Programa de Pós-graduação em
INFORMÁTICA

PUC Minas

Algorithm design and analysis

— Overview —

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Algorithm Design

Objetivos

Levar o aluno a compreender os principais conceitos relacionados ao projeto e análise de algoritmos; auxiliar o aluno no desenvolvimento das habilidades de desenvolver soluções computacionais para problemas por meio da modelagem usando estratégias de projeto de algoritmo; fornecer subsídios para que os alunos aperfeiçoem suas habilidades de desenvolvimento de sistemas, levando-os a reconhecer a importância da abstração e da redução de problemas

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Ementa

Notações para complexidade de algoritmos. Crescimento assintótico de funções e classes de complexidade. Limite inferior para classes de problemas. Análise de algoritmos recursivos. Técnicas de Projeto de Algoritmos: redução, divisão e conquista, programação dinâmica, método guloso, retrocesso e branch and bound. Tratabilidade de problemas. Teoria da Complexidade: classes de problemas P, NP e NP-Completo. Teorema de Cook.

Pedagogical Strategy

- Syncronous lectures
- Slides
- Forum
- Exercises
- Some tools for interactions (like Kahoot)

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Evaluation

- Exams
- Homeworks

Expected knowledge (a priori)

- Data structure
- Graph
- Discrete maths

Searching elements

INSTANCE A list $L = x_1, x_2, \ldots, x_n$ of distinct integers and an element x.

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9	5	7	1	3	8	2	6

$x = 6$

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Solution 2

1. The list is organized as an array $[0, n-1]$
2. Sort L
3. Go through L from 0 to $n-1$ checking the element at position i

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$x \in L$	$x \in L$ or $x \notin L$
$T(n) = 2 \times n + 1$	$T(n) = 4 \times n + 4$

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How to solve the general problem decreasing the number of instructions?

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9 5 7 1 3 8 2 6

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