Introduction to Algorithms

Release 3.0

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Apr 01, 2021

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Part I

Selected Topics

CHAPTER

ONE

STRING MATCHING

Text-editing programs frequently need to find all occurrences of a pattern in the text. Typically, the text is a document being edited, and the pattern searched for is a particular word supplied by the user. Efficient algorithms for this problem—called "string matching"—can greatly aid the responsiveness of the text-editing program. Among their many other applications, string-matching algorithms search for particular patterns in DNA sequences. Internet search engines also use them to find Web pages relevant to queries.

We formalize the string-matching problem as follows. We assume that the text is an array $T[1\,..\,n]$ of length n and that the pattern is an array $P[1\,..\,m]$ of length $m \leq n$. We further assume that the elements of P and T are characters drawn from a finite alphabet Σ. For example, we may have $\Sigma = \{0, 1\}$ or $\Sigma = \{\mathtt{a}, \mathtt{b}, \ldots, \mathtt{z}\}$ $\Sigma = \{1, 2, 3\}$. The character arrays P and T are often called ***strings*** of characters.