**深 圳 大 学 实 验 报 告**

**课程名称：­ 计算机网络（Computer Networks）**

**实验名称： Network Layer Assignment**

**学院： 电子与信息工程学院**

**专业： 电子信息工程**

**指导教师： 毕宿志**

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**实验时间： 2023 年 12 月 10 日**

**实验报告提交时间： 2023 年 12 月 14 日**

**教务部制**

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| 1. **Purpose of experiment** 2. Understand the principles of the Dijkstra algorithm and the Distance-Vector algorithm ; 3. practice the Dijkstra algorithm and the Distance-Vector algorithm; 4. In the program, we can input the specified start node and then output corresponding to the routing table and shortest paths. 5. **Experimental principle** 6. the Dijkstra algorithm 7. Initialization: Set the distance of the source node to 0 and all other nodes to infinity. Mark all nodes as unvisited. 8. Select the node with the smallest distance: Among the unvisited nodes, choose the node with the smallest distance as the current node. 9. Visit neighbors and update distances: For each unvisited neighbor of the current node, calculate the distance from the source node through the current node. If this distance is smaller than the previously recorded distance, update the neighbor's distance to the new smaller value. 10. Mark the current node as visited: After visiting all neighbors of the current node, mark it as visited to indicate that its shortest path has been determined. 11. Repeat steps 2-4: Repeat steps 2 to 4 until all nodes have been visited. 12. Extract the shortest paths: Once the algorithm finishes, the shortest path from the source node to any other node can be extracted by following the path with the smallest recorded distance. 13. the Distance-Vector algorithm 14. Initialization: Each node in the network initializes its own routing table, setting the distance to itself as 0 and the distance to all other nodes as infinity, except for its directly connected neighbors. The routing table also includes the next-hop information to reach each destination. 15. Exchange of routing tables: Each node shares its routing table with its neighboring nodes. This exchange happens periodically or when there is a change in the network topology. 16. Distance calculation: Each node, upon receiving the routing tables from its neighbors, calculates the distance to each destination by considering the distances advertised by its neighbors and adding the cost of the link between itself and the neighbor. 17. Distance update: If a node discovers a shorter path to a destination through one of its neighbors, it updates its routing table with the new distance and next-hop information. 18. Iterative update: Steps 2-4 are repeated iteratively until all nodes in the network have converged on the optimal routing information. Convergence occurs when no further updates are made to the routing tables. 19. Path determination: Once convergence is achieved, each node can determine the shortest path to any other node by following the next-hop information in its routing table. 20. **Content** 21. the Dijkstra algorithm 22. write code with the principle of the Dijkstra algorithm 23. in the the code ,I set a input to get the start node , so we input the start node 24. get the distance list and path from the specified node to other nodes. 25. the Distance-Vector algorithm 26. write code with the principle of the Distance-Vector algorithm 27. in the the code ,I set a input to get the start node , so we input the start node 28. get the distance list and path from the specified node to other nodes. |
| 1. **Conclusion and discussion**   the conclusion:   1. the Dijkstra algorithm   for exmaple, we can get the shortest distance list and the list of path for the start node of 0;  截屏2023-12-16 00.52.24   1. the Distance-Vector algorithm   for exmaple, we can get the shortest distance list and the list of path for the start node of 0;  截屏2023-12-16 00.50.54  the discussion:  In both experiments although there are differences in their algorithms, they both achieve outputting the real routing table by iterating over the original routing table.At the same time, we find that the structure of the arrays used to record the existing topological tables that I was using to make the calculations easy is different. |
| 指导教师批阅意见：  成绩评定：  指导教师签字：  年 月 日  备注： |

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2、教师批改学生实验报告时间应在学生提交实验报告时间后10日内。