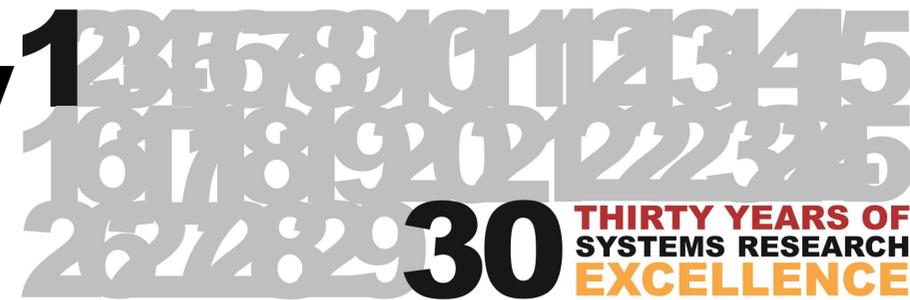


Balancing Airspace Demand and Capacity



**THIRTY YEARS OF
SYSTEMS RESEARCH
EXCELLENCE**

UNIVERSITY OF MARYLAND
INSTITUTE FOR SYSTEMS RESEARCH
A JAMES CLARK SCHOOL OF ENGINEERING

Faculty: Michael Ball and David Lovell

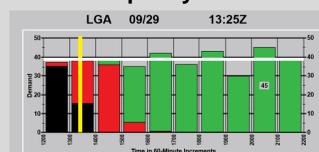
Students: Alex Estes

History

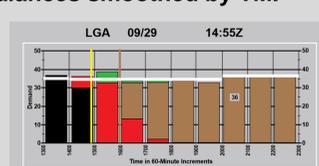
In the U.S. National Airspace System (NAS), there are frequent imbalances between demand (scheduled flights) and the capacity of the NAS resources:

- e.g. poor weather can reduce the number of flights that can land at an airport in a given hour below the number scheduled to land.
- The Federal Aviation Administration (FAA) uses Traffic Management Initiatives (TMI)s to manage such imbalances.
- Choosing the best TMI is difficult due to uncertainty of future weather and traffic conditions
- Prior Research:
 - Facilitating collaboration between FAA decision-makers and airlines
 - Inter-airline resource exchange mechanisms
 - Stochastic optimization models to reduce system delays

Imbalance in capacity and demand



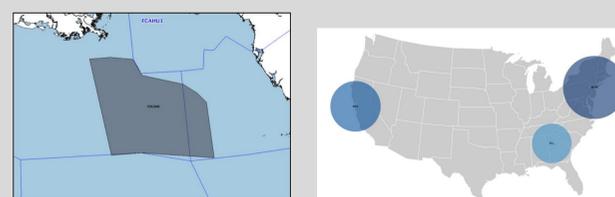
Imbalances smoothed by TMI



Future

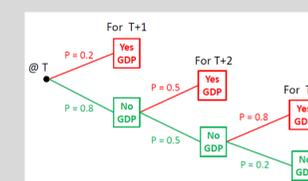
Broader problem scopes

Current research focuses on weather, traffic, and TMIs at airspace around airports. A similar approach can be taken for en route conditions, or for the entire NAS.



Predictions and Suggestions

After similar days and similar TMIs have been identified, this information may be used to predict what actions the FAA will take. This may be useful for airlines. Alternatively, the information can be used to suggest actions to FAA decision makers.



Similar Days in the National Airspace System

Increasing the availability of information for FAA decision-makers

Goal

Currently, FAA decision-makers rely heavily on intuition and experience in order to make TMI decisions. This can lead to decisions which are unpredictable or inefficient. The goal is to make data more available and digestible for FAA decision-makers so they may make higher-quality decisions.

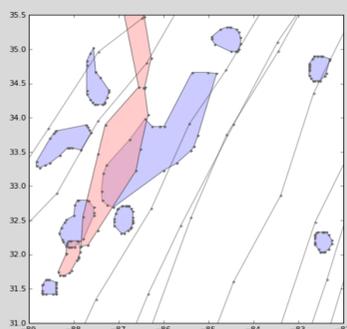
Proposed Process

1. Identify days with similar traffic and weather conditions to current day
2. Categorize TMI actions that were taken
3. Visualize data so that they are easily understandable by user

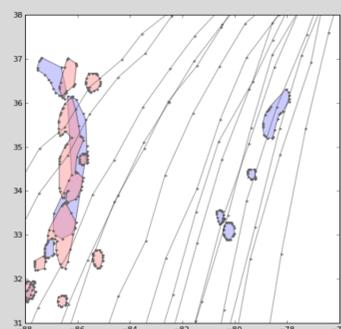
Similar Days

Days are considered similar if the weather has a similar affect on the traffic.

Less Similar

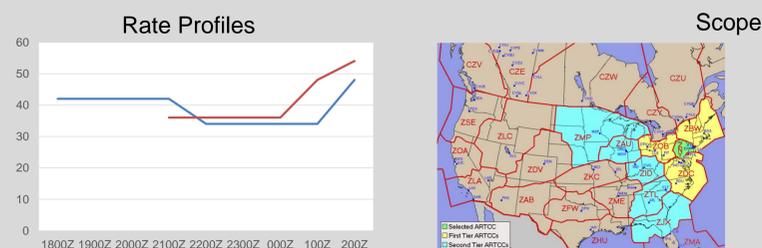


More Similar

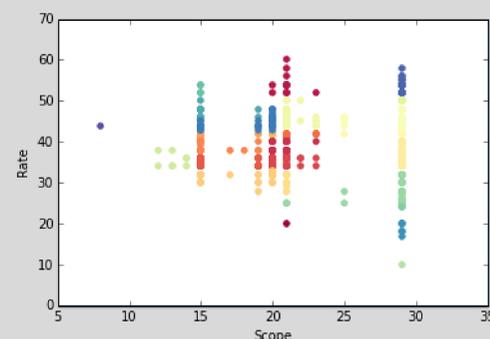


Categorizing Ground Delay Programs

Ground delay programs are characterized by timing information, scope and rate profiles.

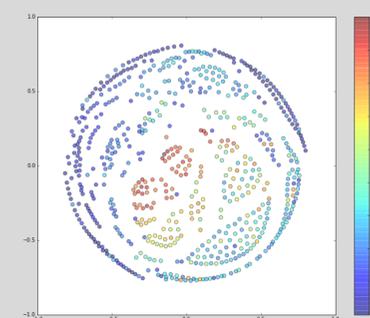


Ground delay programs are placed into groups with other ground delay programs sharing similar features.



Visualizing Data

Metric multidimensional scaling is used to produce plots in which similar days appear close together



Performance metrics and information about weather and traffic conditions are displayed when a day is selected.

Performance Chart

