Exploring Delay Dispersal in US Airport Network
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Introduction
As air-travel becomes pervasive with a finite number of aircrafts in operation, airports need to operate efficiently. Otherwise, a disruption in operation can result in delay propagation throughout the airport network. Delays are costly, both in time and money. However, the importance of modeling the diffusion of delays over a network potentially help develop strategies to prevent the spread of disruptions and information.

Objectives
1. Develop and visualize a network diffusion simulator to simulate the spread of delays under a given general local influence model.
2. Identify the influential airports in the entire network and communities by applying the influence maximization algorithm with the diffusion simulator.
3. Examine and analyze delay propagation within and between clusters in airport networks.

Network Preparation
We sparsified the publicly-available historical United States Federal Aviation Administration (FAA) flight data for the ASPM-77 airports for January 2017 by removing the airport pairs that did not meet the threshold of 10% of the maximum number of flights between all pairs.

Results

Cluster Analysis
- Each cluster delay-activates roughly an equal percentage across the network.
- Cluster1 experiences the most delay between all clusters.
- There is a strong intra-cluster delay propagation.
- Cluster2 has roughly the same amount of delay-activation within its cluster and cluster1.
- Cluster3 has little influence over other clusters. Hence, it shows less connectivity to other clusters.

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