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| **NAME:** | Kunal Bhatia |
| **UID:** | 2021300010 |
| **SUBJECT** | Design and Analysis of Algorithm |
| **EXPERIMENT NO :** | 06a |
| **DATE OF PERFORMANCE** | 27/03/2023 |
| **DATE OF SUBMISSION** | 03/04/2023 |
| **AIM:** | To find shortest path using Dijkstra’s Algorithm. |
| **PROBLEM STATEMENT 1:** | **shortest path using Dijkstra’s Algorithm and prim’s algorithm.** |
| **ALGORITHM and THEORY:** | **function** Dijkstra(*Graph*, *source*):  2   * **for each** vertex *v* in *Graph.Vertices*: * dist[*v*] ← INFINITY * prev[*v*] ← UNDEFINED * add *v* to *Q* * dist[*source*] ← 0 8 * **while** *Q* is not empty: * *u* ← vertex in *Q* with min dist[u] * remove u from *Q*   12   * **for each** neighbor *v* of *u* still in *Q*: * *alt* ← dist[*u*] + Graph.Edges(*u*, *v*) * **if** *alt* < dist[*v*]: * dist[*v*] ← *alt* |

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|  | 17 prev[*v*] ← *u*  18  19 **return** dist[], prev[] |
| **PROGRAM:** | #include <limits.h> |
|  | #include <stdbool.h> |
|  | #include <stdio.h> |
|  | int V; |
|  | int minDistance(int dist[], bool sptSet[]) |
|  | { |
|  | int min = INT\_MAX, min\_index; |
|  | for (int v = 0; v < V; v++) |
|  | if (sptSet[v] == false && dist[v] <= min) |
|  | min = dist[v], min\_index = v; |
|  | return min\_index; |
|  | } |
|  | void printSolution(int dist[]) |
|  | { |
|  | printf("Vertex \t\t Distance from Source\n"); |
|  | for (int i = 0; i < V; i++) |
|  | printf("%d \t\t\t\t %d\n", i, dist[i]); |
|  | } |
|  | void dijkstra(int graph[V][V], int src) |
|  | { |
|  | int dist[V]; |
|  | bool sptSet[V]; |
|  | for (int i = 0; i < V; i++) |
|  | dist[i] = INT\_MAX, sptSet[i] = false; |
|  | dist[src] = 0; |

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|  | for (int count = 0; count < V - 1; count++) { int u = minDistance(dist, sptSet);  sptSet[u] = true;  for (int v = 0; v < V; v++)  if (!sptSet[v] && graph[u][v] && dist[u] != INT\_MAX  && dist[u] + graph[u][v] < dist[v]) dist[v] = dist[u] + graph[u][v];  }  printSolution(dist);  }  int main()  {  printf("Enter the order:"); scanf("%d",&V);  int graph[V][V]; for(int i=0;i<V;i++)  {  printf("Elememts of row number %d:",(i+1)); for(int j=0;j<V;j++)  {  scanf("%d",&graph[i][j]);  }  }  dijkstra(graph, 0);  return 0;  } |

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| **OUTPUT:** |  |

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| **CONCLUSION:** | By performing the above experiment i have successfully found the shortest part of different vertices from a single source using Dijkstra’s algorithm. |