/100
30/30 - 0s - loss: 5.4785 - mae: 2.0165 - 53ms/epoch - 2ms/step
Epoch 85/100
30/30 - 0s - loss: 5.4876 - mae: 2.0177 - 52ms/epoch - 2ms/step
Epoch 86/100
30/30 - 0s - loss: 5.4787 - mae: 2.0174 - 61ms/epoch - 2ms/step
Epoch 87/100
30/30 - 0s - loss: 5.4831 - mae: 2.0158 - 66ms/epoch - 2ms/step
Epoch 88/100
30/30 - 0s - loss: 5.4672 - mae: 2.0183 - 59ms/epoch - 2ms/step
Epoch 89/100
30/30 - 0s - loss: 5.4738 - mae: 2.0147 - 59ms/epoch - 2ms/step
Epoch 90/100
30/30 - 0s - loss: 5.4592 - mae: 2.0145 - 62ms/epoch - 2ms/step
Epoch 91/100
30/30 - 0s - loss: 5.4360 - mae: 2.0092 - 61ms/epoch - 2ms/step
Epoch 92/100
30/30 - 0s - loss: 5.4405 - mae: 2.0113 - 59ms/epoch - 2ms/step
Epoch 93/100
30/30 - 0s - loss: 5.4705 - mae: 2.0212 - 54ms/epoch - 2ms/step
Epoch 94/100
30/30 - 0s - loss: 5.4363 - mae: 2.0098 - 54ms/epoch - 2ms/step
Epoch 95/100
30/30 - 0s - loss: 5.4946 - mae: 2.0223 - 53ms/epoch - 2ms/step
Epoch 96/100
30/30 - 0s - loss: 5.4446 - mae: 2.0098 - 53ms/epoch - 2ms/step
Epoch 97/100
30/30 - 0s - loss: 5.4163 - mae: 2.0077 - 56ms/epoch - 2ms/step
Epoch 98/100
30/30 - 0s - loss: 5.4095 - mae: 2.0067 - 55ms/epoch - 2ms/step
Epoch 99/100
30/30 - 0s - loss: 5.4019 - mae: 2.0034 - 54ms/epoch - 2ms/step
Epoch 100/100
30/30 - 0s - loss: 5.4060 - mae: 2.0054 - 52ms/epoch - 2ms/step
1/1 [==============================] - 0s 142ms/step
Input: [1.   0.33 1.   0.33 1.   0.33 0.33 0.66 1.   1.   1.   0.66
0.66 0.33
 0.33 1.   1.   1.   0.33 0.33]
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True Output: [8]
Predicted Output: 6.3318286


Input: [0.66 0.66 0.33 1.   0.66 0.33 0.33 0.33 0.66 1.   0.33 0.33 1.
0.66
 0.33 0.33 0.33 0.66 0.66 1.  ]
True Output: [9]
Predicted Output: 6.1024475


Input: [0.66 0.66 1.   0.33 1.   1.   1.   0.66 0.66 1.   0.66 1.
0.66 1.
 0.66 0.33 1.   1.   0.33 1.  ]
True Output: [3]
Predicted Output: 6.111462
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