Divide and Conquer Method

1. Divide the problem into a number of subproblems.

At each level of recursion:

2. Conquer the problems by solving them recursively. Note for small

subproblems, solve in a straightforward manner.

3. Combine the solutions to the subproblems into the solution of the

original problem.

Step 3. \[ \text{MAX} \cap \text{SUB} \] is the answer.

\[ \text{if} \; \text{MAX} \cap \text{SUB} < (f(1) \cdot 1) \text{then update the} \]

\[ \text{MAX} \cap \text{SUB} \]

\[ \text{for} \; i = 1 \text{ to } n \text{ do} \]

\[ s(i) = f(i) \text{ and update the} \]

\[ \text{MAX} \cap \text{SUB} \]

\[ \text{a} \]

Example Application: Maximum Subsequence Problem

\[ \text{MAX} \cap \text{SUB} \]

\[ \text{given possibly negative integers a[1], a[2], \ldots, a[n], find the maximum} \]

\[ \text{value of the integral interval for some values of } l \text{ and } r, \; 1 \leq l \leq r \leq n. \; (For} \]

\[ \text{maximum subsequence sum is 0 if all the integers are} \]

\[ \text{negative.} \]

As an example, for inputs \[-4, 10, -12, 5, -7, 8, 3, 1\] the answer is 22.

January 31, 2003

Surya Rama

ANALYSIS OF ALGORITHMS

Example Application: Maximum Subsequence Problem

\[ \text{MAX} \cap \text{SUB} \]

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Maximum Subsequence Problem: Algorithm 3

\[ f(n) = \min \{ f(n-1), f(n-2) + u[n] \} \]

Maximum Subsequence Problem: Algorithm 2

\[ f(n) = \max \{ f(n-1), f(n-2) + u[n] \} \]

Notes on the algorithm:
1. The algorithm is due to Knuth.
2. It is due to several other algorithms.
3. The algorithm is due to several other algorithms.
4. The algorithm is due to several other algorithms.

Analysis: In \( O(n^2) \) we sum \( f(n) \) terms. Therefore the complexity is \( O(n^2) \).
There are no known results to be currently connected with small variations. All boundary conditions fix results of the same order. If we want asymptotic results then we don’t want to worry about

\[(1) \, f(1) \quad (1) \, f \quad (1) \, f \quad (1) \, f\]

**Analysis:** Let \( u \) denote the total number of basic operations of

\[(Y)^\theta + W \prod X W + (T)^\theta + W \prod X W\]

\(W \prod X W (T) W \prod X W\) where \( W \prod X W \)

Step 6. Finally, step 4 except for the right-hand of the sequence.

Dive and conquer methods generally lead to the following recurrence

\[f q + \left(\frac{q}{u}\right) f p = \left(\frac{q}{u}\right) L\]
\[
\begin{align*}
(\omega f)(u) &= (\omega f)_u \\
&= \left( \frac{1}{u} \right)^{n-1} v\omega u \Theta = u^\delta \in C_{\omega \Theta}(\mathbb{R}^n) = (\omega) \Theta
\end{align*}
\]

For some constant \( c > 1 \), let \( f \) be a function in \( C_{\omega \Theta}(\mathbb{R}^n) \).

\[
(\omega f) \geq (q/u) f + (u) \Theta = (u) f
\]

where \( \Theta \) is a constant and \( c \) is a function of \( u \).

Consider \( \Theta \) for an upper bound,
\[
(\omega f) \Theta = (\omega) \Theta
\]

and let \( \Theta \) be a function in \( C_{\omega \Theta}(\mathbb{R}^n) \).

\[
(\omega f) \Theta = (\omega) \Theta
\]

Let \( a < 1 \), \( b < 1 \), and \( f \) be a function in \( C_{\omega \Theta}(\mathbb{R}^n) \).

\[
(\omega f) \Theta = (\omega) \Theta
\]

We consider \( \Theta \) in \( C_{\omega \Theta}(\mathbb{R}^n) \).

\[
(\omega f) \Theta = (\omega) \Theta
\]

The Master Theorem

\[
(\omega f) \Theta = (\omega) \Theta
\]

Proof of the Master Theorem

\[
(\omega f) \Theta = (\omega) \Theta
\]
Example Application: Merge Sort

For more details, refer to the text.
two sorted sequences of order n.

where \( T(\log n) = \Theta(1) \), and

\[ L + (\frac{n}{B})L = (u)L, \]

If denotes the total time to sort, then

\[ (1 - u) + (\frac{n}{B})L + (\frac{n}{B})L \]

For the case of only one comparison.

Analyzing the Merge Sort

Worst Case: In terms of only one comparison.