Travel Route Analysis Using Recursive SQL & Path-Finding Logic

Project Title:

Travel Route Analysis Using Recursive SQL & Path-Finding Logic

Overview:

This project demonstrates complex SQL logic using **recursive CTEs** to model and explore travel routes across Indian cities. It solves real-world challenges like round trip detection, shortest/longest path computation, dynamic route generation, and filtering by distance or hops.

You simulate a transport or logistics system using realistic travel and city data, and implement recursive queries to explore all valid paths between cities — including multi-hop journeys and loops.

Skills Demonstrated:

- Recursive CTEs with UNION ALL
- Cycle detection and loop prevention in travel paths
- Round-trip identification from any city
- Path tracing with level and distance counters
- Dynamic path filters (max distance, max hops)
- Parameterized route search with start and end cities
- Performance optimization with indexing and reduced recursion
- Custom metrics like shortest/longest round trips

Key Highlights:

1. Generate all travel paths from Agra using recursion.
2. Show shortest and longest paths between cities.

3. Detect valid round trips from a city without visiting the same city twice.

4. Allow dynamic source/destination parameters.

5. Use `MAXRECURSION` to control performance.

6. Find top-N round trips within a distance/hop constraint.

7. Detect loops (non-returning to start) for advanced scenarios.

8. Apply indexes for optimizing route discovery queries.

Ideal For:

Clients in transportation, delivery routing, or travel tech needing custom SQL logic for routing, optimization, and reporting.

Bonus:

Includes index suggestions and query structuring techniques for scaling recursive logic in production.