11/28 415

Proj 4 due Sun. 12/2 by 11:55pm

HW 6 up tonight, due 12/5

CS 470 Showcase

Iterative Improvement

Tough part of algorithm is checking for cycle

Sort ~~the~~ edges drives $(|E| \log |E|$

- check if new vertex in a tree (u)
- check if parent in a tree (u)

~~If one is yes, ne~~

If either is no, or root trees are different then merge trees.

if both are in same tree, move on

find and merge operations $\in O$

using Heap delete/find $\in O($~~find~~$(|U| \log |E| + |E|))$ best Heap

avg $k \log |E|$ where k requires

union / find agorithms

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Heap

best

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TSP: (Travelling Salesman Problem)

Given n cities with known distances between each pair, find shortest tour that passes through all the cities exactly once b4 returning to starting city

One of the NP Hard (so is knapsack)

NP Hard = No Polynomial solution known

Using Greedy

- 1 Create MST
- 2 Create Euler's circuit using DFS
- 3 Delete repeated vertices and create short-cut with edges not in MST

$\in O(n^2)$

As long as all edges satisfy triangular inequality

$L_{TSP} \leq 2W^* \leq 2\,O_{TSP}$

$W^* < L_{TSP} \leq 2W^*$

W^* = value of MST

Greedy works for knapsack

Exhaustive	2^n	Knapsack	$n\log n$	Greedy	
~~TSP~~ Greedy	$n!$	TSP	n^2		

tsp dynamic programming

~~Huffman Coding~~

Maximize Solve for $x_1, x_2, \ldots x_i$

Maximize $\sum v_i x_i$

$x_i = 0$ if item not chosen
$x_i = 1$ if item chosen

subject to $\sum w_i x_i \leq W$

Linear Programming

maximize (or minimize) $c_1 x_1 + \ldots + c_n x_n$
subject to $a_{i1} x_1 + \ldots a_{in} x_n$

Geometric solution (to come Monday)
maximized at extreme point
will give a (not nec. all) optimal solutions

Did SRMapping

Dr. Kooshesh / Bobby 10/31 1130

$ Github.sonoma.edu

\# migrate project to

ID 10T