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CMSC204

Professor Tsai

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Learning Experience Assignment 6

Throughout this assignment, I gained valuable insights into graph algorithms and data structures, particularly through the implementation of Dijkstra's Shortest Path algorithm. This project deepened my understanding of fundamental concepts such as graph traversal, shortest path calculations, and edge management. By creating a network of towns and roads, I not only practiced implementing these concepts but also refined my skills in designing and managing complex data structures like graphs.

One of the key lessons I learned was the importance of meticulous planning and design when working with interconnected data structures. The process of creating and managing the Town, Road, and Graph classes required me to think critically about how each component interacts within the overall system. This was particularly evident when implementing methods for adding and removing edges and vertices, where I had to ensure the consistency and integrity of the graph's state.

However, I encountered significant challenges when it came to integrating and applying these concepts into a cohesive project. While the theoretical aspects of Dijkstra's algorithm and graph management were clear, translating these ideas into practical code was more complex. Debugging issues related to edge handling and pathfinding underscored the importance of carefully managing state and ensuring that all operations maintain the graph's integrity. For instance, ensuring that roads were accurately reflected in the graph and managing bidirectional connections proved to be more challenging than anticipated.

Reflecting on the project, I realize that a more thorough approach to planning and incremental testing could have mitigated some of these challenges. In future projects, I would prioritize a more structured approach to design and testing, perhaps by breaking down tasks into smaller, more manageable components and validating each part individually before integrating them into the larger system. Additionally, enhancing my debugging techniques and employing more detailed test cases would help identify and resolve issues more efficiently.

Overall, this assignment provided me with a deeper appreciation for the complexities of graph-based algorithms and data management. The experience reinforced the importance of careful planning, thorough testing, and iterative development in tackling complex programming challenges.