Summary Part

1. **In your own words, explain what dynamic programming is.**

   Dynamic programming is a method for solving complex problems by breaking them down into simpler subproblems. It involves solving each subproblem just once and storing their solutions – typically in a table – to avoid redundant computations. This approach is particularly useful for optimization problems where the solution can be constructed from solutions to subproblems.

2. **Recall the recursive version of the Fibonacci function that used a cache from the Week 5 Worksheet. Do you think this is a type of Dynamic programming?**

   This is a type of Dynamic Programming. By storing previously computed values (memoization), the function avoids redundant calculations, making it more efficient than the straightforward recursive approach, which recalculates values multiple times.

3. **How does dynamic programming help solve the knapsack problem?**

   Dynamic programming helps solve the knapsack problem by breaking it down into smaller subproblems. For each item and each capacity, we determine the maximum value that can be achieved either by including or excluding the item. This approach builds a table where each entry represents the solution to a subproblem, ultimately leading to the optimal solution for the entire problem.

Self-reflection part

What did you learn?

This week, I learned about dynamic programming, its principles, and how it can be applied to various problems like the Fibonacci sequence and the knapsack problem.

What went smoothly?

Understanding the concept of breaking down problems into subproblems and using memoization to store intermediate results was quite intuitive.

What was difficult about the content this week?

The most challenging part was understanding how to apply dynamic programming to the knapsack problem.

How will you approach things differently next time?

I will start by clearly defining the subproblems and identifying the state variables before diving into the implementation.

Do you have any feedback about the content for this week?

Good!