Sorting algorithms

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Outlines

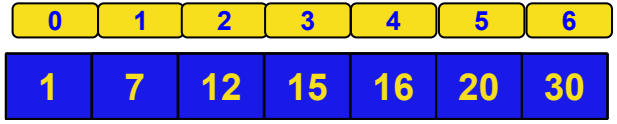
- Introduction
- Bubble sort algorithm
- Selection sort algorithm
- Insertion sort algorithm

Introduction

- A Sorting Algorithm is used to **rearrange** a given **array or list elements** according to a **comparison operator** on the elements.
- Time complexity is very important for sorting algorithms.
- There are many **types** of sorting algorithms:
  - **Bubble sort**
  - **Selection sort**
  - **Insertion sort**
  - **Merge sort**
  - **Quick sort**

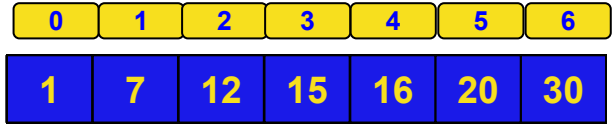
Bubble sort algorithm

- **Steps** to make bubble sort:
  - **Check if the i^{th} element is larger than the i + 1 element**
  - **If is larger, swap them, then move to the next element**
  - **If not larger, move to the next element.**
  - **Repeat the above steps till element before the last one.**



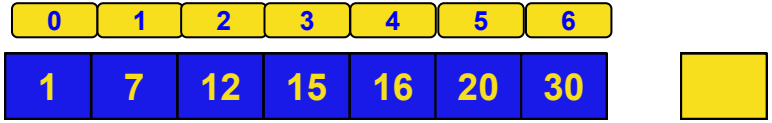
Selection sort algorithm

- **Steps** to make selection sort:
  - **Search for the minimum element.**
  - **Swap the minimum with the i^{th} element starting from 0.**
  - **Repeat until the array is sorted or reach the last element.**



Insertion sort algorithm

- **Steps** to make insertion sort:
  - **Start from the second element**
  - **Store the element in a temp variable**
  - **Check if the element is smaller than all previous elements**
  - **If smaller, move the previous element to the next position**
  - **If not smaller, save the element in the temp variable to the empty position**
  - **Repeat till the array is sorted**



Summary

- Now you are familiar with sorting algorithms.
- Remember that bubble sort has $O(n^2)$ time complexity.
- Remember that selection sort has $O(n^2)$ time complexity.
- Remember that insertion sort has $O(n^2)$ time complexity.