DSA Project

Network Routing Optimization Using Dijkstra's Algorithm

Meet the group

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Introduction

Why Routing Optimization Matters:

- Internet -> huge network of routers
- Every router connected by links
- Data must travel through the fastest path
- High delays means poor performance

Problem Statement

The Problem:

- Network links have different latencies
- Need the minimum-latency path
- Dynamic and complex network
- Manual selection impossible

Proposed Solution

Our Solution:

- Model routers as graph nodes
- Model connections as weighted edges
- Use Dijkstra's Algorithm
- Visualize path on a topology graph

HOW – WHAT –WHY

01

C++ Backend:

- Reads network file
- Builds graph
- Runs Dijkstra
- Saves shortest
  path + topology

02

Python Visualization:

- Loads CSV + path
- Draws full topology
- Highlights optimal
  path

03

Graph Structure:

- adjacency[u] = list of (v, weight)
- Undirected network
- Weight = latency (ms)

How Dijkstra Works:

- Uses min-heap priority
  queue
- Always picks router with
  minimum cost
- Updates neighbors
- Builds parent[] to
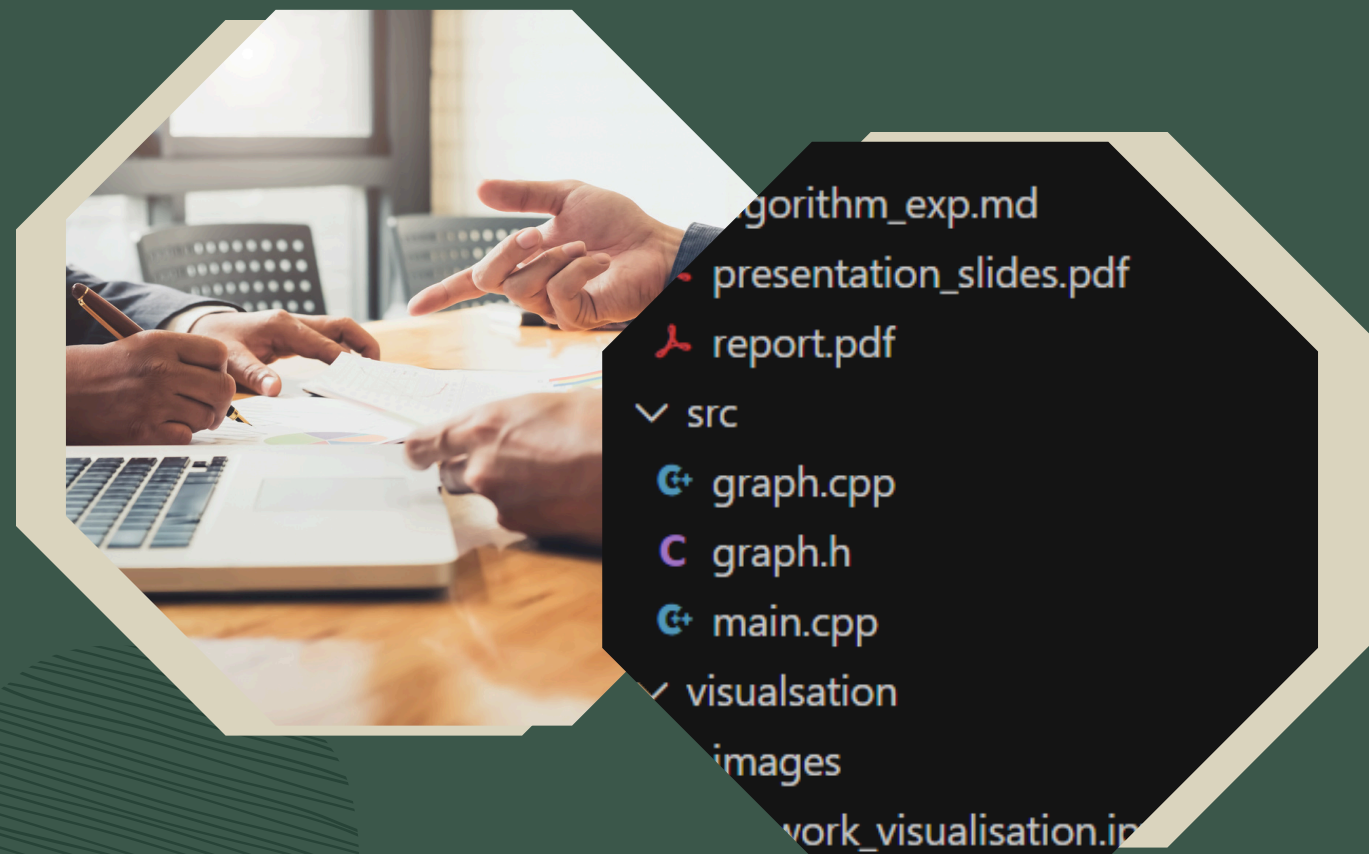 reconstruct route

04

Real-World Applications

Used In:

- OSPF (Internet routing)
- Telecom backbone networks
- Data centers
- Cloud routing algorithms

Conclusion

Summary:

- Efficient routing simulation
- Models real Internet behavior
- Combines C++ & Python
- Demonstrates real-world DSA application

Thank You