Takneek PS - Insight

40 Points

Rain Man

Introduction

Monsoon comes with several conundrums, however an age-old problem has always been the debate over whether one should walk or run in the downpour in order to minimize the amount of wetness one incurs while trying to find shelter. The problem may sound very intuitive at first and there have been several dissertations trying to resolve the matter (such as this video from minutephysics). However, optimizing the problem in real life presents certain hurdles which is your job to solve through this PS.

Problem Statement

Premise

In a 2-dimensional world, you are given an object and the various parameters of the rain. Your job is to calculate the optimal orientation and speed with which the object should move for it to collide with the minimum number of rain particles.

Input

- A 2-dimensional object defined by user input of n points joined using straight lines in order. It can be modeled as a polygon that may be convex or concave.
- Direction, speed and intensity (density) of the rain.
- Starting and ending points of the object. The path can be modeled as a series of line segments joined one after the other.

Objective

You need to create an application (web or otherwise) that allows the user to draw an object using points and lines and take the input of the other parameters. The output should be the object displayed in the appropriate orientation (with the

direction of rain also displayed for reference), its optimal speed and a measure of the number of rain particles it hits during its journey.

Points Breakdown

- **10 marks** Frontend and UI/UX.
- **20 marks Minimization of rain particles.**
- **10 marks** Creativity and brownie points.

*Team structure [**Max 2 teams from each hall**]*

- Maximum team members: **7**
- Maximum no. of Y20s: **2**
- Minimum no. of Y23s: **1**
- Maximum no. of Y22s: **5**

Brownie Points

- A simulation of the object as it passes through the rain.
- Solving the problem in 3D.
- Solving the problem for a smooth object and smooth path.