TREE ALGORITHMS, COMMUNICATION NETWORKS AND DATA STRUCTURES

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A tree algorithm is a procedure that divides recursively into subsets an initial set of n items until each of the subsets obtained has a cardinality strictly less than some fixed number D. These algorithms have a wide range of applications.

— Data structures. These are algorithms on data structures used to sort and search. They are sometimes referred to as divide and conquer algorithms.
— Communication Networks. These algorithms are used to give a distributed access to a common communication channel that can transmit only one message per time unit.
— Distributed systems. Some algorithms use a splitting technique to select a subset of a set of identical communicating components.
— Statistical tests. A test, performed on a set of individuals, indicates if at least one of these individuals has some characteristics (like a disease if this is blood testing).

Formally, a tree algorithm can be described as follows:

TREE ALGORITHM $\mathcal{T}(n)$

— TERMINATION CONDITION.
If $n < D$ $\longrightarrow$ STOP.
— TREE STRUCTURE.
If $n \geq D$, randomly divide n into $n_1, \ldots, n_G$, with $n_1 + \cdots + n_G = n$ where G is a random variable with some fixed distribution.
$\longrightarrow$ APPLY $\mathcal{T}(n_1)$, $\mathcal{T}(n_2)$, $\ldots$, $\mathcal{T}(n_G)$.

This talk presents the context of these algorithms as well as the technical tools that can be used to analyze their associated cost functions.

REFERENCES

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