Graph-Based Adversarial Thinking Assignment

Title: Navigating Safely: Applying Graph Theory to Find the Least Dangerous Routes in El Paso

Introduction:

Graph theory provides powerful tools for understanding and optimizing complex networks, such as transportation routes. It involves the use of nodes, representing locations, and edges, representing paths, weighted by criteria of importance. In this assignment, we will explore graph principles to identify the safest path between familiar locations in El Paso based on the criterion 'Least Dangerous Route.' We'll incorporate adversarial thinking to understand potential risks involved in navigating these paths.

Task:

You are provided with a graph data file derived from real-world locations within the area of El Paso. Each node represents a point of interest, and the edges between these nodes indicate possible routes, weighted by safety levels. Your task is to apply graph theory to analyze these routes and identify the least dangerous path among the given locations. Consider the provided criteria and potential adversarial conditions such as traffic conditions, visibility issues, and pedestrian crossings, which could affect route safety.

Student Expectations:

- Use the graph data file to visualize the provided locations.

- Apply graph algorithms (such as Dijkstra's or A* algorithms) to search for the least dangerous routes.

- Evaluate and justify your chosen path based on the criteria of safety and potential threats.

- Provide a detailed report outlining your methodology, findings, analysis, and recommendations for improvement.

Guidelines:

This assignment focuses on the 'Applying' level of Bloom's Taxonomy. Students are expected to demonstrate their ability to implement theoretical knowledge in practical scenarios:

- Understand and apply graph algorithms to real-world data.

- Transfer insights from theoretical graph models to practical safety concerns.

- Use analytical skills to assess risk factors and determine the optimal path.

Critical Thinking Prompts:

- How do potential adversarial factors (e.g., nighttime vs. daytime, weather conditions) impact your chosen route?

- What additional real-world data could enhance the reliability and accuracy of your route evaluation?

- Could some of the intersections pose higher risks, and if so, how would you adjust your graph weights to account for this?

- How can public infrastructure, such as better lighting or traffic signs, mitigate identified risks on your selected route?

In this assignment, you will gain hands-on experience with graph theory, develop a nuanced understanding of route safety, and explore how theoretical frameworks can be applied to real-world scenarios, enhancing your sense of belonging by connecting you with local environments.