Dynamic Programming : Why the need for optimal sub structure

structure

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words dynamic progr
implement on a problem which doesn't have optimal substructure property.

2.Dynamic Programming : Why the need for optimal sub structure

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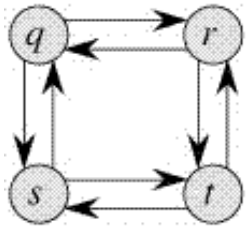
In dynamic programming agiven problems has Optimal Substructure Proper
problem can be obtained by using optimal solutions of its sub problems.

For example the shortest path problem has following optimal substructure p
shortest path from a source node U to destination node V then the shortest
shortest path from U to X and shortest path from X to V.

But Longest path problem doesn't have the Optimal Substructure property.
i.e the longest path between two nodes doesn't have to be the longest path

For example, the longest path q->r->t is not a combination of longest path
t, because the longest path from q to r is q->s->t->r.



So here: optimal solution to a problem does not contain an optimal solution

For more details you can read

Longest path problem from wikipediaOptimal substructure from wikipedia

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3.Dynamic Programming : Why the need for optimal sub structure

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You're perfectly right that the definitions are imprecise. DP is a technique fo
than an algorithm in itself. The term "optimal substructure" is a vague conc
every loop can be expressed as a recursive function: each iteration solves a
every algorithm with a loop a DP? Clearly not.

What people actually mean by "optimal substructure" and "overlapping subp
are used often enough to decrease the asymptotic complexity of solutions. I
useful! In most cases the subtle implication is a decrease from exponential t
p
Ex: There is an exponential number of paths between two nodes in a dense
looking at only a polynomial number of them because the memos are extre

On the other hand, Traveling salesman can be expressed as a memoized fur
the memos cause a factor of O((1/2)^n) time to be saved. But, the numbe
O(n!). This is so much bigger that the asymptotic run time is still super-exp
an algorithm is generally not called a Dynamic Program even though it's foll
the DP for shortest paths. Apparently it's only a DP if it gives a nice result!