Average-Case Analysis

Expected Runtime

Insertion Sort

Since insertion sort has a while loop inside, for the worst-case analysis of data comparisons we just assume the iterator is what makes it stop.

InsertionSort(L) {
  for pos = 2 to L.length {
    val = L[pos];
    iter = pos-1;
    while (iter<>0) and (L[iter]>val) {
      L[iter+1]=L[iter];
      iter--;
    }
    L[iter+1]=val;
  }
}
Insertion Sort

For best-case data comparison analysis we have the while loop terminate on its first data comparison.

For each outer loop (sum as i goes from 2 to n) the inner loop’s total data comparisons done is 1…

Insertion Sort

For average-case comparison analysis we need to consider all possible ways the while loop might terminate.

For each outer loop (sum as i goes from 2 to n) the inner loop’s total iterations can be between 1 and i-1 so we can determine the expected value of that to get an average-case runtime…