

Assignment 10 | Advance Algorithms

CE-092

Assignment submission for Advance Algorithms subject week 10.

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Task 1:

Vertex cover using greedy and approximate methods.

Code:

Greedy Approach :

```
def greedy_vc(input_graph):
    cover = []
    valid, num_edge = valid_cover(input_graph, cover)

    while not valid:
        m = [x for x in range(0, len(num_edge)) if
num_edge[x] == max(num_edge)][0]
        cover.append(m)
        valid, num_edge = valid_cover(input_graph,
cover)
    return cover

def valid_cover(graph, cover):
    valid = True
    num_edge = [0] * len(graph)
    for i in range(0, len(graph)):
        for j in range(i, len(graph)):
            if graph[i][j] == 1:
```

```

        if (i not in cover) and (j not in
cover):

            valid = False
            num_edge[i] += 1
            num_edge[j] += 1
        return valid, num_edge

def test():
    graph = [[0, 1, 1, 0],
             [1, 0, 1, 1],
             [1, 1, 0, 1],
             [0, 1, 1, 0]]
    cover = greedy_vc(graph)
    print(cover)

test()

```

Approximate approach :

```

/*
 * @Author: nevil11
 * @Date: 2020-10-25 17:37:11
 * @Last Modified by: nevil11
 * @Last Modified time: 2020-10-25 17:43:40
 */

package vcp;
import java.util.*;
import java.util.LinkedList;

class VCP {
    private int V;

    VCP(int v) {
        V = v;
    }
}

```

```

}

void printVertexCover(int g[][]) {
    boolean visited[] = new boolean[V];
    for (int i = 0; i < V; i++)
        visited[i] = false;

    for (int i = 0; i < V; i++) {
        if (!visited[i]) {
            for (int j = 0; j < V; j++) {
                if (g[i][j] == 1 && !visited[j]) {
                    visited[i] = true;
                    visited[j] = true;
                    break;
                }
            }
        }
    }

    for (int j = 0; j < V; j++)
        if (visited[j])
            System.out.print(j + " ");
}

public static void main(String args[]) {
    VCP g = new VCP(4);

    int[][] graph = {{0, 1, 1, 0},
                     {1, 0, 1, 1},
                     {1, 1, 0, 1},
                     {0, 1, 1, 0}
    };
}

```

```
        System.out.println();  
        g.printVertexCover(graph);  
        System.out.println();  
    }  
}
```

Output:

```
+ Terminal  
nevil11@me:/media/nevil11/Nevil New/Third Year/AA/LABS/L10$ python greedy\ vetext\ cover.py  
[1, 2]  
nevil11@me:/media/nevil11/Nevil New/Third Year/AA/LABS/L10$ java approx\ vertex\ cover.java  
0 1 2 3  
nevil11@me:/media/nevil11/Nevil New/Third Year/AA/LABS/L10$ |
```

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