

Laboratory practice No. 5 Divide and conquer, dynamic programming

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3) Practice for final project defense presentation

3.1

The Held Karp algorithm:

There are 2 possible cases in each iteration:

- A) A base case where we already know the answer. (Stopping condition)
- B) Decreasing the number of considered vertices and calling our algorithm again. (Recursion)

Explanation of every case:

- A) If the list of vertices is empty, return the distance between starting point and vertex.
- B) If the list of vertices is not empty, let's decrease our problem space:
 - 1) Consider each vertex in vertices as a starting point ("initial")
 - 2) As "initial" is the starting point, we have to remove it from the list of vertices
 - 3) Calculate the cost of visiting "initial" (costCurrentNode) + cost of visiting the rest from it ("costChildren")
 - 4) Return the minimum result from step 3

the implementation of the algorithm, which do not show all the possible routes, just the optimal one.

<https://github.com/Sinclert/Heuristics-TSP>

3.2

This problem can also be solved with Lin-Kernighan heuristic, K-opt algorithm, DFS,

4) Practice for midterms

1.1)

2.1) $O(\text{len } x * \text{len } y)$

2.2) `return table [lenx][leny];`

3.1) a) $O(n)$

3.2) a) Porque $T(n) = c1:n + c2$

4) C) $O(2^n)$ y se optimiza con programación dinámica

5.1) C

5.2) `a[mitad];`

5.3) `(a , mitad , de , z);`

6.1) `sem[i] = 1;`

6.2) `sem [j] = sem[j];`

6.3) `max++;`

6.4) c) $O(n^2)$

7.1) `g[i][j]`

7.2) `g[k] [i]`

7.3) `g[i][k]`

7.4) $O(n^3)$

6) Team work and gradual progress (optional)

Use of website: Kanban Table
<https://www.kanbantool.com/>

Gradual progress
 First day: 10/10/2018

To do	In Progress 0 / 2	Done
<div>+ add task</div> <div> <div>Distancia Levenshtein</div> <div>Held-karp Algorithm</div> <div>The problem of the longest common subsequence</div> <div>Exercises online without Html documentation</div> <div>Mock project support questions</div> <div>Practice for midterms</div> <div>Laboratory in English</div> </div>	<div>+ add task</div>	<div>+ add task</div>

Second day: 11/10/2018

To do	In Progress 2 / 2	Done
<div>+ add task</div> <div> <div>The problem of the longest common subsequence</div> <div>Exercises online without Html documentation</div> <div>Practice for midterms</div> <div>Mock project support questions</div> <div>Laboratory in English</div> </div>	<div>+ add task</div> <div> <div>Distancia Levenshtein</div> <div>Held-karp Algorithm</div> </div>	<div>+ add task</div>

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Third day: 12/10/2018

To do	In Progress 3 / 2	Done
<div>+ add task</div> <div> <div>The problem of the longest common subsequence A</div> <div>Mock project support questions I</div> <div>Laboratory in English S</div> </div>	<div>+ add task</div> <div> <div>Held-karp Algorithm I</div> <div>Practice for midterms S</div> <div>Exercises online without Html documentation A</div> </div>	<div>+ add task</div> <div> <div>Distancia Levenshtein S</div> </div>

Fourth Day: 13/10/2018

To do	In Progress 3 / 2	Done
<div>+ add task</div> <div> <div>Laboratory in English S</div> </div>	<div>+ add task</div> <div> <div>Exercises online without Html documentation A</div> <div>The problem of the longest common subsequence A</div> <div>Mock project support questions I</div> </div>	<div>+ add task</div> <div> <div>Distancia Levenshtein S</div> <div>Held-karp Algorithm I</div> <div>Practice for midterms S</div> </div>

Fifth day: 14/10/2018

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To do	In Progress 1 / 2	Done
+ add task	+ add task	+ add task
	<div>Laboratory in English ^s</div>	<div>Distancia Levenshtein ^s</div> <div>Held-karp Algorithm ^I</div> <div>Practice for midterms ^s</div> <div>The problem of the longest common subsequence ^A</div> <div>Mock project support questions ^I</div> <div>Exercises online without Html documentation ^A</div>

Role of each member

<div> <div>Held-karp Algorithm</div> <div>Done ▾ 19 sec ▾ + checklist ≡</div> <div>Description</div> <div>Implement the Held-Karp algorithm also known as a dynamic programming algorithm for the traveling agent problem</div> <div>Attachments</div> <div> <div>Card type</div> <div>Priority</div> <div>Due date</div> <div>Assigned to</div> <div> <div>violet ▾</div> <div>high ▾</div> <div></div> <div>Isaias ▾</div> </div> </div> </div>	<div> <div>Laboratory in English</div> <div>In Progress ▾ 2 sec ▾ + checklist ≡</div> <div>Description</div> <div>Translate the lab to english</div> <div>Attachments</div> <div> <div>Card type</div> <div>Priority</div> <div>Due date</div> <div>Assigned to</div> <div> <div>pink ▾</div> <div>normal ▾</div> <div></div> <div>shincapiem ▾</div> </div> </div> </div>
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Distancia Levenshtein

Done ▾ 9 sec ▾

+ checklist ≡

Description

Given two strings, determine the Levenshtein distance between them

Attachments

Card type

Priority

Due date

Assigned to

yellow

high

s shincapiem

The problem of the longest common subsequence

Done ▾ 20 sec ▾

+ checklist ≡

Description

Given two sequences, find the length of the longest sequence present

Attachments

Card type

Priority

Due date

Assigned to

light_blue

high

A Andres

Practice for midterms

Done ▾ 2 sec ▾

+ checklist ≡

Description

Solve the practice for midterms

Attachments

Card type

Priority

Due date

Assigned to

strong_red

high

s shincapiem

Mock project support questions

Done ▾ 2 sec ▾

+ checklist ≡

Description

Answer the questions according to the previous problems.

Attachments

Card type

Priority

Due date

Assigned to

white

high

I Isaías

Exercises online without Html documentation

Done ▾ 5 sec ▾

+ checklist ≡

Description

Solve the problem using dynamic programming

Attachments

Card type

Priority

Due date

Assigned to

lemon

high

A Andres

