Algorithms and Data — Problem Set 3

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1 The Interval Scheduling Again

This approach is a greedy since it tries to make the locally optimal choice with each interval selection, i.e., it picks the one with the last start time that does not conflict with any of the others with the hope that by doing this repeatedly we arrive at a globally optimal solution.

This does, in fact, yield an optimal solution. Let I be a set of intervals. We first pick an interval I_1 with start time S_1 such that S_1 is greater than all other start times. Then, we let I' be a subset of I such that no intervals in I' intersect with I_1. We repeat the process using I', and continue repeating in this way until no intervals are left.

Thus, in essence, we are picking intervals that begin closest to the maximum end time E_max of I and do not overlap any of our currently chosen intervals. The fact that we are choosing the interval with the start time closest to the maximum end time means that there can be other interval or combination of intervals that do not intersect our current choices and minimize the distance between their start time and the max end time. That is to say, choosing in this way will give us the maximum number of non-ovelapping intervals in a given set of intervals.