HA2

Created	@Mar 27, 2020 9:42 PM
Tags	

Define what are the subproblems:

We are trying to solve problems finding the best optimal solution for every point. Since, we want to find what the optimal solution for point n, we should figure out for the optimal solution for point n-1, until we figure out what optimal solution for point 1;

For solving one problem, we should know two answers of two subproblems as:

1. e(i,j) - the minimum sum of squared errors for points i and j
2. The optimal solution for the previous point

Base case:

For zero points we have zero optimal sotuions:

MIN(0)=0

Recurrence relations:

$$MIN(j) = \begin{Bmatrix} 0,\ if\ j=0 \\ min\ (\ e(i,j)+1+MIN(i-1))\ for\ 1 \le i \le j \end{Bmatrix}$$

Pseudocode:

```
//START===O(n^3)=================
MIN(0)=0

for j=1 to n:
  for i=1 to j:

    for z=i to j:
      sum1=(x[z]*y[z])
      sum2=x[z]
```

```
      sum3=y[z]
      sum4=x[z]*x[z]
      sum5=x[z]

    a=((j-i+1)*sum1-sum2*sum3)/((j-i+1)*sum4-sum5*sum5)

    for z=i to j:
      sum6=y[z]
      sum7=x[z]

    b=(sum6-a*sum7)/(j-i+1)

    for k=i to j:
      e(i,j)=y[k]-a*x[k]-b

//T(n)=(n+(n-1)+(n-2)+..+3+2+1)*n=(n+1)*n/2*n=O(n^3)
//END===========================

//START===O(n^2)================
  for j=1 to n
    for i=1 to j
      tmp=min((e(i,j) + 1 + MIN(i-1))
    MIN(j)=tmp

//T(n)=(n+(n-1)+(n-2)+..+3+2+1)=O(n^2)
//END==========================

  return MIN(n)

//Running time: T(n)=O(n^2)+O(n^3)=O(n^3)
```