CS 381: Assignment #6

Due on Tuesday, Dec 2nd, 2014

Prof. Grigorescu 12:00pm

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Problem 1

1.First, I will check if the flow given is valid, by which it means that check if the flow is conservative and each flow doesn't exceed the capacity, which cost $O(E)$ where E is the num of edges. Afterwards, I will check if there is any more augment path exists which can be done by a single BFS, takes $O(V + E)$ time. So the total complexity is $O(n^{3/2})$.

2.We can check the residual graph, if the edge which decreases by 1 has no reverse edge,(or reverse edge is 0), that means the result will be modified. So set the reverse edge to -1 and find an augment path from t to s which can eliminate this negative weight edge. IF the edge has reverse edge, then it has no effects on the graph, so the total complexity is one-time BFS which is $O(n + n^{3/2})$

Problem 2

Create the network like the following.

```
S=source
C=client1..clentn
B=base1...basen
T=sink
```

The edge is

```
W(S,client1...n)=1
W(Base1...basen,t)=L_a
W(Client1..n,Base1...n)= if Ci,Bj can be connected within R, 1, else ,0
```

Where W(a,b) represents the max capacity from a to b.
Find the max flow of the network(Ford-Fulkenson), see if the result equals to the number of client.
Since the input flow is limited to 1, which restrict for each client can only connect to 1 server, and the load flow is L, which restrict only L client can be connected to 1 server.
The complexity is $O(VE^2)$