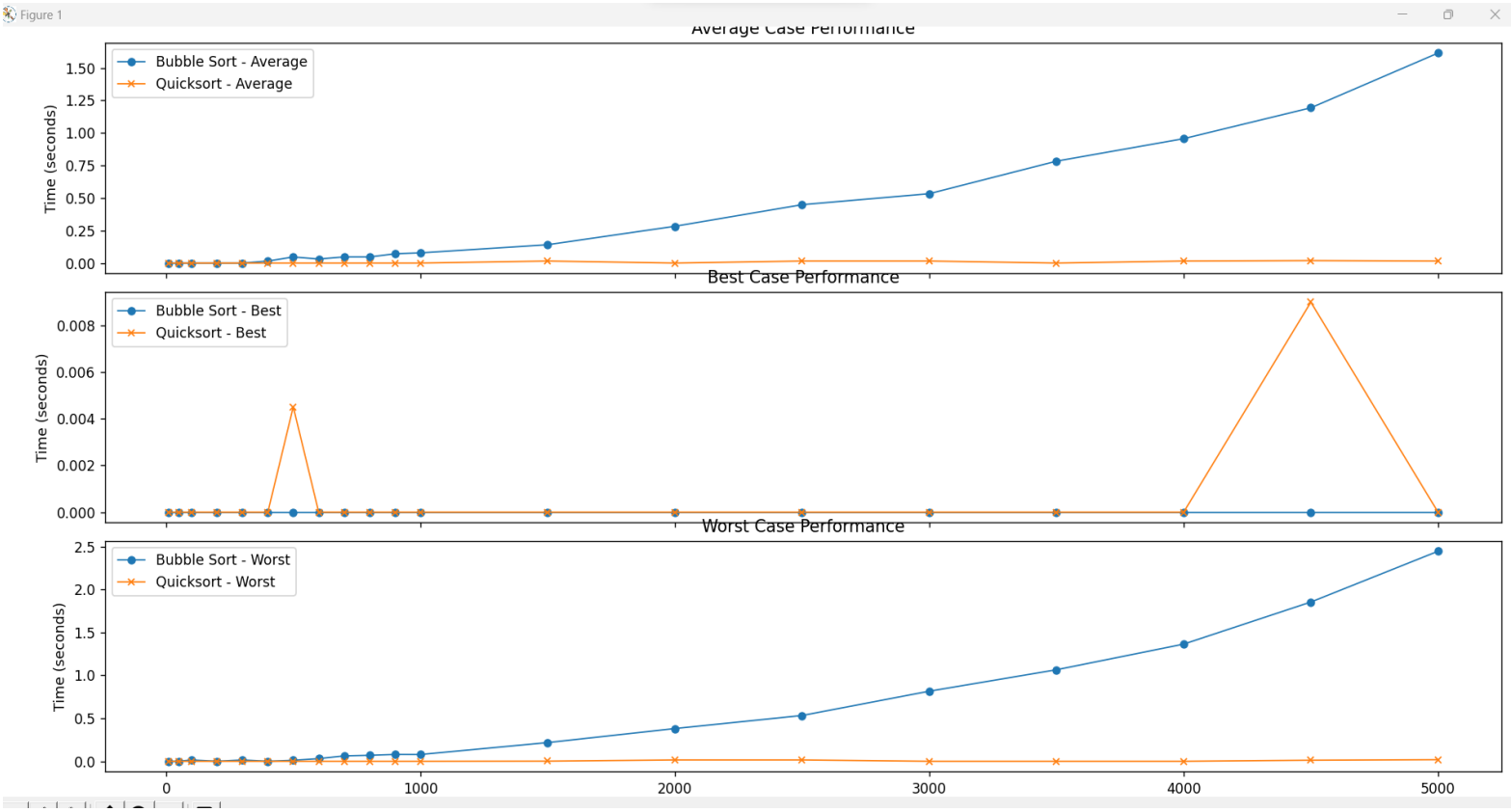


3. Overall we can seee quicksort has better performance than Bubble sort. The implementation of quicksort is so much faster in most cases that at the given scale, it is very hard to see the perturbations for each array size for the given axis scale. The performance remains similar for best case performance as it's a comparioson between *O*(n*log(n)) and *O*(n).

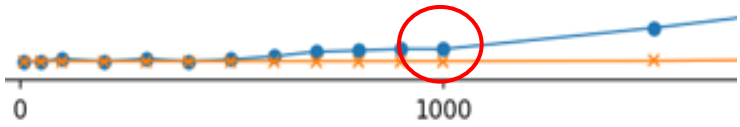
At the given scale as explained before the difference is hard to notice as for the Quicksort the log function has a asympatote like shape while the bubble sort has a linear implementation.

For Worst Case and Average Case the deviation is expected. Average case for bubble remain quadratic (n*n) while for the quick sort it is *O*(n*log(n)).

In the last worst case,we should have n^2 for both but we observe differnece due to:

- Random Pivot selection mitigates the worst case complexity. This is due to the fact we use random function.
- There might be some larger number of array sizes at which the O n log n is deviated into the O(n^2)

4. We can quite clearly see the devaition from the graphs :



1000 array size is a good estimate of the small array size bacuse the devaition after this threshold starts to sucessively increase. The inputs < 1000 give almost indifferent results. Implementations of the code tested at different values serves the purpose of comparison through quantigyin the array size.