Balancing Airspace Demand and Capacity

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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) 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

Future
Broader problem scopes
Current research focuses on weather, traffic, and TMI 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 TMI 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.

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

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

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