

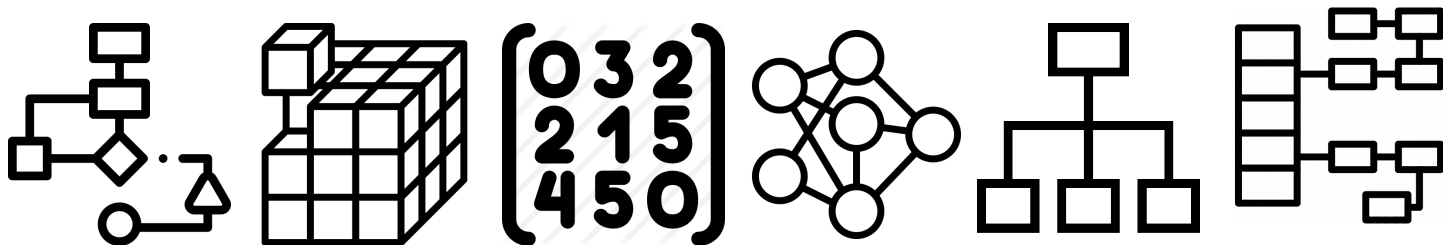
CS211-Algorithms & Data Structures



Taibah University

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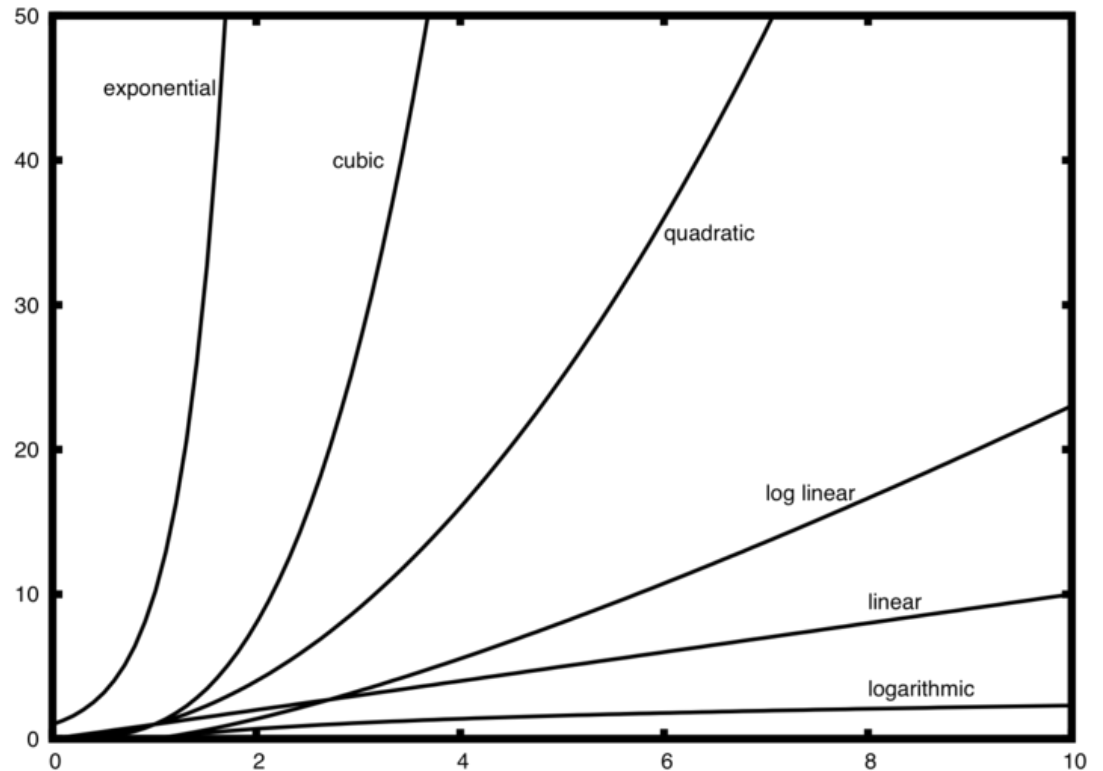
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Searching

Common order of magnitude functions

Notation	Name
$O(1)$	Constant
$O(\log n)$	Logarithmic
$O(n)$	Linear
$O(n \log n)$	Log linear
$O(N^2)$	Quadratic
N^3	Cubic
2^n	Exponential



Linear search

- Compare all elements in the array with the key
- If k matches with an element, return the index
- If k doesn't match with any of element, return -1
- It is not appropriate choice for long lists

arr	30	8	9	1	12	70	5	7	22	0
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Value =70

Binary search

- Appropriate for long lists
- Appropriate for problems require lots of search
- Sorting is needed at the beginning
- Consider we need to find the value 70 using binary search

arr	30	8	9	1	12	70	5	7	22	0
	0	1	5	7	8	9	12	22	30	70
	0	1	2	3	4	5	6	7	8	9

iteration	left	right	mid	arr[mid]	left<=right?
1	0	9	4	8	True
2	5	9	7	22	True
3	8	9	8	30	True
4	9	9	9	70	True