	SR UNIVERSITY
sru	**Campus Warangal**
	Program: II - B.Tech (CS& AI)
	Professor(a): Dr. Venkataramana Veeramsetty, Professor
	Department: Computer Science and AI **Semester:** II
	Generative AI - Assignment - 4

Instructions:

1. (1 ponto) Design a simple ANN architecture with one input and one output layer (**no hidden layer**). Assume a linear activation function in the output layer.

   - Write Python code for a backpropagation algorithm with gradient descent optimization to update weights and bias parameters of the ANN model with training data shown in Table 1.

   - Calculate the mean square error with training and testing data shown in Table 2.

   - Write Python code that reads the input data [x1, x2, and x3] from the user. Predict the output with deployed ANN model

Tabela 1: Training Data

x1	x2	x3	y
0.1	0.2	0.3	0.14
0.2	0.3	0.4	0.20
0.3	0.4	0.5	0.26
0.5	0.6	0.7	0.38
0.1	0.3	0.5	0.22
0.2	0.4	0.6	0.28
0.3	0.5	0.7	0.34
0.4	0.6	0.8	0.40
0.5	0.7	0.1	0.22

Tabela 2: Test Data

x1	x2	x3	y
0.6	0.7	0.8	0.44
0.7	0.8	0.9	0.50

2. (1 ponto) Design a simple ANN architecture with one input and one output layer (**no hidden layer**). Assume a sigmoid activation function shown in the equation 1 in the output layer.

$$f(x) = \frac{1}{1 + e^{-x}} \tag{1}$$

   - Write Python code for a backpropagation algorithm with gradient descent optimization to update weights and bias parameters of the ANN model with training data shown in Table 3.

Tabela 3: Training Data

x1	x2	x3	y
0.1	0.2	0.3	0.5349
0.2	0.3	0.4	0.5498
0.3	0.4	0.5	0.5646
0.5	0.6	0.7	0.5939
0.1	0.3	0.5	0.5548
0.2	0.4	0.6	0.5695
0.3	0.5	0.7	0.5842
0.4	0.6	0.8	0.5987
0.5	0.7	0.1	0.5548

Tabela 4: Test Data

x1	x2	x3	y
0.6	0.7	0.8	0.6083
0.7	0.8	0.9	0.6225

- Calculate the mean square error with training and testing data shown in Table 4.

- Write Python code that reads the input data [x1, x2, and x3] from the user. Predict the output with deployed ANN model

- **Expected learning Outcomes from this assignment related to python**
  - Students are able to understand how backpropagation algorithm helps to update model parameters of ANN
  - Students are able to write code in python for backpropagation algorithm
  - Students are able to design architecture of ANN based on problem statement
  - Students are able to derive mathematical expression for change in weights and bias parameters for different activation functions

- Naming cinvention
  - Report File Name: RollNo_Week No._Assignment No.

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