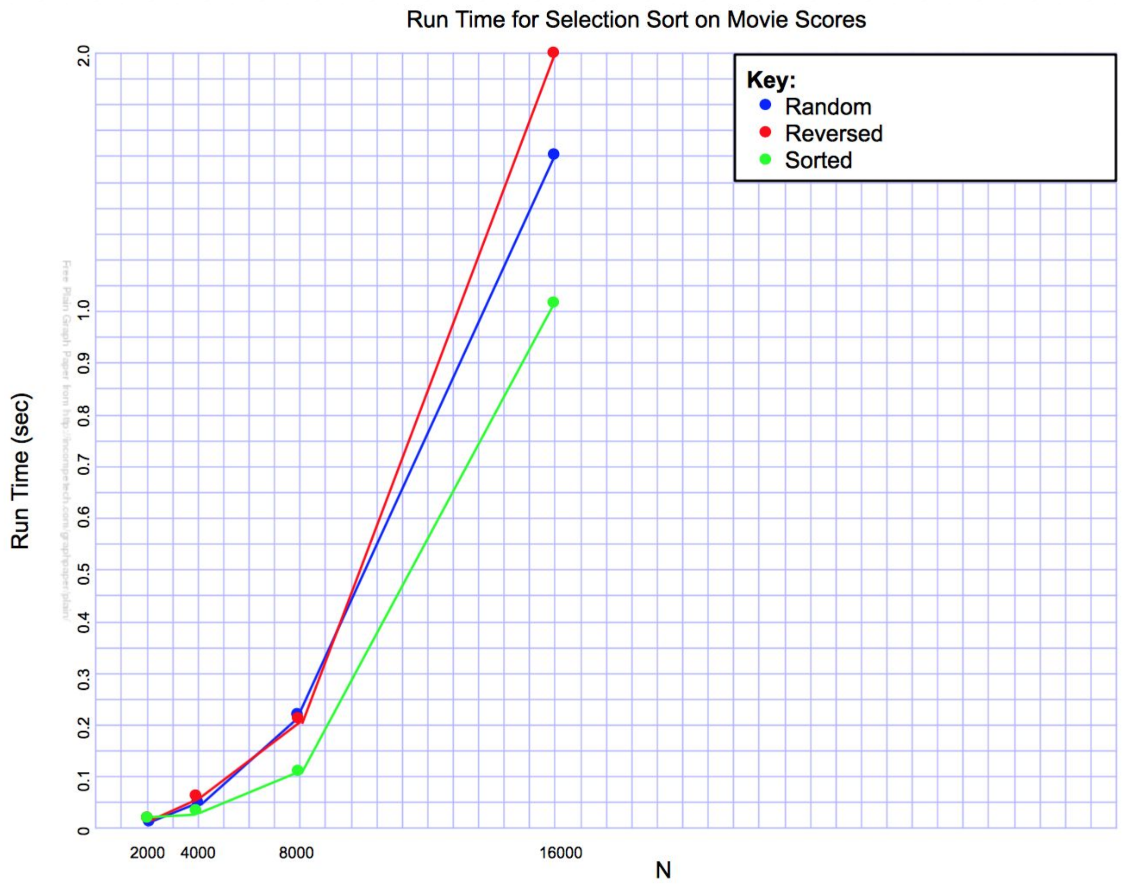
Sunwoo Ha
Introduction to Algorithms
September 21, 2017

Week 4 Workshop

1. See java files in branch.
2. **movie_title_score.random.csv:**
    - **2000**: 0.026, 0.02, 0.022 -> Average runtime is **0.023**
    - **4000**: 0.052, 0.049, 0.051 -> Average runtime is **0.051**
    - **8000**: 0.212, 0.225, 0.237 -> Average runtime is **0.225**
    - **16000**: 1.216, 1.888, 1.861 -> Average runtime is **1.655**

   movie_title_score.reversed.csv:
    - **2000**: 0.022, 0.023, 0.03 -> Average runtime is **0.025**
    - **4000**: 0.057, 0.066, 0.057 -> Average runtime is **0.06**
    - **8000**: 0.21, 0.212, 0.232 -> Average runtime is **0.218**
    - **16000**: 1.697, 2.737, 1.572 -> Average runtime is **2.002**

   movie_title_score.sorted.csv:
    - **2000**: 0.031, 0.023, 0.02 -> Average runtime is **0.0247**
    - **4000**: 0.041, 0.034, 0.037 -> Average runtime is **0.0373**
    - **8000**: 0.121, 0.137, 0.128 -> Average runtime is **0.129**
    - **16000**: 1.57, 0.938, 1.39 -> Average runtime is **1.299**



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3. Using the doubling rule, when the input doubles, SelectionSort's runtime is approximately raised to the power of 2 of the last run time. Therefore, the growth of SelectionSort is quadratic.
4. In the SelectionSort code, there are two array accesses, which costs constant time. When an array access occurs, the cost is ~ n as it is nested in a double for loop. So, the cost model for this algorithm would be ~ n^2.
5. Looking at the algorithm for SelectionSort, I do not think that the order of the inputs make much of a difference on the run time as it requires the pointer to look at all of the entries to the right to identify the index of the minimum entry. Since it must repeat this process for each element in the array, despite how it is ordered, it will make the algorithm insensitive to the order of the input.