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Studies On Dianamic Programming

The Term Dianamic Programming was originally used in the 1940s by Reachard Bellman to describe the process of solving Problems where one needs to find the best decisions one after another.

By 1953 he refined this to the modern meaning referring specifically to nesting smaller decision problems inside larger decisions

An Overview :-

Dianamic Programing is Both a mathematical Optimization method and Computer programing method. In Both Contexts it refers to simplifying a complicated Problem by Breaking it down in to simpler sub Problems in a recursive manner.

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Deterministic Dianamic Programming.

Dianamic Programming Simplly (DP)

Determines the Optimum Sol^n to an a veriable problem by decomposing it in to n stages with each stage constituting a single - variable sub problem.

Recursive Nature Of Computations in [DP].

Computation in DP are done Recursively in the sence that the optimum Sol^n of one sub problem is used as an input to the next sub problem.

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- Dianamic programming is a techinique which permits us to dissect difficult problems in to sequence of sub problems which are Evaluated by stages.

Linear Programming is a method which gives single Stage that is one time sol^n dianamic programming has the power to determin the optimal sol^n over say a one year time horizon by Breaking in to twelve smaller one month time horizon Problems and to solve each of these optimally

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This is done by determining optimal policies from stage to the end of the problem

- Obtain the optimal solution to the original problem by solving all stages sequentially.

Difference Between Dynamic Programming & Linear Programming.

- Dianamic Programing is different from Linear Programming on two counts.

There dose not exist a standard mathematical formulation of dianamic Programing Problem there is no algorithim like simplex method etc

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Vi at the new state of function system if this decision is made

Since vi has already been Calculated for the needed states the above opration yields Vi-1 For those states. Finally v_1 at the innitial state of the system is the value of the Optimal solution the Optimal value of the desicion veriables can be recouverd one by one by tracking Back the calculations alread Performed.

Four Steps For Solving Problems With Dianamic Programming...

- Divide the original Problem in to sub-Problems called Stages.
- Solve the last stage of the Problem for all Possible condition or states.
- Moving Backword from the last stage solve each inter meadiate. Stage Successively. this is

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This is done by defining a sequence of value functions V_1, V_2, V_n with an argument y Representing the State of system at a times i from 1 to n

mean,

i can have the different values depending upon the number of States and each time we have a sol^n and the sol^n is in the form of value which we have stated from $V_1, V_2 \cdots V_n$

and 1, 2, ... n are States

The

Defination of $V_n(Y)$ is the value obtain in state Y at the last time n. The values V_i at earlier times $i = n-1, n-2, \ldots 2, 1$ can be found by working Backwords using a recursive Relationship called the Bellman Equation. For $i = 2, n$, V_{j-1} at any State Y is calculated from v_i by maximizing a simple function (usually the sum) of the gain from a decision at time $j-1$ and the fu^n

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Bellman Equation.

If sub Problems can be nested recursively inside larger Problems, so that dianamic Programing methods are applicable then there is a relation bet" the value of the Larger Problem and the Value of the Sub Problems in the optimization litratu -re This Relationship is called the Bellman Equation.

Dynamic Programming in mathematical Optimization.

In terms of mathematical optimization dynammic Programming is usually Refar for simplifying A desicion by Breaking down in to a sequence of decision steps over time

It means

we Con change our desicion to segment to segment on a problem and we can change our combine result so it is dianamic in nature.

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