**ANALYTICS OF SORTING ALGORITHMS**

# **GRAPHS:**

**OBSERVATIONS:**

**INSERTION SORT:**

By applying Insertion sort on the set of different numbers (50,100,200,300,400,500) it is to be observed that the time complexities are O(n) in best case and O(n^2) in worst and average case as shown in graphs this algorithm takes much time so it is not considered as good approach.

**MERGE SORT:**

By applying Merge sort on the set of different numbers (50,100,200,300,400,500) it is to be observed that the time complexities are O (n log n) in best case, worst and average case as shown in graphs this algorithm takes does not take much time so it is as good approach to sort numbers.

**QUICK SORT:**

By applying Merge sort on the set of different numbers (50,100,200,300,400,500) it is to be observed that the time complexities depend on the selection of pivot element.

* **Middle as Pivot**: It is considered as good approach and time complexity comes out O(n log n)
* **Random as Pivot:** It is considered as risk taking approach because in worst case time complexity comes out as 0(n^2) and in other cases 0(n log n)
* **Median as Pivot:** Median of Three is considered as one of the best approaches and the time complexity remains 0(n log n)

**IMPORTANT NOTE:** The complilation time taken in graphs is based on the the average complier time given by Dev C++ compiler so one cannot exactly tell the Best Sorting Algorithm on the basis of compilation time because each time it gives out different time sometimes extreme high and sometime extreme low and average.

**BEST AND WORST SORTING ALGORITHM ANALYSIS**:

The best sorting algorithm among above on the basis of nature of algorithm and by research by various computer scientists is the approach of Median as Pivot (By Median of Three) it gives 0(n log n). And the worst is considered as Insertion Sort as it’s gives 0(n^2) in most of the times.

**Sources for predicting Best and Worst Algorithm:**

[<https://scialert.net/fulltext/?doi=itj.2007.424.427>]

[<https://iq.opengenus.org/insertion-sort-analysis/>]