G-Real

Network Monitoring Problem
Problem Type: Vertex Cover

Our company has 8 computers connected by several communication links. These computers are named: ... ...

Problem: How can we select the minimum number of computers to deploy monitoring devices, such that every communication link is monitored by at least one device?

Communication links as follows: ... ...

Wireless Channel Allocation Problem
Problem Type: Coloring

I am designing a public Wi-Fi network for my city, with ... The network will cover 8 major locations in the city: ... ...

The interference relationships between the base stations are as follows: ... ...

Can you help me come up with a solution for frequency allocation to ensure stable and reliable network performance across all locations?

Delivery Logistics Problem
Problem Type: TSP

Our company handles deliveries across a busy urban area, and today we have 7 distinct delivery points to cover ... ...

Here is the distance table showing the approximate distance (in kilometers) between each pair of locations: ... ...

Based on this distance table, we need to determine the optimal delivery route that ... return to warehouse with the shortest possible total distance.

TIEA

Function: Extracts background, entities, and definitions from text to provide semantic context for problem analysis.
Tool Use: False
Output Format:
- **context:** The background and contextual description of the problem.
- **entities:** List of key entities or concepts mentioned.
- **definitions:** Definitions and explanations of terms involved

PIEA

Function: Extracts problem type, constraints, and optimization objectives for graph theory solutions.

Tool Use: False

Output Format:
- **objective:** The goal of the problem
- **constraints:** Key constraints in the problem.
- **optimization:** Optimization objectives

GSIEA

Function: Extracts and standardizes graph data from text, identifying nodes, edges, weights, and topology for efficient downstream processing.
Tool Use: False
Output Format:
- **nodes:** List of nodes in the graph
- **edges:** Connected nodes with attributes like weight or direction
- **graph type:** The type of graph

GTA

Graph Theory Knowledge Base

Function: Integrates extracted information, analyzes graph properties, and searches a **Graph Theory Knowledge Base** to select the optimal algorithm, enhancing inference efficiency and solution accuracy.

Tool Use: False

Output Format:
- **problem:** Type of graph theory problem.
- **algorithm:** Selected algorithm name.
- **parameters:** Required parameters for the algorithm.
- **complexity:** Time complexity of the selected algorithm.
- **description:** Why this algorithm is the best choice for the given problem.

SGIA

Function: Converts textual graph data into a standardized, optimized format, ensuring consistency, efficiency, and compatibility for computational solving.
Tool Use: True
Output Format:
- **graph type:** The type of graph
- **adjacency list:** Maps nodes to their neighbors and edge weights.
- **node mapping:** Links node names to numerical IDs.

ASA

Code Interpreter

Graph Theory Algorithm Library

Function: Executes the selected optimal graph algorithm by extracting and formatting required parameters, calling the **Graph Theory Algorithm Library** for computation, ensuring solution feasibility, and providing clear, explainable reasoning for the results.

Tool Use: True

Final Solution:
The most efficient delivery route that visits each delivery point exactly once and returns to the warehouse is:

Route: Warehouse → Gilded Archway → Jade Fountain → Zenith Arena → Primrose Boulevard → Temple Square → Pennywhistle Arcade → Lunar Pier → Warehouse

Total Distance: 34 units
This solution ensures that the delivery is conducted in the most efficient manner, minimizing travel distance.