Pandit Deendayal Energy University

School of Technology

Department of Information and Communication Technology

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AI Systems Project

Title:

<u>Pizza With 3n slices Game</u>

By

Rishil Trivedi (20BIT103)

Priyal Bhatt(20BIT092)

1. Problem Definition: Pizza Slice Selection (for 3n slices)

   You and a friend are enjoying a pizza with 3n slices of varying sizes. To determine who gets to eat the largest slice, you've decided to play a game where each of you will take turns picking a slice from the pizza. The game is played as follows:

   1.You pick any pizza slice.
   2.Your friend picks the next slice in the clockwise or anticlockwise direction of your pick.

   Given an integer array slices that represent the sizes of the pizza slices in a clockwise direction, write a function to return the maximum possible sum of slice sizes that you can pick.
   Input: An integer array slices where each element represents the size of a pizza slice.
   Output: An integer representing the maximum sum of slice sizes that can be picked.

2. Motivation:

   The motivation behind the problem is to determine the maximum possible sum of slice sizes that can be picked by three people sharing the pizza. This is a simplified version of a more general problem in game theory, where two or more players must make decisions based on their limited information and conflicting goals. By solving this problem, we can gain insights into how to make optimal decisions in similar situations.

3. Brief Description:

   The idea behind the problem of selecting slices from a pizza with 3n slices is to find a strategy for maximizing the size of the slice that you pick, while considering the limitations imposed by the choices made by the other person. The problem can be approached using the Min-Max algorithm, backtracking, or recursion.

   In the Min-Max algorithm, you make decisions by finding the minimum value that the opponent can choose and maximizing the value of your own choices.

   In backtracking and recursion, the problem is solved by generating all possible combinations of slice selections and evaluating the sum of slice sizes for each combination. The solution is the combination with the maximum sum of slice sizes.

   By using these methods, you can find the optimal strategy for selecting slices from a pizza with 3n slices, and gain insights into how to make optimal decisions in similar situations.

4. Methodology:

The problem of selecting slices from a pizza with 3n slices can be solved using the Min-Max algorithm, which is a decision-making strategy used in game theory. The Min-Max algorithm works by finding the minimum value that the opponent can choose and maximizing the value of your own choices, in order to determine the optimal solution to the problem. Here backtracking can be used to generate all possible combinations of slice selections, and recursion can be used to evaluate the sum of slice sizes for each combination.

5. Expected Outcome:

The output of the solution is an integer that represents the maximum size of the slice that you can pick, using the optimal strategy. This value represents the best possible outcome for the problem, and provides a means of comparing different strategies and solutions.

By finding the optimal solution, you can gain a deeper understanding of the underlying concepts and principles of game theory and decision-making, and apply these insights to other similar problems in the future.

6. Timeline/ Gant Chart:

Phases	Description	Estimated Timeline
Phase 1	Defining Problem statement	Completed
Phase 2	Working on innovation and optimal approach for the problem	Within 10 days
Phase 3	Working on the implementation of the code	Nearly a month
Phase 4	Prepare detailed project file	15 days

7. References:
    Inspired by a question asked on online competitive coding website known as LeetCode.
    [https://leetcode.com/problems/pizza-with-3n-slices/]