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1 #include "../bits/stdc++.h"
2 // 最小費用流
3 // O(FElogV)
4 // verified: http://judge.u-aizu.ac.jp/onlinejudge/review.jsp?rid=3382347
5 class minCostFlow
6 {
7     using capacity_type = int;
8     using cost_type = double;
9     using pii = std::pair<cost_type, int>;
10    const int INF = 1e9;
11    struct Edge
12    {
13        int to, rev;
14        capacity_type cap;
15        cost_type cost;
16        Edge(int to_, int _rev, capacity_type cap_, cost_type cost_)
17            : to(to_), rev(_rev), cap(cap_), cost(cost_) {}
18    };
19    int V;
20    std::vector<std::vector<Edge>> G;
21    // ポテンシャル
22    std::vector<cost_type> h;
23    // 最短距離
24    std::vector<cost_type> dist;
25    // 直前の頂点, 辺
26    std::vector<int> prevv, preve;
27
28 public:
29    minCostFlow(int _V) : V(_V), G(_V), h(_V), dist(_V), prevv(_V), preve(_V) {}
30    void add(int from, int to, capacity_type cap, cost_type cost)
31    {
32        G[from].push_back(Edge(to, G[to].size(), cap, cost));
33        G[to].push_back(Edge(from, G[from].size() - 1, 0, -cost));
34    }
35    cost_type calc(int s, int t, int f)
36    {
37        cost_type res = 0;
38        fill(h.begin(), h.end(), 0);
39        while (f > 0)
40        {
41            std::priority_queue<pii, std::vector<pii>, std::greater<pii>> que;
42            fill(dist.begin(), dist.end(), INF);
43            dist[s] = 0;
44            que.push(pii(0, s));
45            while (!que.empty())
46            {
47                pii p = que.top();
48                que.pop();
49                int v = p.second;
50                if (dist[v] < p.first)
51                    continue;
52                for (size_t i = 0; i < G[v].size(); i++)
53                {
54                    Edge &e = G[v][i];
55                    if (e.cap > 0 && dist[e.to] > dist[v] + e.cost + h[v] - h[e.to])
56                    {
57                        dist[e.to] = dist[v] + e.cost + h[v] - h[e.to];
58                        prevv[e.to] = v;
59                        preve[e.to] = i;
60                        que.push(pii(dist[e.to], e.to));
61                    }
62                }
63            }
64            if (dist[t] == INF)
65                return -1;
66            for (int v = 0; v < V; v++)
67                h[v] += dist[v];
68            capacity_type d = f;
69            for (int v = t; v != s; v = prevv[v])
70            {
71                d = std::min(d, G[prevv[v]][preve[v]].cap);
72            }
73            f -= d;
74            res += d * h[t];
75            for (int v = t; v != s; v = prevv[v])
76            {
77                Edge &e = G[prevv[v]][preve[v]];
78                e.cap -= d;
79                G[v][e.rev].cap += d;
80            }
81        }
82        return res;
83    }
84 };
85

```