Novel Approaches

7th Research Consortium for
Multidisciplinary System Design Workshop

Purdue University, West Lafayette, IN
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Thoughts for Novel Approaches Discussion

- Influence of independent actors in a system (e.g. airlines in NextGen); how to incorporate these aspects
  - Combining optimization with game theory
  - Other areas where the actions of "operators" or "users" impact design

Novel Optimization Methods

- Power of matching optimization / search with problem characteristics
  - GAs for handling mixed integer NLPs
- Kriging
  - Scalability of Kriging fit with number of samples
  - Approximating the fitness function vs. individual Kriging models for each objective and constraint
    - Can get individual models for zero additional cost (same θ and γ) if use same correlation function and sample points (Ed has a proof)
    - Might improve constraint handling
- Hybrid approach: GA at top level combined with gradient-based goal attainment at lower level

Thoughts for Novel Approaches Discussion

- Can MDO problems be posed in a manner allowing for efficient geometric programming?
    - Are many / some response functions in MDO problems have convex?
    - Potential to solve very large (sparse) problems in "minutes"
- Potential to use the GP problem on portions of an MDO problem where convexity holds, or in a sequence of approximations, or in a step-wise approach