

Análisis y Algoritmos

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Mayo 16, 2019

1) Homework 2

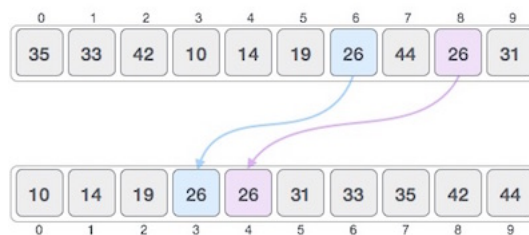
Sorting Algorithms:

A sorting algorithm is an algorithm made up of a series of instructions that takes an array as input, performs specified operations on the array, sometimes called a list, and outputs a sorted array.

Sorting algorithms are often taught early in computer science classes as they provide a straightforward way to introduce other key computer science topics like Big-O notation, divide-and-conquer methods, and data structures such as binary trees, and heaps. There are many factors to consider when choosing a sorting algorithm to use.

The objective

There are a lot of different algorithms to sort an array, all of them outputs an ascending order array, to solve the problem we are going to use two, bubble sort and insertion sort.



This the Bubble Sort algorithm implementation:

```
void BubbleSort()
{
    unsigned int i, j, temp;

    for (i = 0; i < m_values.size() - 1; i++)
    {
        for (j = 0; j < m_values.size() - i - 1; j++)
        {
            if (m_values[j] > m_values[j + 1])
            {
                temp = m_values[j];
                m_values[j] = m_values[j + 1];
                m_values[j + 1] = temp;
            }
        }
    }
}
```

This the Insertion Sort algorithm implementation:

```
void InsertionSort()
{
    int i, key, j;

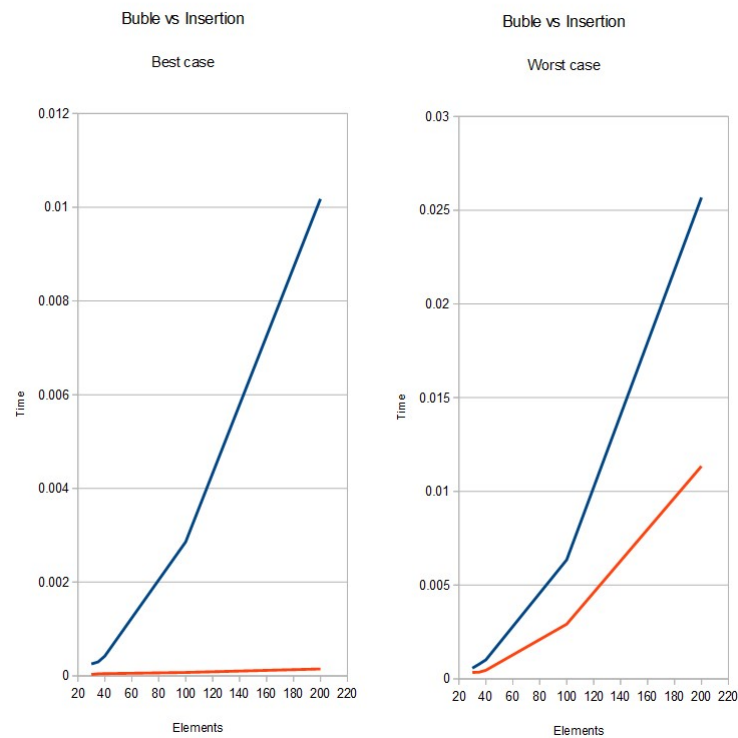
    for (i = 1; i < m_values.size(); i++)
    {
        key = m_values[i];

        j = i - 1;

        while (j >= 0 && m_values[j] > key)
        {
            m_values[j + 1] = m_values[j];
            j -= 1;
        }

        m_values[j + 1] = key;
    }
}
```

This graphics represents how much time it takes to each implementation sort the input:



The blue line represents bubble sort, the red one corresponds to the insertion sort implementation.

REFERENCIAS

- [1] Cormen, T., Leiserson, C., Rivest, R. and Stein, C. (2009). Introduction to algorithms. Cambridge (England): Mit Press.