

LAB 7

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from pandas import read_csv
import numpy as np
from keras.models import Sequential
from keras.layers import Dense, SimpleRNN
from sklearn.preprocessing import MinMaxScaler
from sklearn.metrics import mean_squared_error
import math
import matplotlib.pyplot as plt

def create_RNN(hidden_units, dense_units, input_shape, activation):
    model = Sequential()
    model.add(SimpleRNN(hidden_units, input_shape=input_shape,
                        activation=activation[0]))
    model.add(Dense(units=dense_units, activation=activation[1]))
    model.compile(loss='mean_squared_error', optimizer='adam')
    return model

demo_model = create_RNN(2, 1, (3,1), activation=['linear', 'linear'])

wx = demo_model.get_weights()[0]
print(wx)

[[1.3971518 1.2749761]]

wx = demo_model.get_weights()[0]
wh = demo_model.get_weights()[1]
bh = demo_model.get_weights()[2]
wy = demo_model.get_weights()[3]
by = demo_model.get_weights()[4]

print('wx = ', wx, ' wh = ', wh, ' bh = ', bh, ' wy =', wy, ' by = ', by)

wx = [[1.3971518 1.2749761]] wh = [[ 0.8238168  0.5668561 ]
[-0.5668561  0.82381684]] bh = [0. 0.] wy = [[0.18545425]
[1.3760282 ]] by = [0.]

x = np.array([1, 2, 3])
print(x)
# Reshape the input to the required sample_size x time_steps x features
x_input = np.reshape(x,(1, 3, 1))
y_pred_model = demo_model.predict(x_input)

m = 2 # Hidden Layers so accordingly weights are required
h0 = np.zeros(m) # Initialization
h1 = np.dot(x[0], wx) + h0 + bh # input layer
h2 = np.dot(x[1], wx) + np.dot(h1,wh) + bh # First Hidden Layer
h3 = np.dot(x[2], wx) + np.dot(h2,wh) + bh # Second Hidden Layer

o3 = np.dot(h3, wy) + by # Dense output layer Layer

print( 'ho=',h0,'h1 = ', h1,'h2 = ', h2,'h3 = ', h3)

print("Prediction from network ", y_pred_model)
print("Prediction from our computation ", o3)

[1 2 3]
1/1 [=====] - 1s 816ms/step
ho= [0. 0.] h1 = [[1.39715183 1.27497613]] h2 = [[3.22257279 4.39228309]] h3 = [[4.35647261 9.27010016]]
Prediction from network [[13.563846]]
Prediction from our computation [[13.56384541]]
```