Using BFS for SSSP

Modify BFS to Encode Paths

```
bfs(vertex v){
    Q = new Queue
    prev = empty list of vertices

    visit(v)
    Q.enqueue(v)

    while(queue is not empty) {
        u = Q.dequeue()
        for(each unvisited neighbor w of u){
            visit(w)
            prev[w] = u  // This line added to BFS
            Q.enqueue(w)
        }
    }
}
```
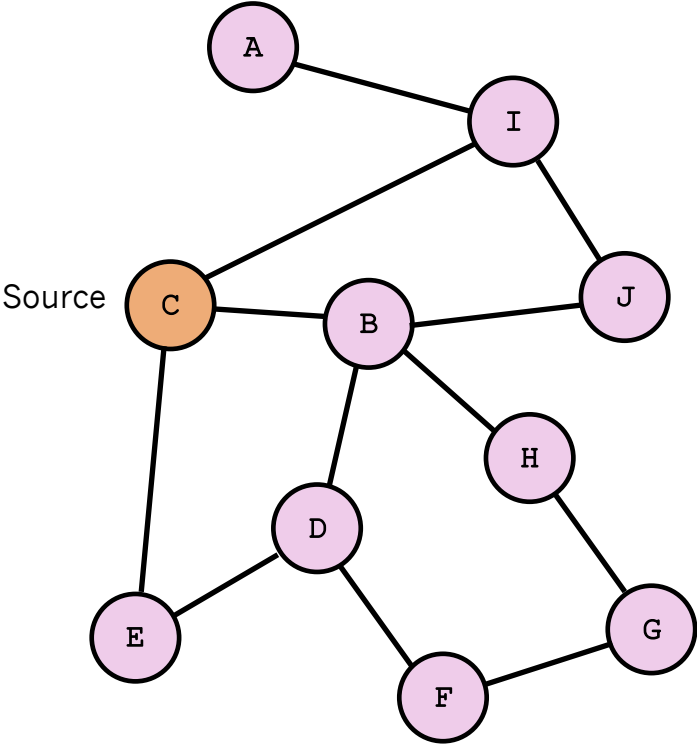
Recovering Shortest Paths

```
Shortest_path(vertex s, vertex t){
    prev = list of vertices from BFS
    sp = empty list of vertices

    current = t
    while (prev[current] has a vertex){
        add current to front of sp
        current = prev[current]
    }

    if (sp.length > 0){
        add s to front of sp
    }

    return sp
}
```

BFS SSSP Example

A

I

Source C B J

H

D

E G

F

Vertex	Prev
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	