Assignment 2

Shiv Pratap Singh

IIT2014121

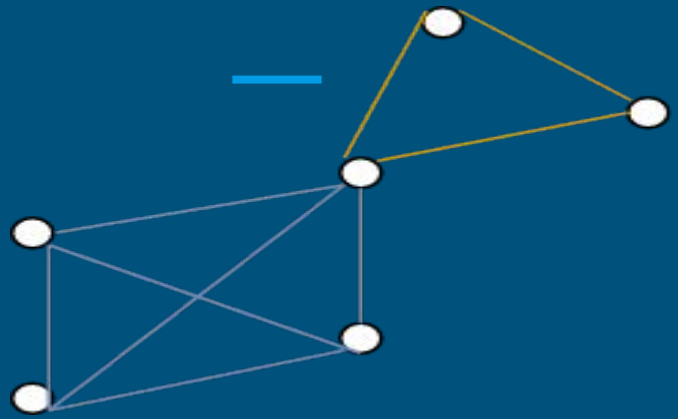
Nazish Tabassum

ICM2014504

Arqum Ahmad

IWM2014008

Given a graph, find the edge-disjoint and vertex disjoint subgraphs where subgraphs are complete graphs

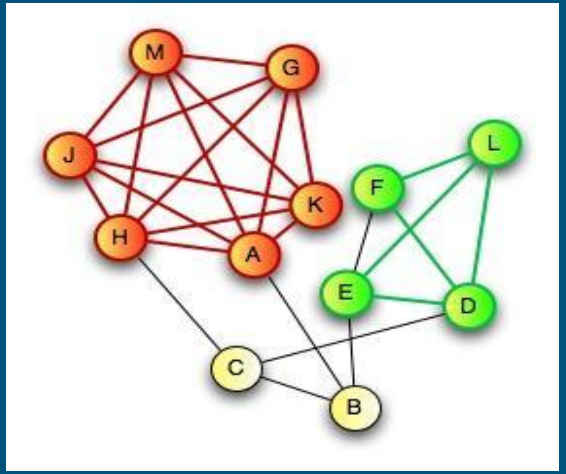


Edge disjoint cliques in a graph

Summary

- Edge-disjoint - Two graphs not having any edge common.
- Vertex-disjoint - Two graphs not having any vertex common.

So what, we need to find subgraphs in graph which are edge disjoint or vertex disjoint and which are clique.



Vertex disjoint cliques in a graph

Algorithm for edge disjoint cliques in a graph

B. Edge disjoint maximal cliques

Input: A graph in the form of adjacency matrix

Output: A set C containing edge disjoint maximal cliques in graph

```
EdgeDisjointCliques
    Find isolated vertex in graph
        pushAllIsolatedVertexIn(C)
    PrepareEdgeSetFromGraph
     while(NotEdgeSetEmpty)
        (u, v) = EdgeSet.pop()
        cliqueSet.insert(u, v)
        ExpandCliqueSet(v, cliqueSet)
        cliqueSet.clear()
ExpandCliqueSet(v, cliqueSet)
    For j iterate over N(v)/cliqueSet
        If JIsExpandable(j, cliqueSet)
            CliqueSet.insert(j)
    CliqueSetRemoveAssociatedEdges(cliqueset)
    C.insert(cliqueset)
JIsExpandable(j, cliqueSet)
    For i iterateOverCliqueSet
        IsNeighbour(i,j)
CliqueSetRemoveAssociatedEdges(cliqueset)
    RemoveAssociatedEdgesfromGraph
    RemoveAssociatedEdgesfromEdgeSet
```

Algorithm for vertex disjoint cliques in a graph

C. Vertex disjoint maximal cliques

Input: A graph in the form of adjacency matrix

Output: A set C containing vertex disjoint maximal cliques in graph

VetexDisjointCliques

```
1  Find isolated vertex in graph
2      pushAllIsolatedVertexIn(C)
3  PrepareEdgeSetFromGraph
4   while(NotEdgeSetEmpty)
5      (u, v) = EdgeSet.pop()
6      cliqueSet.insert(u, v)
7      ExpandCliqueSet(v, cliqueSet)
8      cliqueSet.clear()
```

ExpandCliqueSet(v, cliqueSet)

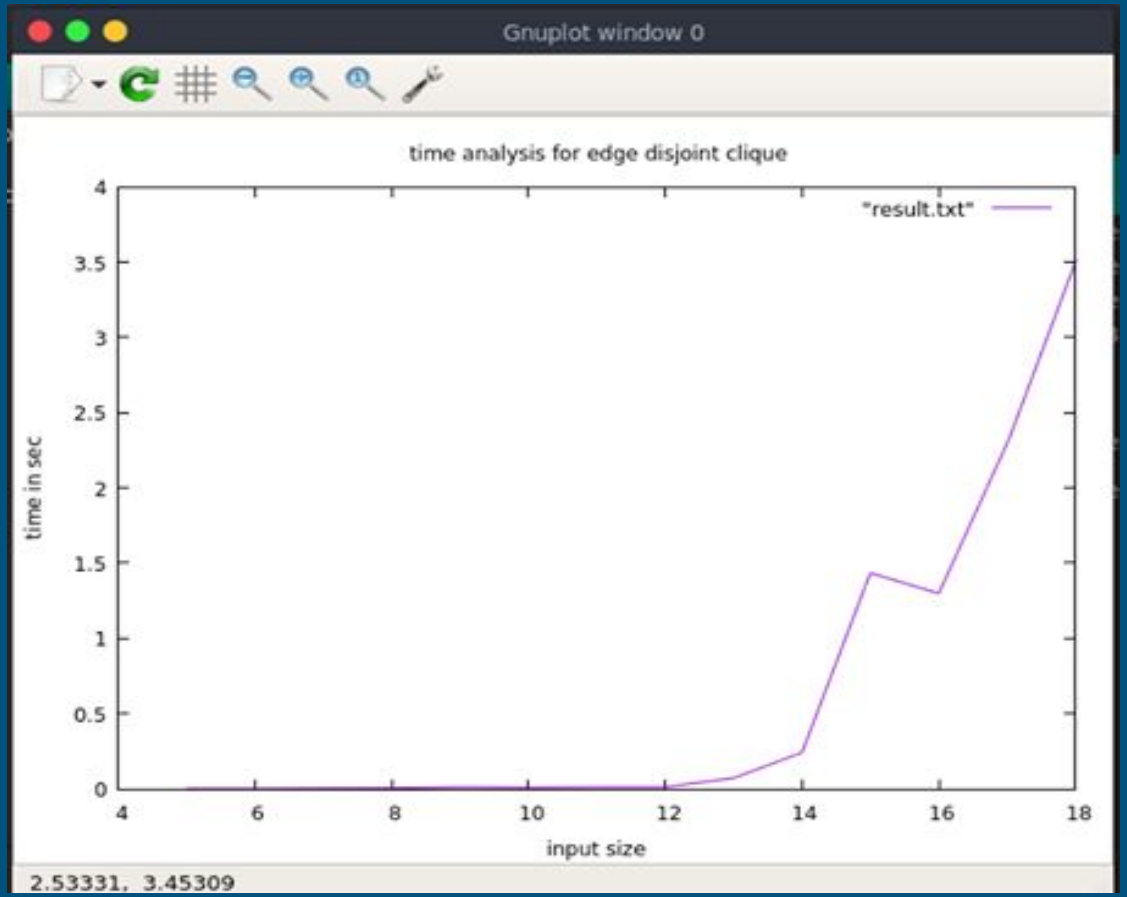
```
1  For j iterate over N(v)/cliqueSet
2      If JIsExpandable(j, cliqueSet)
3          CliqueSet.insert(j)
4  CliqueSetRemoveAssociatedVertex(cliqueset)
5  C.insert(cliqueset)
```

JIsExpandable(j, cliqueSet)

```
1   For i iterateOverCliqueSet
2       IsNeighbour(i,j)
```

CliqueSetRemoveAssociatedEdges(cliqueset)

```
1  RemoveAllAssociatedEdgesfromGraphForEachVer-
texInCliquesSet
2  RemoveAllAssociatedEdgesfromEdgeSetForEachVer-
texInCliquesSet
```


Gnuplot window 0
time analysis for edge disjoint clique
"result.txt"
time in sec
input size
0
0.5
1
1.5
2
2.5
3
3.5
4
4
6
8
10
12
14
16
18
2.53331, 3.45309

Thank You