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Final Exam Write Up

The rocket that I have selected

**Validation**

**Process**

To find the rocket, I first canvased the configuration space via Latin Hypercube sampling. This sampling, besides randomly demonstrating the space, became the initial population for a custom-built genetic algorithm. The objective function for this algorithm was based on the rockets ability to meet the 5 primary constraints, as well as the rocket’s probability of failure and the rocket’s payload. The genetic algorithm carried methods for mutation, crossover breeding, and aging.

In addition to the genetic algorithm, I implemented an intelligent search strategy that refined each rocket incrementally during the simulation. This intelligent search was based on responding to common patterns of failure. For example, it might increase the number of boosters if the orbital velocity was too low, increase the payload in response to severe acceleration, or lengthen the rocket timing. Step sizes for this search pattern were minimized to limit bias in searching.

Results were also compared with those taken from a 50,000-sample, linear response surface. Optimal values of this response surface were solved for, however, the overall size and scope of the configuration space made the solutions unreliable.

**Resources**

My source code is available via Github at <https://github.com/jmorris335/Optimization-Final-Exam.git>