

Introduction to Algorithms

3rd Edition

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Chapter 1

1. The Role of Algorithms in Computing

1.1 Algorithms

1.1-1

Suppose we need to find the smallest number of buildings in a suburb of a city which need security huts for surveillance of vehicles entering the suburb. We can model this problem by trying to find the convex hull, where buildings are vertices are the n points in the plane.

1.1-2

Space required for data storage, since memory is finite in any computing system executing an algorithm.

1.1-3

Linked lists have the following strengths:

- They are easy to insert items into.
- They are easy to remove items from.
- They do not require a large block of contiguous memore to be allocated ahead of insertion.

They have the following limitations:

- Traversing the linked list is slow.
- Accessing an element is not easy and requires indirect methods.
- Deallocating the memory used is slow.

1.1-4

The traveling-salesman problem can be interpreted as a series of many different shortest-path problems which are combined into one. However, the shortest-path problem does not require that whoever traverses the path return to where they started. It can also be solved efficiently, whereas the traveling-salesman problem cannot.

1.1-5

If we are trying to find the optimal layout of train routes so that trains do not cross tracks at the same time, then only the best solution will do. On the other hand, if we are trying to minimize the cost of procuring parts for the train, then an approximation to the best solution may be good enough.