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ENG/20M

CSCE 686 Advanced Algorithms, Project Stochastic Algorithm Selection

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Although we would prefer to utilize a genetic algorithms (GA) approach for the maximum coverage/minimum risk problem, we believe it to be too difficult to effectively represent a state. Ideally, we could represent a given state as a binary string. However, because each UAV path must be connected, a binary representation will certainly lead to invalid states during the GA process. Because we don’t know which UAVs (and how many) we need to use, how long the individual UAV paths need to be, or where the paths start and end, we will forego the use of genetic algorithms.

Instead, we will use a different population-based stochastic search algorithm. Stochastic beam search (SBS) seems a good choice. SBS is much more capable than GA of *building* a solution out of a given start state because it operates like any other path-based search tree. Furthermore, SBS might actually fully address some of the issues we faced in our deterministic approach – namely, an exceedingly-large search space. Because SBS culls the tree as it moves from one level to the next, we ensure our tree is sufficiently bounded. In doing so, we lose optimality (these are NP-hard problems, so this is expected), but we almost certainly improve execution time and resources. For these reasons (and more), we elect to utilize stochastic beam search for the project.

**References**

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