Constraint Optimization Problem

Model:

* Inputs:
  + S: Drone start node set
  + V: Road graph vertices
  + R: Road graph edges
  + N: Number of drones
* Variable:
  + Domain: Subgraph of connected graph with vertices V + S
  + N variable assignments
* Set of Constraints:
  + Every variable assignment must have exactly one edge connected to exactly one node in S.
  + Every variable assignment must have 0 disconnected subgraphs
  + Every edge in R must be contained in at least one variable assignment
* Cost function: Sum of subgraph traversal costs

Solutions:

* Constraint Satisfaction Problem:
  + Modified Recursive Backtracking Search (Branch and Bound):
    - Modified to keep track of score of solutions that meet constraints
    - Branch and Bound can still take Recursive Backtracking Optimizations:
      * Filtering: Arc Checking
      * Ordering: Most Constrained Variable first
* Optimization Problem:
  + Metaheuristics:
    - Exploitation vs Exploration
    - Simulated Annealing
      * Always exploits
      * Explores randomly at a decreasing rate as time goes on
      * Tracks decreasing rate with Temperature
    - Genetic Algorithm
      * Population
      * Fitness
      * Selection: Exploitation
      * Crossover: Exploration
      * Mutation: Exploration

Genetic algorithms are best because they can get closest to optimal solution