Computational Thinking with Algorithms: Project 2021

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## Higher Diploma in data

# Introduction

Concept of sorting and sorting algorithms

Sorting is the action of “arranging a collection of items according to some pre-defined ordering rules.” (Mannion, 2021)

In computing it is an important concept as a large porting of computing work is spent on sorting. It has therefore since the beginning of modern computing been an important filed of study for optimization. By sorting information in advance, many tasks can be simplified greatly and take up less computational power. It is often an important part of other algorithms too, so its optimization to a specific task is important ??waffle

Sorting algorithms in computing began in 1945 with the development of merge sort by John von Neumann. Multiple other sorting methods were also developed in the early days of computing e.g Radix sort (1954), Counting sort (1954), Quick sort (1962) etc.

### complexity (time and space)

Write about it here… find notes

### Comparison-based-sorts

“A comparison sort is a type of sorting algorithm which uses comparison operations only to determine which of two elements should appear first in a sorted list.” (Mannion, 2021)

There are many sorting algorithms that are in this category (e.g. Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quicksort, Heapsort).

They are the most widely applicable sorts for a diverse type of input data.

### Non-comparison-based-sorts

“Under some special conditions relating to the values to be sorted, it is possible to design other kinds of non-comparison sorting algorithms that have better worst-case times (e.g. Bucket Sort, Counting Sort, Radix Sort)” (Mannion, 2021)

Fill in more details herer

### Comparator Functions

Write about less than comparator functions herer

### Stability

Write about stability in sorting here

### In-place sorting

Sorting algorithms have different memory requirements, which depend on how the specific algorithm works.

A sorting algorithm is called in place if it uses only a fixed additional amount of working space, independent of the input size.

Other sorting algorithms may require additional working memory, the amount of which is often related to the size of the input n

In place sorting is a desirable property if the availability of memory is a concern (Mannion, 2021)

Rewrite all this in my words

### Performance

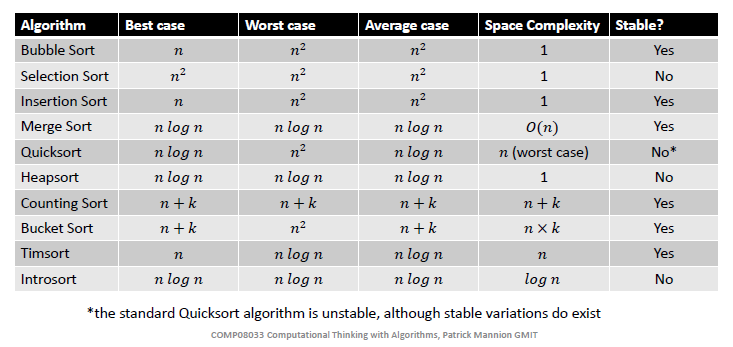


Table : Overview of sorting algorithms

Show graph from notes

# Sorting Algorithms

## Bubble Sort

Introduce algorithm

Discuss space and time complexity

Explain how it works

(Diagram of explination) \* Save until tomorrow

Different input instances – graph made already – single out each

## Merge Sort

Introduce algorithm

Discuss space and time complexity

Explain how it works

(Diagram of explination) \* Save until tomorrow

Different input instances – graph made already – single out each

## Counting Sort

Introduce algorithm

Discuss space and time complexity

Explain how it works

(Diagram of explination) \* Save until tomorrow

Different input instances – graph made already – single out each

## Insertion Sort

Introduce algorithm

Discuss space and time complexity

Explain how it works

(Diagram of explination) \* Save until tomorrow

Different input instances – graph made already – single out each

## Quick Sort

Introduce algorithm

Discuss space and time complexity

Explain how it works

(Diagram of explination) \* Save until tomorrow

Different input instances – graph made already – single out each

# Implementation and Benchmarking

Describe process followed when implementing the application

Present results:

Table of results

Results graphed against each other

Discuss how measured results differed

Were they similar to what you expected - Given time complexity of each chosen algorithm

Table and graph labelled appropriately

# References

Mannion, P., 2021. Sorting Algorithms, Part 1. In: *COMP08033 Computational Thinking with Algorithms,.* s.l.:GMIT.

Wikipedia, 2021. *Wikipedia.* [Online]   
Available at: https://en.wikipedia.org/wiki/Sorting  
[Accessed 12 May 2021].