Unit 7: Algorithms on Graphs I (part 2)

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SPECIFICATION REFERENCES

2.2 Floyd's algorithm for finding the shortest path.

PRIOR KNOWLEDGE

Covered so far

- Introduction to graph theory (Unit 1c)

KEYWORDS

Minimum spanning tree, Kruskal's algorithm, Prim's algorithm, network, distance matrix, Dijkstra's algorithm, working values, final values, directed network, source vertex, destination vertex, distance table, sequence table, Floyd's algorithm.

7a. Floyd's algorithm (2.2)

Teaching time
6 hours

OBJECTIVES

By the end of the sub-unit, students should:

- be able to find all the shortest paths between all the pairs of vertices using Floyd's algorithm.

TEACHING POINTS

The method successively modifies two distinct matrices; a distance matrix (showing weights of each edge) and a route matrix.

The distance matrix will be symmetrical unless it represents a digraph. An iteration must be carried out for each vertex, even if there are no changes on an iteration – the algorithm is not complete until you have done so.

OPPORTUNITIES FOR REASONING/PROBLEM SOLVING

Students must be able to explain what the algorithm has achieved and be able to show how to find the quickest time and/or route between any two vertices.

COMMON MISCONCEPTIONS/ EXAMINER REPORT QUOTES

It is not usual for a complete application of Floyd to be set – usually just one or two iterations are tested. For a complete application, the network must be small.

NOTES

When applying Floyd's algorithm, unless directed otherwise, students will be expected to complete the first iteration on the first row of the corresponding distance and route problems, the second iteration on the second row and so on until the algorithm is complete.