

Unit 3: Analysis of Algorithms.

The analysis of algorithms is crucial to estimate the amount of resources that an algorithm needs for solving a certain problem. Analyzing the time complexity or space complexity of an algorithm allows us to compare different solutions for a certain problem, and select the most efficient algorithm.

The lesson begins with an example of how to empirically estimate the time complexity of an algorithm. In particular, we show two different algorithms that calculate the sum of the first n numbers and describes the steps to estimate the time complexity of each of the algorithms empirically. The empirical analysis has important limitations such as the necessity of implementing the algorithms to be compared.

Once the drawbacks of the empirical analysis have been discussed, we study how to theoretically estimate the time complexity of an algorithm. First, we present the concept of temporal function and give some examples of how to calculate this function. Then, we study the concept of Big-O function (complexity order) and see the main Big-O functions, which will allow us to compare different algorithms easily.

At the end of the lessons, students should be able to:

- Determine empirically the time complexity of simple algorithms.
- Determine the asymptotic complexity of algorithms
- Compare and Classify algorithms according to their complexity
- Differentiate concepts best-case and worst-case performance of an algorithm.