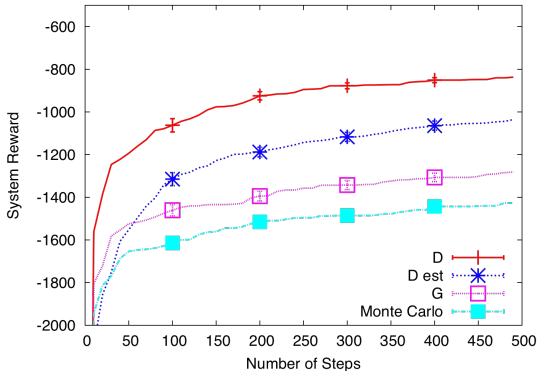
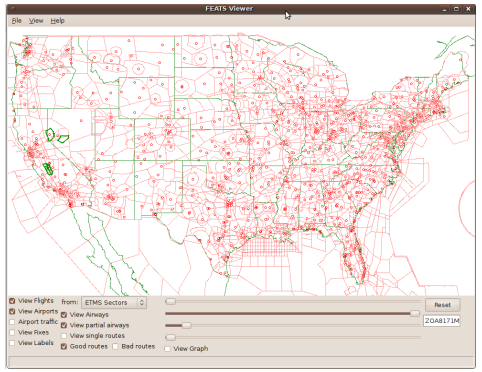
CPS Small: Distributed Coordination of Agents For Air Traffic Flow Management

PIs: Kagan Tumer (Oregon State University); Adrian Agogino (UC, Santa Cruz)

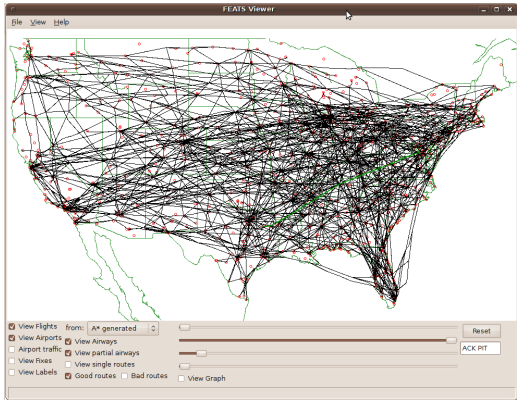
- Problem:
  - Inefficiencies in air traffic control cost time and money ($41 Billion in 2007)
  - Most approaches are hard to scale and cannot handle dynamic/noisy situations
  - Local congestion management may causes propagation of congestion
  - Global congestion management slow to react to developing conditions



- Opportunity:
  - Multiagent approach offers to speed up response by focusing on local response
  - New problem: How to measure global impact of local decisions?
    What about congestion propagation?



- Objectives:
  1. Derive a fast simulator to compute system states and agent rewards
  2. Select agent actions and rewards and evaluate their system-wide impact
  3. Show effectiveness of agent actions/rewards with real air traffic data



- Scientific Approach/Merit:
  - Select agents, actions and rewards to have “alignment” within system
  - Shift focus from “how to learn/control” to “what to learn/control”

- Impact:
  - Coordinated behavior for thousands of agents w/o external mechanisms
  - Potential savings of billions of dollars and millions of traveler hours