

Financial Forecasting - Recursive Algorithm Analysis

1. Understand Recursive Algorithms

Recursion is a programming technique where a function calls itself to solve smaller instances of a problem until a base case is reached. It is particularly useful in problems that exhibit self-similarity or can be divided into sub-problems. In the context of financial forecasting, recursion can simplify the process of calculating future values based on repeated application of growth formulas.

4. Analysis

Time Complexity of Recursive Algorithm

The time complexity of the recursive future value calculation is $O(n)$, where n is the number of years. This is because the recursive function makes one call per year until it reaches the base case. Each call performs a constant amount of work.

Optimization to Avoid Excessive Computation

To optimize the recursive solution and avoid excessive computation or stack overflow for large values of n , we can use an iterative approach instead. The iterative approach uses a loop to calculate the future value without additional function calls, thereby reducing the space complexity from $O(n)$ to $O(1)$. Alternatively, if applicable, memoization can be used when there are overlapping subproblems.