Homework 1

CPLEX

1. Shortest Path Problem
2. Maximum Flow Problem
3. Minimum Cost Flow Problem

2014-09-25

Homework #1

```
#NODE=14
#LINK=42
int A[NODE][NODE]=
{
{ -1,  1, 14, -1, -1, -1, -1, -1, 21, -1, -1, -1, -1, -1,},
{ 46, -1, 54, 22, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,},
{  5, 68, -1, -1, -1, 68, -1, -1, -1, -1, -1, -1, -1, -1,},
{ -1, 94, -1, -1, 39, -1, -1, -1, -1, -1, 52, -1, -1, -1,},
{ -1, -1, -1, 10, -1,  4,  6, -1, -1, -1, -1, -1, -1, -1,},
{ -1, -1, 15, -1, 68, -1, -1,  1, -1, -1, -1, -1, 11, -1,},
{ -1, -1, -1, -1,  7, -1, -1, -1, 42, -1, -1, -1, -1, -1,},
{ -1, -1, -1, -1, -1, 69, -1, -1, -1, 59, -1, -1, -1, -1,},
{ 94, -1, -1, -1, -1, -1, 85, -1, -1, 53, -1, -1, -1, -1,},
{ -1, -1, -1, -1, -1, -1, -1, 10, 66, -1, -1, 42, -1, 71,},
{ -1, -1, -1, 92, -1, -1, -1, -1, -1, -1, -1, 77, -1, 27,},
{ -1, -1, -1, -1, -1, -1, -1, -1, -1,  5, 74, -1, 33, -1,},
{ -1, -1, -1, -1, -1, 64, -1, -1, -1, -1, -1, 76, -1,255,},
{ -1, -1, -1, -1, -1, -1, -1, -1, -1, 37, 25, -1, 10, -1,},
};
```

1-1. Shortest Path Problem

A[i][j]:

If A[i][j]≠-1, distance between node i and node j

Otherwise, no link between node I and node j

Node 2: source node

Node 13: destination node

1. **Formulate the network as a shortest path problem**
2. **Use CPLEX to obtain the optimal solution**

1-2. Maximum Flow Problem

A[i][j]:

If A[i][j]≠-1, physical capacity of link between node i and node j

Otherwise, no link between node I and node j

Node 3: source node

Node 13: destination node

1. **Formulate the network as a maximum flow problem**
2. **Use CPLEX to obtain the optimal solution**

1-3. Minimum Cost Flow Problem

A[i][j]:

If A[i][j]≠-1, cost of link between node i and node j

Otherwise, no link between node I and node j

Capacity=10 for each link

Node 0, 1, 2: supply nodes

Node 10, 11, 12: sink nodes

Amount of flow supplied by Node 0 = 4.

Amount of flow supplied by Node 1 = 5.

Amount of flow supplied by Node 2 = 15.

Amount of flow sink to Node 10 = 4.

Amount of flow sink to Node 11 = 8.

Amount of flow sink to Node 12 = 12.

1. **Formulate the network as a min cost flow problem**
2. **Use CPLEX to solve the problem. Is the problem feasible or infeasible?**

   If feasible, show an optimal solution.

注意事項

- 請先詳閱作業繳交格式說明
- 繳交期限：於10/07(二)上課時繳交紙本，上課前上傳至e-course
- 繳交檔案內容（請務必包含以下檔案，並壓縮）：
  1. word檔（請依照指定之紙本格式）
  2. CPLEX code、solution（請依照作業順序命名）
     ex:hw1-1.lp（CPLEX code）、hw1-1.sol（solution）
- e-course上的作業配分目前僅供參考，之後會依作業數量調整各作業比例
- 如有疑問，可寄mail或直接至工A館 224教室

  Email: kmsmsnet@gmail.com