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**ISLAMABAD
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DATA STRUCTURE AND ALGORITHM

Lab Report

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Experiment # 1

PRIMS THEOREM

Objective

To understand and implement the Prim's theorem.

Software Tool

1. Dev C++

1 Theory

In computer science, Prim's algorithm is a greedy algorithm that finds a minimum spanning tree for a weighted undirected graph. This means it finds a subset of the edges that forms a tree that includes every vertex, where the total weight of all the edges in the tree is minimized.

2 Task

2.1 Procedure: Task 1

2.2 Procedure: Task 2

```
#include <stdio.h>
#include <limits.h>
using namespace std;
#define V 8
int minKey(int key[], bool mstSet[])
{
    int min = INT_MAX, min_index;
    for (int v = 0; v < V; v++)
        if (mstSet[v] == false && key[v] < min)
            min = key[v], min_index = v;

    return min_index;
}
```

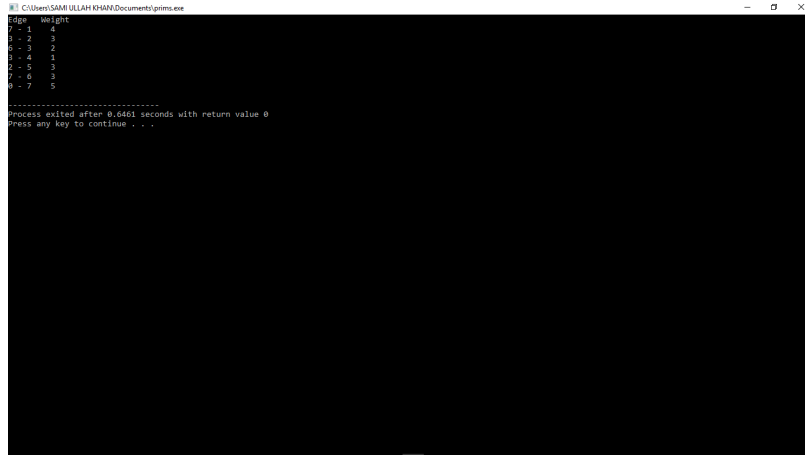


Figure 1: Time Independent Feature Set

```

}int printMST(int parent[], int n, int graph[V][V])
{
    printf("Edge---Weight\n");
    for (int i = 1; i < V; i++)
        printf("%d---%d---%d\n", parent[i], i, graph[i][parent[i]]);
}void primMST(int graph[V][V])
{
    int parent[V];
    int key[V];
    bool mstSet[V];
    for (int i = 0; i < V; i++)
        key[i] = INT_MAX, mstSet[i] = false;
    key[0] = 0;
    parent[0] = -1;
    for (int count = 0; count < V-1; count++)
    {
        int u = minKey(key, mstSet);
        mstSet[u] = true;
        for (int v = 0; v < V; v++)
            if (graph[u][v] && mstSet[v] == false && graph[u][v] <
key[v])
                parent[v] = u, key[v] = graph[u][v];
    }

    printMST(parent, V, graph);
}

```

```
}
```

```
int main()
{
    /* Let us create the following graph
        2      3
    (0)---(1)---(2)
      |   / \   |
      6| 8/   \5|7
      | /     \ |
    (3)----- (4)
        9
    */
    int graph[V][V] = {{1, 8, 0, 0, 0,10,0,5},
                       {8, 0, 4, 0, 4,4,0,4},
                       {0, 4, 0, 3, 0,3,0,0},
                       {0, 0, 3, 0, 1,6,2,0},
                       {0, 4, 0, 1, 0,0,3,0},
                       {10, 4, 3, 6, 0,0,0,0},
                       {0, 0, 0, 2, 3,0,0,3},
                       {5, 4, 0, 0, 0,0,3,0},
    };

    primMST( graph );

    return 0;
}
```

3 Conclusion

in this we understand about the kruskal theorem and how it is implemented by code.