Determining Optimal Police Patrol Times and Locations Using Local Search Techniques

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Local search is a powerful optimization method used to approach numerous computationally intensive, real-world problems. This research focused on designing an algorithm using local search optimization techniques to determine optimal police patrol locations and times based on historical crime data. The novel algorithm was inspired by the formulation of the facility location problem, a fundamental problem in the area of discrete optimization. An objective function was designed, which incorporated historical crime locations, times, and severities as well as a fixed cost for each police observation. The algorithm strives to minimize the objective function and ultimately output specific 30 minute intervals for police patrol at identified locations, which allows for easy implementation within existing police department infrastructure. The algorithm was implemented in Java, using the Google Maps API for geographic information, and then tested using historical crime data from the City of Hollywood, FL. The system analyzed 4085 crimes which occurred over a 6 month period and successfully identified 134 optimal police patrol locations and times. Placing police officers at such strategically chosen locations can help to improve the productivity and efficiency of police staff and enhance neighborhood safety by reducing crime rates. Further field testing can determine the effectiveness of the results, but a preliminary analysis of the algorithm results seems promising based on the distribution and clustering of crime locations.

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