Generative - Coding Assignment

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Assignment Overview

This coding assignment assignment for Generative contains 3 problems focused on Algorithm using Python. The difficulty level is set to 3.

Problems

Problem 1

Implement a function that performs linear interpolation in a Z-space represented as a list of lists. Given two points in Z-space and a scalar value, the function should compute the interpolated point.

Test Cases:

Input: [[[1, 2, 3], [4, 5, 6]], [[7, 8, 9], [10, 11, 12]], 0.5]
Expected Output: [[4.0, 5.0, 6.0], [7.0, 8.0, 9.0]]
Input: [[[10, 20], [30, 40]], [[50, 60], [70, 80]], 0.2]
Expected Output: [[18.0, 28.0], [36.0, 48.0]]
Input: [[[1, 2], [3, 4]], [[5, 6], [7, 8]], 0]
Expected Output: [[1, 2], [3, 4]]

Input: [[[1, 2], [3, 4]], [[5, 6], [7, 8]], 1]
Expected Output: [[5, 6], [7, 8]]

Problem 2

Implement a simple 2D convolution operation on a grayscale image represented as a list of lists.

Test Cases:

Input: {'image': [[50, 50, 50], [50, 50, 50], [50, 50, 50]], 'filter': [[1, 0, -1], [1, 0, -1], [1, 0, -1]]}
Expected Output: [[0, 0], [0, 0]]
Input: {'image': [[1, 2, 3], [4, 5, 6], [7, 8, 9]], 'filter': [[0, 1], [1, 0]]}
Expected Output: [[6, 10], [14, 18]]

Problem 3

Implement a simple activation function in Python. Specifically, implement the ReLU (Rectified Linear Unit) activation function.

Test Cases:

Input: 5.0
Expected Output: 5.0
Input: -2.0
Expected Output: 0.0
Input: 0.0
Expected Output: 0.0
Input: 100.5
Expected Output: 100.5
Input: -0.001
Expected Output: 0.0

Instructions

• Programming Language: Python
• Submit your code along with any required documentation.
• Make sure to test your code thoroughly before submission.
• Your code must pass all provided test cases.
• Include proper documentation and comments in your code.