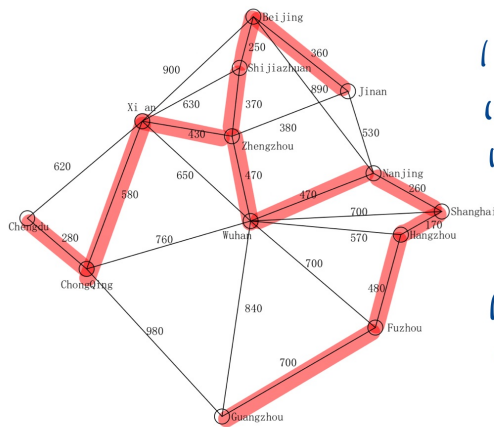


CSCI803 Assignment

Yao Xiao
SID 2019180015

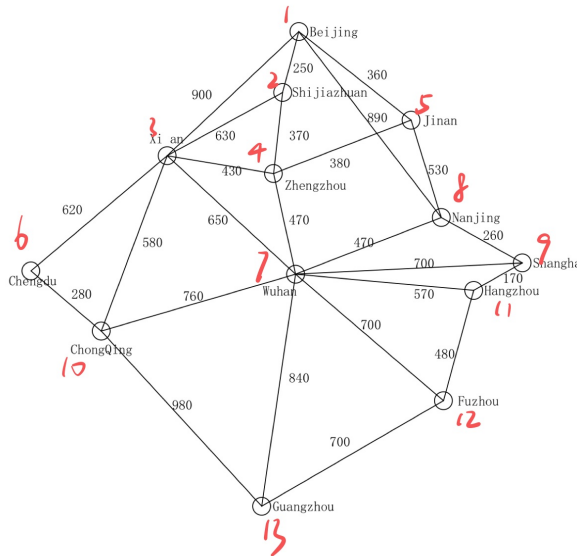
November 4, 2020

1 Problem 1



Path	Node
(Shanghai, Hangzhou)	Hangzhou
(Beijing, Shijiazhuang)	Beijing
(Shanghai, Nanjing)	Nanjing
(Chengdu, Chongqing)	Chengdu
(Beijing, Jinan)	Jinan
(Shijiazhuang, Zhengzhou)	Shijiazhuang
(Zhengzhou, Xi'an)	Xi'an
(Wuhan, Zhengzhou)	Zhengzhou
(Wuhan, Nanjing)	Wuhan
(Hangzhou, Fuzhou)	Fuzhou
(Chongqing, Xi'an)	Chongqing
(Fuzhou, Guangzhou)	Guangzhou

2 Problem 2



Start	End	Shortest-Path
V_1	V_2	$V_1 \rightarrow V_2$
V_1	V_5	$V_1 \rightarrow V_5$
V_1	V_4	$V_1 \rightarrow V_2 \rightarrow V_4$
V_1	V_8	$V_1 \rightarrow V_8$
V_1	V_3	$V_1 \rightarrow V_3$
V_1	V_7	$V_1 \rightarrow V_2 \rightarrow V_4 \rightarrow V_7$
V_1	V_9	$V_1 \rightarrow V_2 \rightarrow V_7 \rightarrow V_9$
V_1	V_{11}	$V_1 \rightarrow V_8 \rightarrow V_9 \rightarrow V_{11}$
V_1	V_{12}	$V_1 \rightarrow V_8 \rightarrow V_9 \rightarrow V_{11} \rightarrow V_{12}$
V_1	V_{13}	$V_1 \rightarrow V_2 \rightarrow V_4 \rightarrow V_7 \rightarrow V_{13}$

3 Problem 3

```

1  from sys import argv
2  import re
3
4  great_node = -1
5  graph = []
6  file = open(argv[1], "r")
7
8  for line in file:
9      if not re.match("//", line):
10         info = line.split(" ")
11         arrest = {info[0] + "&" + info[1]: info[2].replace('\n', ' ')}
12         if int(info[0]) > great_node:
13             great_node = int(info[0])
14         if int(info[1]) > great_node:
15             great_node = int(info[1])
16         graph.append(arrest)
17
18  nodes = great_node + 1
19  prim = []
20  min_dist = {}

```

```

21 added = []
22 added.append(int(list(graph[0].keys())[0].split("&")[0]))
23
24 i = 0
25 while i < nodes:
26     for node in range(len(graph)):
27         n = list(graph[node].keys())[0].split("&")
28         if (int(n[0]) in added or int(n[1]) in added) and (int(
29             n[0]) not in added or int(n[1]) not in added):
30             if len(min_dist) == 0:
31                 min_dist = graph[node]
32             elif int(list(graph[node].values())[0]) < int(
33                 list(min_dist.values())[0]):
34                 min_dist = graph[node]
35     if min_dist:
36         prim.append(min_dist)
37         if int(list(min_dist.keys())[0].split("&")[0]) not in added
38             :
39             added.append(int(list(min_dist.keys())[0].split("&")
40                 [0]))
41         if int(list(min_dist.keys())[0].split("&")[1]) not in added
42             :
43             added.append(int(list(min_dist.keys())[0].split("&")
44                 [1]))
45     min_dist = {}
46     i += 1
47
48 print("====MST□Nodes====")
49 print(prim)
50 print("====Final□Cost====")
51 cost = 0
52 for i in prim:
53     if i:
54         cost += int(list(i.values())[0])
55 print(cost)

```

```
main.tex lab6.py x
Users > december > Desktop > Lab6 > lab6.py ...

1 from sys import argv
2 import re
3
4 great_node = -1
5 graph = []
6 file = open(argv[1], "r")
7
8 for line in file:
9     if not re.match("//", line):
10         info = line.split(" ")
11         arrest = {info[0] + "&" + info[1]: info[2].replace('\n', '')}
12         if int(info[0]) > great_node:
13             great_node = int(info[0])
14         if int(info[1]) > great_node:
15             great_node = int(info[1])
16         graph.append(arrest)
17
18 nodes = great_node + 1
19 prim = []
20 min_dist = {}
21 added = []
22 added.append(int(list(graph[0].keys())[0].split("&")[0]))
23
24 i = 0
25 while i < nodes:
26     for node in range(len(graph)):
27         n = list(graph[node].keys())[0].split("&")
28         if (int(n[0]) in added or int(n[1]) in added) and (int(
29             n[0]) not in added or int(n[1]) not in added):
30             if len(min_dist) == 0:
31                 min_dist = graph[node]
32             elif int(list(graph[node].values())[0]) < int(
33                 list(min_dist.values())[0]):
34                 min_dist = graph[node]
35     if min_dist:
36         prim.append(min_dist)
37         if int(list(min_dist.keys())[0].split("&")[0]) not in added:
38             added.append(int(list(min_dist.keys())[0].split("&")[0]))
39         if int(list(min_dist.keys())[0].split("&")[1]) not in added:
40             added.append(int(list(min_dist.keys())[0].split("&")[1]))
41     min_dist = {}
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