CS 374 HW 8 Problem 2

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TOTAL POINTS

25 / 100

1 Flood it II 25 / 100

  + 100 pts Correct algorithm and running time analysis

  + 80 pts Correct algorithm

  + 50 pts Correct configuration graph construction

  + 10 pts Use a k-tuple of vertices in original graph as a configuration vertex in configuration graph

  + 20 pts Add edges of the configuration graph correctly : for every two configuration vertex (v1,...vk) and (u1...uk), compute the list L of colors such that for all the k pairs vi & ui, there is a path only using edge of that color from vi to ui, find the cheapest color c in L, add an edge color c and price p(c) from (v1,...vk) to (u1...uk)

  + 20 pts Describe implementation detail of how to find out for a given color c if for all the k pairs vi & ui, there is a path only using edge of that color from vi to ui. This may be done by an auxiliary algorithm.

  - 20 pts Incorrect graph construction with some idea: Try to add an edge between two configuration vertex for each color c such that for all k pairs vi & ui, either they are the same or there is an edge of c from vi to ui. And then run the algorithm from question 1 from (s,...,s) to (t1,...tk). This makes the graph a multi-graph and thus algorithm on question 1 does not work. (This should be combined with other positives scoring items for anything they did correctly)

  + 20 pts Correctly run Dijkstra's on the constructed configuration graph from (s,...,s) to (t1,...tk)

  + 10 pts Some argument on why the algorithm/graph reduction works (No formal proof required)

  + 20 pts Correct running time

  + 15 pts Correct running time for constructing the graph (knowing it has n^k vertices and O(n^2k) edges)

  + 5 pts Correct running time for Dijkstra's on configuration graph

  ✓ **+ 25 pts** IDK

  + 0 pts Impossible to follow the answer

  - 5 pts Minor mistakes

IDK

1 Flood it II 25 / 100

+ **100 pts** Correct algorithm and running time analysis

+ **80 pts** Correct algorithm

+ **50 pts** Correct configuration graph construction

+ **10 pts** Use a k-tuple of vertices in original graph as a configuration vertex in configuration graph

+ **20 pts** Add edges of the configuration graph correctly : for every two configuration vertex $(v_1,...v_k)$ and $(u_1...u_k)$, compute the list L of colors such that for all the k pairs v_i & u_i, there is a path only using edge of that color from v_i to u_i, find the cheapest color c in L, add an edge color c and price p(c) from $(v_1,...v_k)$ to $(u_1...u_k)$

+ **20 pts** Describe implementation detail of how to find out for a given color c if for all the k pairs v_i & u_i, there is a path only using edge of that color from v_i to u_i. This may be done by an auxiliary algorithm.

- **20 pts** Incorrect graph construction with some idea: Try to add an edge between two configuration vertex for each color c such that for all k pairs v_i & u_i, either they are the same or there is an edge of c from v_i to u_i. And then run the algorithm from question 1 from $(s,...,s)$ to $(t_1,...t_k)$. This makes the graph a multi-graph and thus algorithm on question 1 does not work. (This should be combined with other positives scoring items for anything they did correctly)

+ **20 pts** Correctly run Dijkstra's on the constructed configuration graph from $(s,...,s)$ to $(t_1,...t_k)$

+ **10 pts** Some argument on why the algorithm/graph reduction works (No formal proof required)

+ **20 pts** Correct running time

+ **15 pts** Correct running time for constructing the graph (knowing it has n^k vertices and $O(n^2k)$ edges)

+ **5 pts** Correct running time for Dijkstra's on configuration graph

✓ + **25 pts** IDK

+ **0 pts** Impossible to follow the answer

- **5 pts** Minor mistakes