IE 479 Fall 2024 Project 1
Logistics Planning for Emergency Aid
Distribution Centers
Due Date: October 15, 23:59

1 General Information

Natural disasters are an inevitable part of life, often striking without warning and causing widespread disruption. In the aftermath of events like earthquakes, floods, or hurricanes, the efficient distribution of emergency aid is crucial to saving lives and supporting affected communities. This aid often includes essential resources like food, water, medical supplies, and temporary shelter. To ensure rapid response and widespread coverage, temporary aid distribution centers need to be strategically placed in locations that provide easy access to vulnerable populations while minimizing logistical challenges.

Effective logistics planning for these distribution centers is essential, as it impacts not only the speed of aid delivery but also the number of people who can be reached within a critical time window. Careful consideration must be given to factors such as transportation routes, coverage areas, and resource allocation.

This project requires to develop a logistics plan for the placement of emergency aid distribution centers in response to a hypothetical disaster. Factors such as coverage radius, population density, and transportation constraints should be considered to optimize the placement of these centers while addressing real-world issues like budgetary limitations and capacity constraints.

2 Problem Definition

Authorities plan to open local aid distribution centers in regions recently impacted by a natural disaster. The centers should be strategically placed in locations that maximize coverage for the affected population and minimize transportation distances. These centers will be placed in accessible locations such as parking lots or community spaces.

3   Case Questions

1. Each aid distribution center must be located near a major road or transportation hub to ensure accessibility for supply trucks. Considering the logistics requirements, determine the optimal locations for aid distribution centers to cover every affected area within a certain radius. Analyze the system using radii of 2km, 3km, 4km, 5km, and 6km. Where should you place the centers for each radius?

2. If you have a limited budget to open distribution centers, try to cover as many people as possible within a specific radius. Analyze the system with the same radius values (2km, 3km, 4km, 5km, 6km), assuming you can open a maximum of 4 centers. Where should these centers be placed?

3. Minimize the total distance between the affected districts and the aid distribution centers while ensuring every district is within the coverage radius. Where should you place the centers based on radius values of 3km, 4km, 5km, and 6km, assuming a maximum of 4 centers?