Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Algorithm Analysis and Design

Practical 1

(1) There are 2 chefs, namely chef 1 and chef 2 in the MasterChef competition. The judge is going to judge on the basis of 3 categories: presentation, taste and hygiene to prepare the dishes. The marking is scaling from 1 to 100. The rating for chef 1 challenge is the triplet a = (a[0], a[1], a[2]), and the rating for Chef 2 challenge is the triplet b = (b[0], b[1], b[2]), where 0 index is presentation, 1 index is taste and 2 index is hygiene.

The task is to find their comparison points by comparing a[0] with b[0], a[1] with b[1], and a[2] with b[2].

- If a[i] > b[i], then Chef 1 is awarded 1 point.
- If a[i] < b[i], then Chef 2 is awarded 1 point.
- If a[i] = b[i], then neither person receives a point.

Comparison points are the total points a person earned.

Given a and b, determine their respective comparison points.

Design the algorithm for the same and implement using the programming language of your choice.

Make comparative analysis for various use cases & input size.

Sample Input 1

27 48 70

89 26 7

Sample Output 1

2 1

Explanation 1

Comparing the 0th elements, 27<89 so Chef 2 receives a point.

Comparing the 1st and 2nd elements, 48>26 and 70>7 so Chef 1 receives two points.

The return array is [2,1].

Code:

App.py:

```
from flask import Flask, render_template, request

app = Flask(__name__)

def compare_chefs(chef1_scores, chef2_scores):

    points_for_chef1 = 0
```

```python
    points_for_chef2 = 0
    for i in range(3):
        if chef1_scores[i] > chef2_scores[i]:
            points_for_chef1 += 1
        elif chef1_scores[i] < chef2_scores[i]:
            points_for_chef2 += 1
    return [points_for_chef1, points_for_chef2]


@app.route('/')
def index():
    return render_template('index.html')


# Route for Task 1 page
@app.route('/task1')
def task1():
    return render_template('task1.html')


# Route for Task 2 page
@app.route('/task2')
def task2():
    return render_template('task2.html')



@app.route('/compare', methods=['POST'])
def compare():
    chef1_scores = [
        int(request.form['chef1_presentation']),
        int(request.form['chef1_taste']),
        int(request.form['chef1_hygiene'])
    ]
    chef2_scores = [
```

```python
        int(request.form['chef2_presentation']),
        int(request.form['chef2_taste']),
        int(request.form['chef2_hygiene'])
    ]
    result = compare_chefs(chef1_scores, chef2_scores)
    return render_template('result.html', result=result)


# Task 2

def find_closest_to_zero_pair(arr):
    arr.sort()
    left=0
    right = len(arr) - 1
    min_sum = float('inf')
    closest_pair = None

    while left < right:
        current_sum = arr[left] + arr[right]

        if abs(current_sum) < abs(min_sum):
            min_sum = current_sum
            closest_pair = (arr[left], arr[right])

        if current_sum < 0:
            left += 1
        else:
            right -= 1
            return closest_pair\


@app.route('/find_pair', methods=['POST'])
def find_pair():
```

```python
        input_array = request.form['input_array']
        arr = list(map(int, input_array.split(',')))
        closest_pair = find_closest_to_zero_pair(arr)
        return render_template('result1.html', input_array=input_array,
closest_pair=closest_pair)
```

```python
if __name__ == '__main__':
        app.run(debug=True)
```

Index.html:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>AAD Practical</title>
    <link rel="stylesheet" href="../static/style.css">
</head>
<body>

 <div class="all">
   <h1>Practical - 1 </h1>

   <div class="btn">
     <a href="{{ url_for('task1')}}">
   <button>
    <span class="button_top"> Task_1
    </span>
   </button></a>
```

```html
  <a href="{{ url_for('task2')}}">
   <button>
     <span class="button_top"> Task_2
     </span>
   </button></a>
  </div>
</div>
</body>
</html>
```

Task1.html:

```html
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>Chef Comparison</title>
   <link rel="stylesheet" href="../static/task1.css">
</head>
<body>
   <div class="container">
     <h1>Chef Comparison</h1>
     <form action="/compare" method="post">
       <div class="chef-scores" id="chef1">
         <h2>Enter the scores for Chef 1</h2>
         <label for="chef1-presentation">Presentation:</label>
         <input type="number" name="chef1_presentation" min="0" max="100" required>
         <label for="chef1-taste">Taste:</label>
```

```
        <input type="number" name="chef1_taste" min="0" max="100"
required>
        <label for="chef1-hygiene">Hygiene:</label>
        <input type="number" name="chef1_hygiene" min="0" max="100"
required>
      </div>

      <div class="chef-scores" id="chef2">
        <h2>Enter the scores for Chef 2</h2>
        <label for="chef2-presentation">Presentation:</label>
        <input type="number" name="chef2_presentation" min="0" max="100"
required>
        <label for="chef2-taste">Taste:</label>
        <input type="number" name="chef2_taste" min="0" max="100"
required>
        <label for="chef2-hygiene">Hygiene:</label>
        <input type="number" name="chef2_hygiene" min="0" max="100"
required>
      </div>
      <button type="submit">Compare</button>
    </form>
  </div>
</body>
</html>
```

Result.html:
```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
```

```
<title>Comparison Results</title>

<link rel="stylesheet" href="../static/task1.css">

</head>

<body>

    <div class="container">

        <h1>Comparison Results</h1>

<p>Chef 1: {{ result[0] }} points</p>

<p>Chef 2: {{ result[1] }} points</p>

<a href="/"><button type="submit">Back to home</button> </a>

</div>

</body>

</html>
```
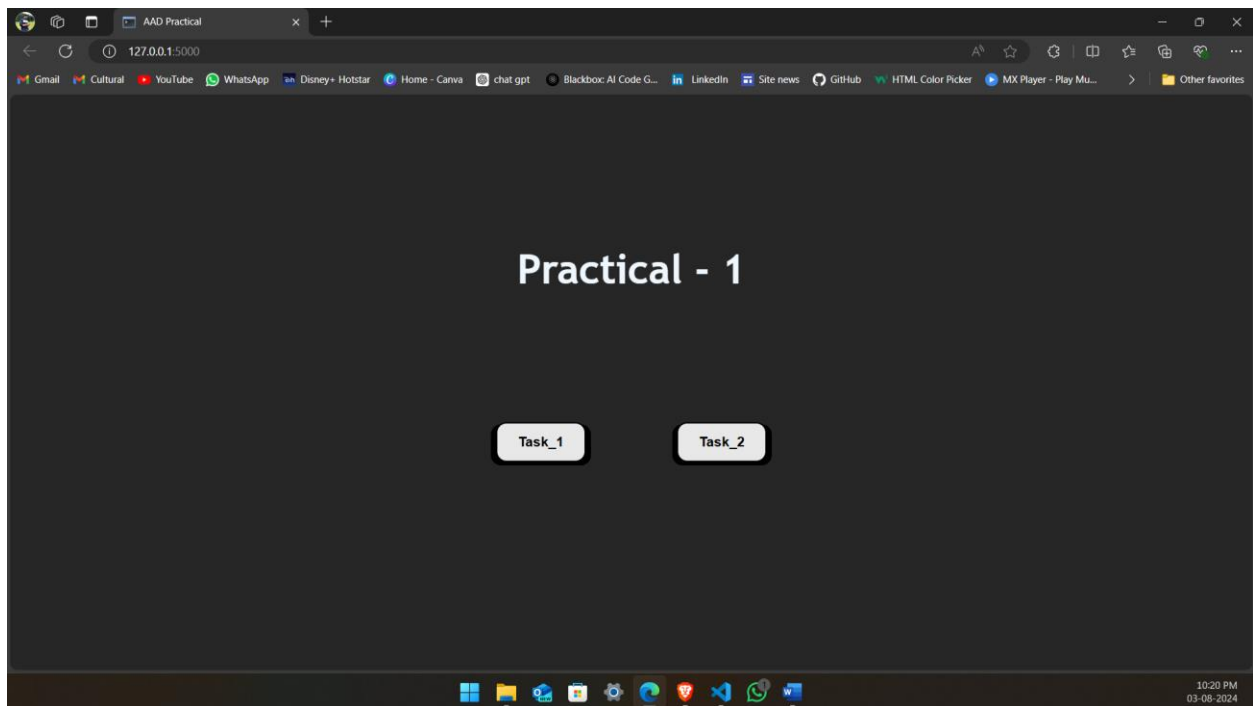
Chef Comparison

Enter the scores for Chef 1

Presentation:

27

Taste:

48

Hygiene:

70

Enter the scores for Chef 2

Presentation:

89

Taste:

26

Hygiene:

7

Compare

Comparison Results

Chef 1: 2 points

Chef 2: 1 points

Back to home

(2) Let us suppose that you are having an array containing both positive and negative numbers. Given the numbers you are supposed to find 2 such elements such that the sum of those numbers is closest to zero.

Code:

App.py:
Here I have combined both the python code into one for website here is the second one , entire code is available in first screen shot of App.py

 # Task 2

```python
def find_closest_to_zero_pair(arr):

    arr.sort()

    left=0

    right = len(arr) - 1

    min_sum = float('inf')

    closest_pair = None


    while left < right:

        current_sum = arr[left] + arr[right]


        if abs(current_sum) < abs(min_sum):

            min_sum = current_sum

            closest_pair = (arr[left], arr[right])


        if current_sum < 0:
```

```python
            left += 1

        else:

            right -= 1

        return closest_pair\


@app.route('/find_pair', methods=['POST'])

def find_pair():

    input_array = request.form['input_array']

    arr = list(map(int, input_array.split(',')))

    closest_pair = find_closest_to_zero_pair(arr)

    return render_template('result1.html', input_array=input_array,

closest_pair=closest_pair)




if __name__ == '__main__':

    app.run(debug=True)
```

Result1.html:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
```

```html
    <title>Closest Pair Result</title>
    <link rel="stylesheet" href="../static/task1.css">
</head>
<body>
    <div class="container">
        <h1>Result</h1>
        <p>Input Array: {{ input_array }}</p>
        <p>Closest Pair: {{ closest_pair }}</p>
        <a href="/"><button type="submit">Back to home</button> </a>
    </div>
</body>
</html>
```

Task2.html:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Find Closest Pair to Zero</title>
    <link rel="stylesheet" href="../static/task1.css">
</head>
<body>
    <div class="container">
        <h1>Find the Pair with Sum Closest to Zero</h1>
        <form action="/find_pair" method="post">
            <label for="input_array">Enter array elements separated by commas:</label>
            <input type="text" id="input_array" name="input_array" required>
            <button type="submit">Find Pair</button>
        </form>
```

```
    </div>
</body>
</html>
```
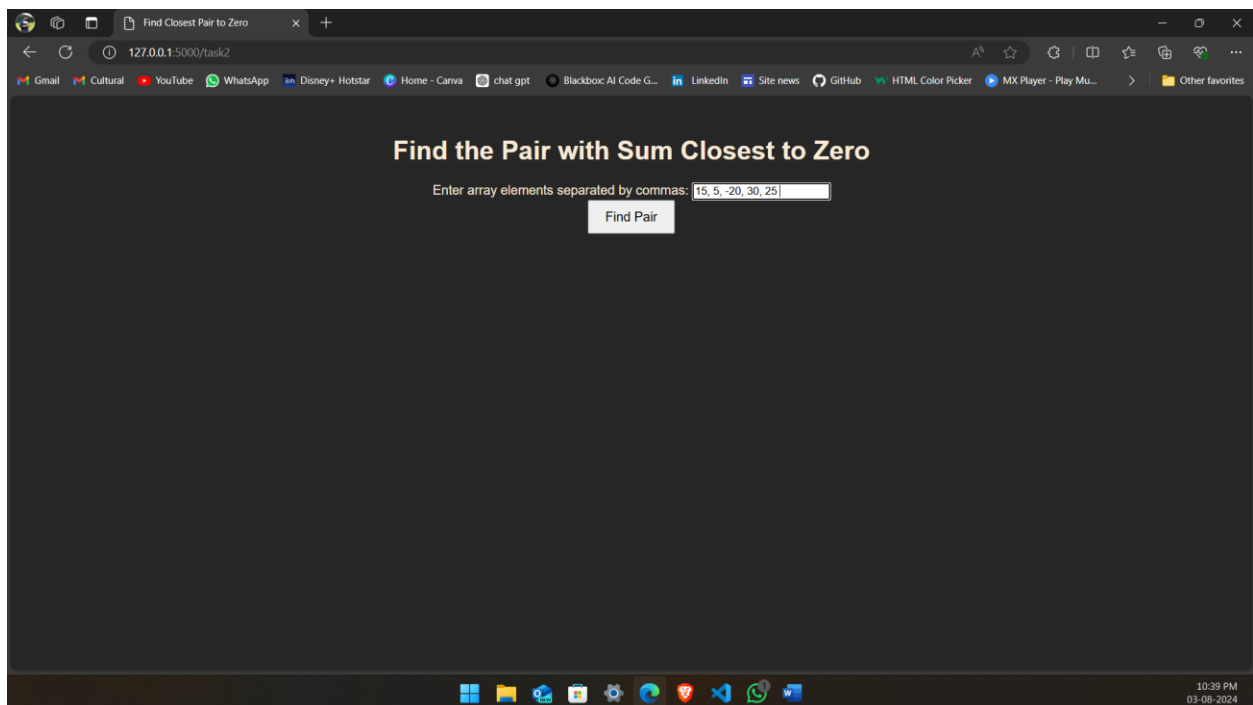
Output:

Sample Input 2

15, 5, -20, 30, 25

Sample Output 2

15, -20 & -20, 25

Explanation 2

In all the comparison, the sum of 15,-20 & -20, 25 is smallest amount among all other comparison.

Name: Ayush Patel   Class B Batch 55   Enrolment: 22162171038

Result

Input Array: 15, 5, -20, 30, 25

Closest Pair: (-20, 30)

Back to home