

In21-S2-CS2023 – Data Structures and Algorithms

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Complexity Analysis

Complexity Analysis

Bubble Sort and... ○

▸ Why Complexity... ●

▼ Asymptotic Nota... ○

- Big-O notation
- Drag and place the cor...

Take Home Assi... ○

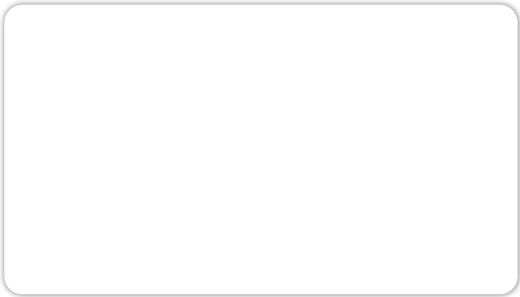
📄 Summary & submit

Asymptotic Notation

Asymptotic Notation or Asymptotic Analysis is the method we use to categorize functions or to calculate upper/lower bounds with respect to the growth rate of the functions. If we can write the total number of steps followed by a particular algorithm, as a function of its input size (n), then we can analyze it with asymptotic analysis.

Please refer to the following video to get a better understanding of this.

What Is Asymptotic Analysis? And Why Does It Matter? A Deeper Understanding



★ 3 Question(s) answered ✕

You have answered 3 questions, click below to submit your answers.

✔ Submit Answers

Answered questions		Score
2:47	Q2	1 / 1
3:42	Q3	2 / 2
12:02	Summary	1 / 1

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Complexity Analysis – Take home assignment ▶

video to learn about them.

5.4.3 - Algorithms & Algorithm Analysis - Other Asymptotic Notations



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We can use the following analogy for the asymptotic notations

Big-O Notation	Comparison Notation	Limit Definition
$f \in o(g)$	$f \in \bigcirc g$	$\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = 0$
$f \in O(g)$	$f \in \leq g$	$\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} < \infty$
$f \in \Theta(g)$	$f \in \equiv g$	$\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} \in \mathbb{R}_{>0}$
$f \in \Omega(g)$	$f \in \geq g$	$\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} > 0$

$f \in \omega(g)$

$f \supset g$

$\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = \infty$

Drag and place the correct terms to the following table.

$0.001n^3$

$0.025n$

$500n$

$100n^{1.5}$

$50n \log_{10} n$

$0.3n$

$5n^{1.5}$

$2.5 \cdot n^{1.75}$

$n^2 \log_2 n$

$n(\log_2 n)^2$

$n \log_3 n$

$n \log_2 n$

$n \log_3 n, n \log_2 n$

✓ Check

The following video explains another example. It is sufficient to watch until 8:50 timestamp.

CS560 Algorithms and Their Analysis: Big Theta notation examples



Now try to work out the following example.

$$f(x) = x + 100x^2$$

$$g(x) = x^2$$

Show that

$$f(x) = \Theta(g(x))$$



Asymptotic Notation

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