DIJKSTRA'S SHORTEST PATH ALGORITHM

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HISTORY

- Created and published by Dr Dijkstra, a Dutch computer scientist and software engineer in 1959
- 3-page article, titled “A note on two problems in connexion with graphs” where he explained his new algorithm

DIJKSTRA'S ALGORITHM

- Find the shortest path between nodes in a graph
- To find the shortest path from a node ('source node') to all other nodes in the graph
- Producing a shortest-path tree
- This algorithm is used in GPS devices to find the shortest path between current location and destination. Broad applications in industry, especially for modelling of networks

IMAGINE

- Journey by car from Greenock to Glenrothes
- Multiple routes to choose, each with varying distances and traffic conditions
- Dijkstra's algorithm is like a navigation app calculating the fastest route
- Considering factors such as road distances, traffic patterns, times of traffic, roadworks, blocked roads, congested roads, and weather conditions
- To ascertain the shortest travel time
- The app suggests the route that minimises the total travel time, considering all factors
- You follow the suggested route making adjustments along the way based on real-time traffic updates

KEY POINTS

- The algorithm works on weighted graphs, where each edge has a weight representing the distance or cost of traversing that edge
- Maintains a set of unvisited nodes and a set of visited nodes
- At each step, it selects the unvisited node with the smallest distance from the source node
- Updates the distance of all neighbours of the selected node
- Process continues until all nodes are visited