Tutorial / Exercise – Algorithms Efficiency and Big-O

Exercises:

1 This exercise is aimed at exposing you to some of the more common algorithms used in programming, and to get an idea of their efficiency and limitations. For each of the algorithms below, research them, implement them, test them and compare their theoretical performance with their actual performance.

- **Bogosort**
- **Bubble Sort**
- **Insertion Sort**

For each sort you need to:

Write down, or derive, the efficiency of the algorithm in Big-O notation

Write an implementation in CPP

Test the implementation to see if it performs according to the predicted efficiency. For this you will probably need to run the code many times and average the result.

Big-O is usually expressed in terms of how many times the algorithm iterates but you can measure the total execution time of the code (which will give comparatively similar results). For each algorithm you will need to test it with different numbers of items in the list to be sorted, as a minimum have three elements in the list, we suggest you test with up to 50.

Additional Exercise

If you have time you should implement and test Quicksort.

Test with initial lists which are partially sorted. How well do the various algorithms code with this? You should find some perform better than others. This is an important result as often the data we need to process is pre-sorted in some way and this can affect our choice of algorithm.