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UNICAMP

Flights Network

Final Presentation

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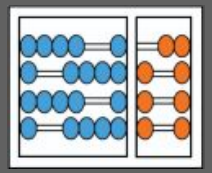

Instituto de Computação
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What we skipped | What is new

1. Airport hubs
2. ~~Possible flight legs between any origin and destination airport~~
3. ~~Most commonly used flight legs~~
4. ~~Indications of possible skiplagged flights~~
5. Ranking the airports by connection flights
6. Strongly connected airports

1. Airport hubs
2. Ranking the airports by connection flights
3. Strongly connected airports
4. Geographic distribution of airports
5. Airport delays analysis

Flights Network - Data Structure

This dataset contains records of all flights that took place in January 2019 at US airports.

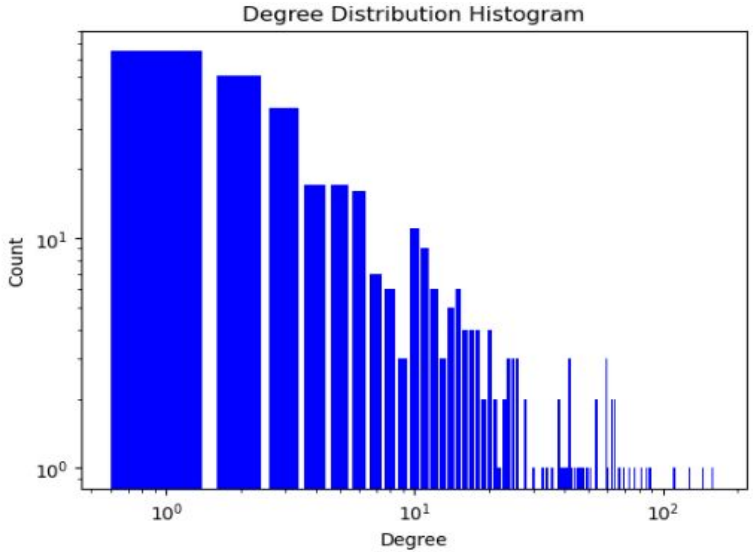
Rows: 584.000

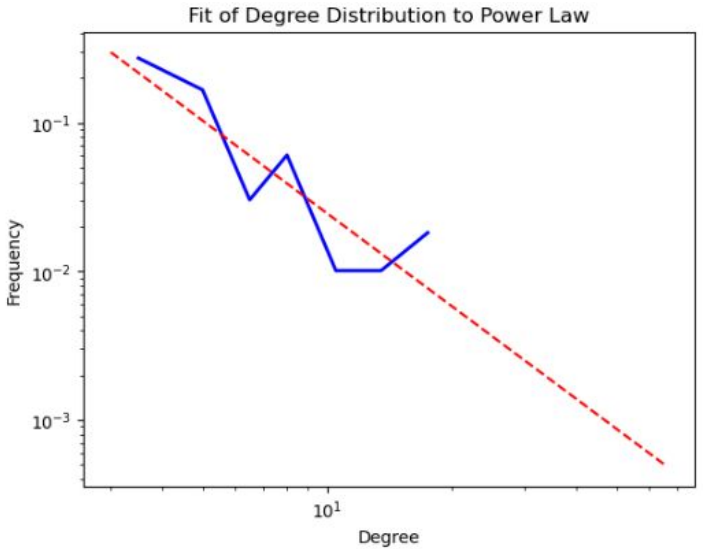
Nodes: 346

Edges: 5535

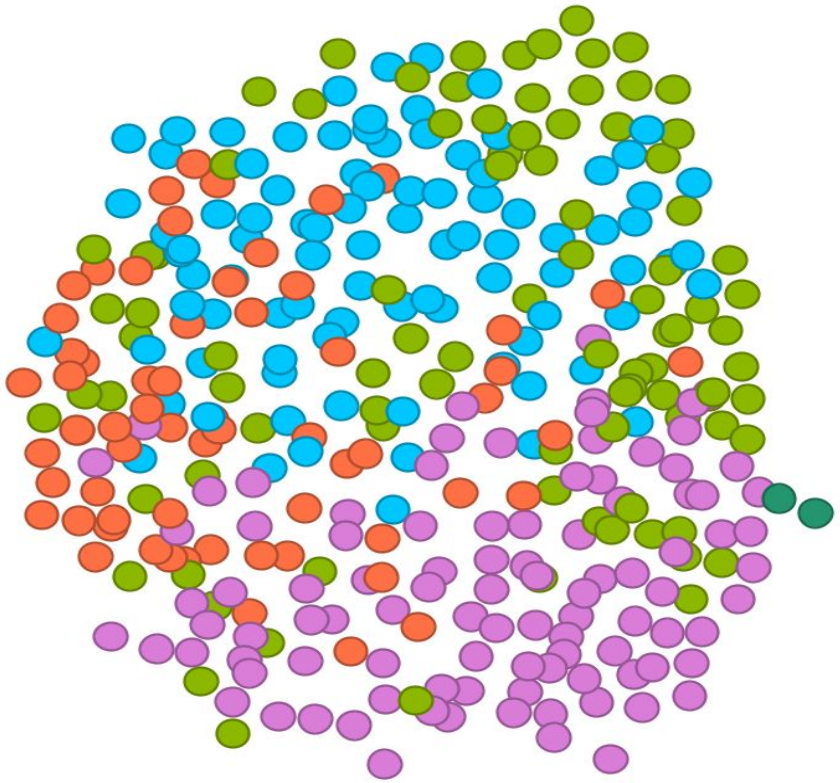
R value = -65.87

p-value = 4.6



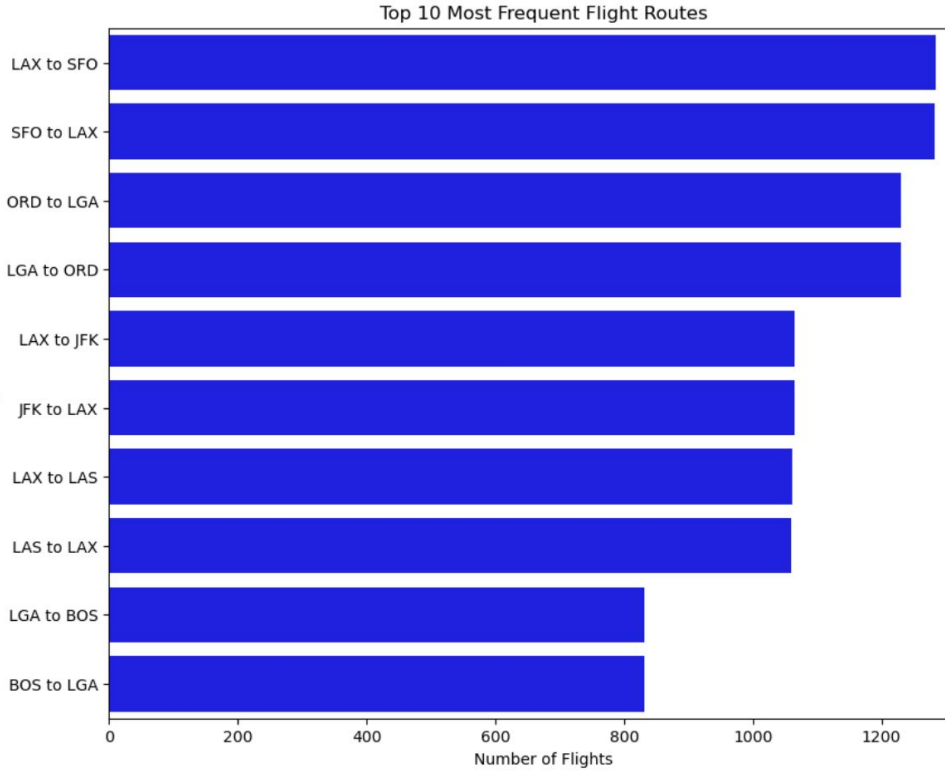


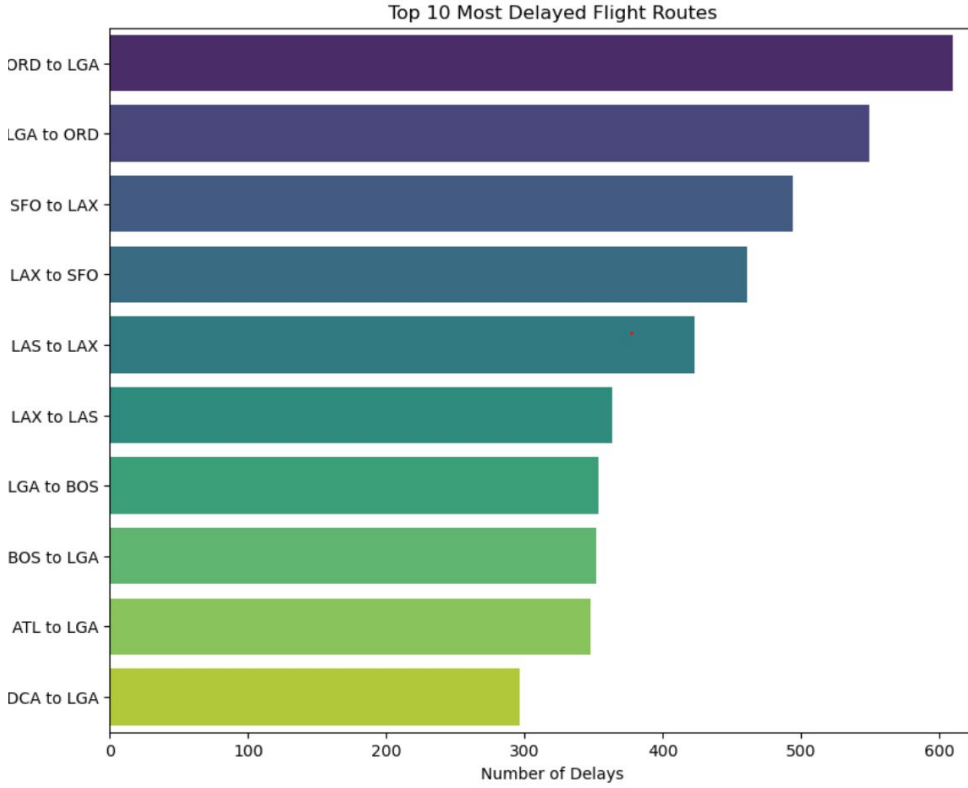
Community Structure (Modularity)



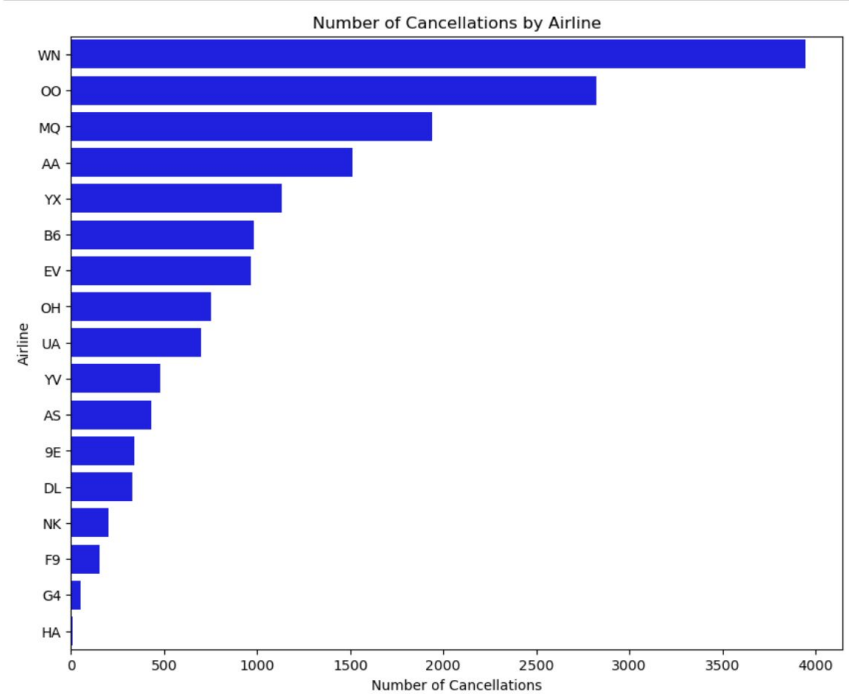
Modularity value: 0.27
Moderate community structure

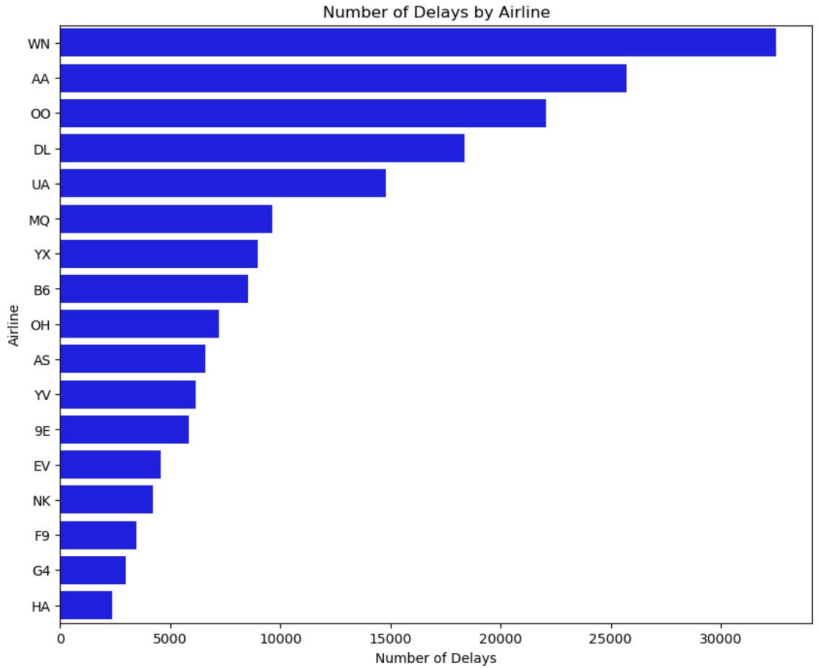
Most Frequent Flight Route and Delayed Flight Route



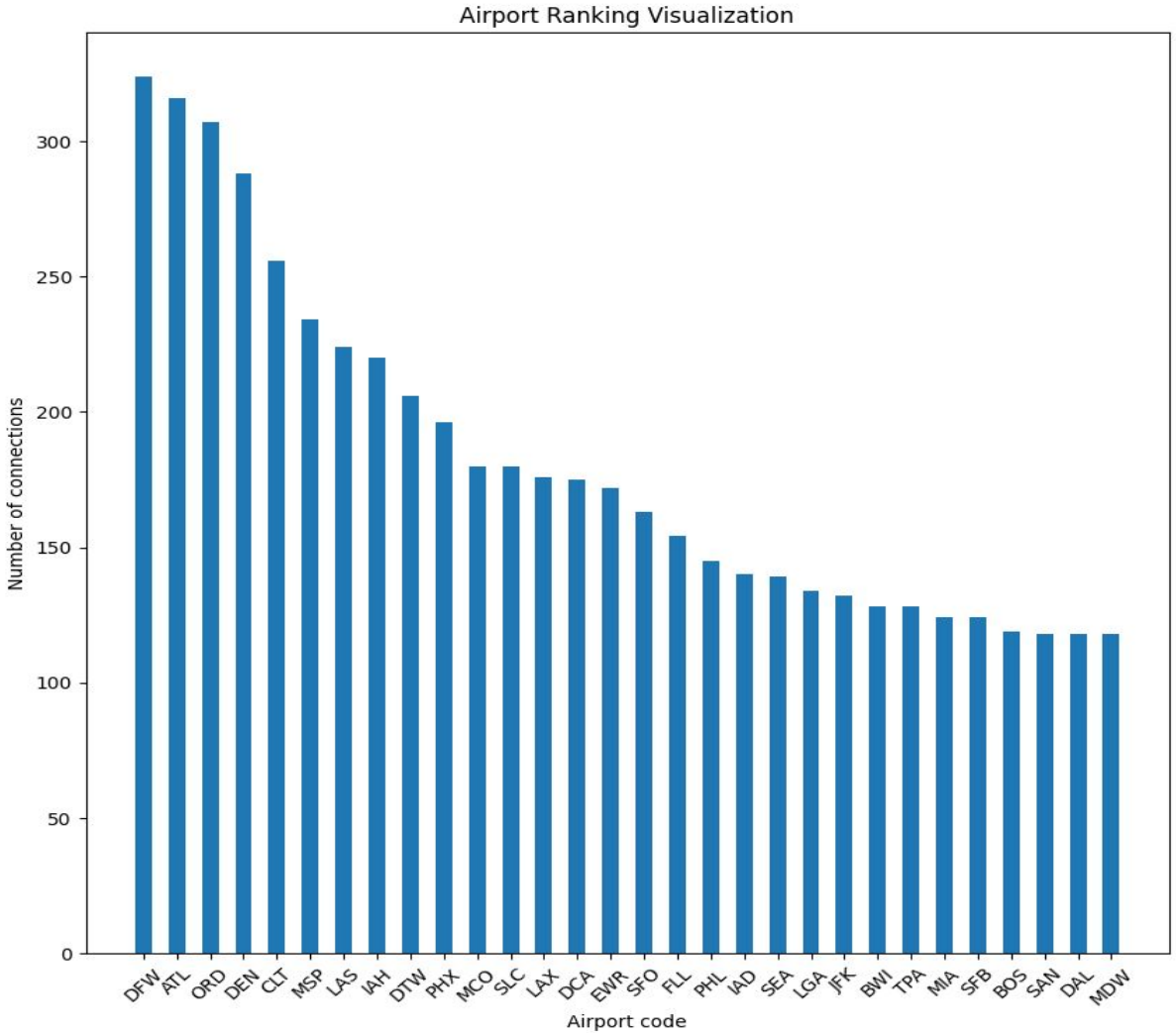


Flight Delay/Cancellation by Airline

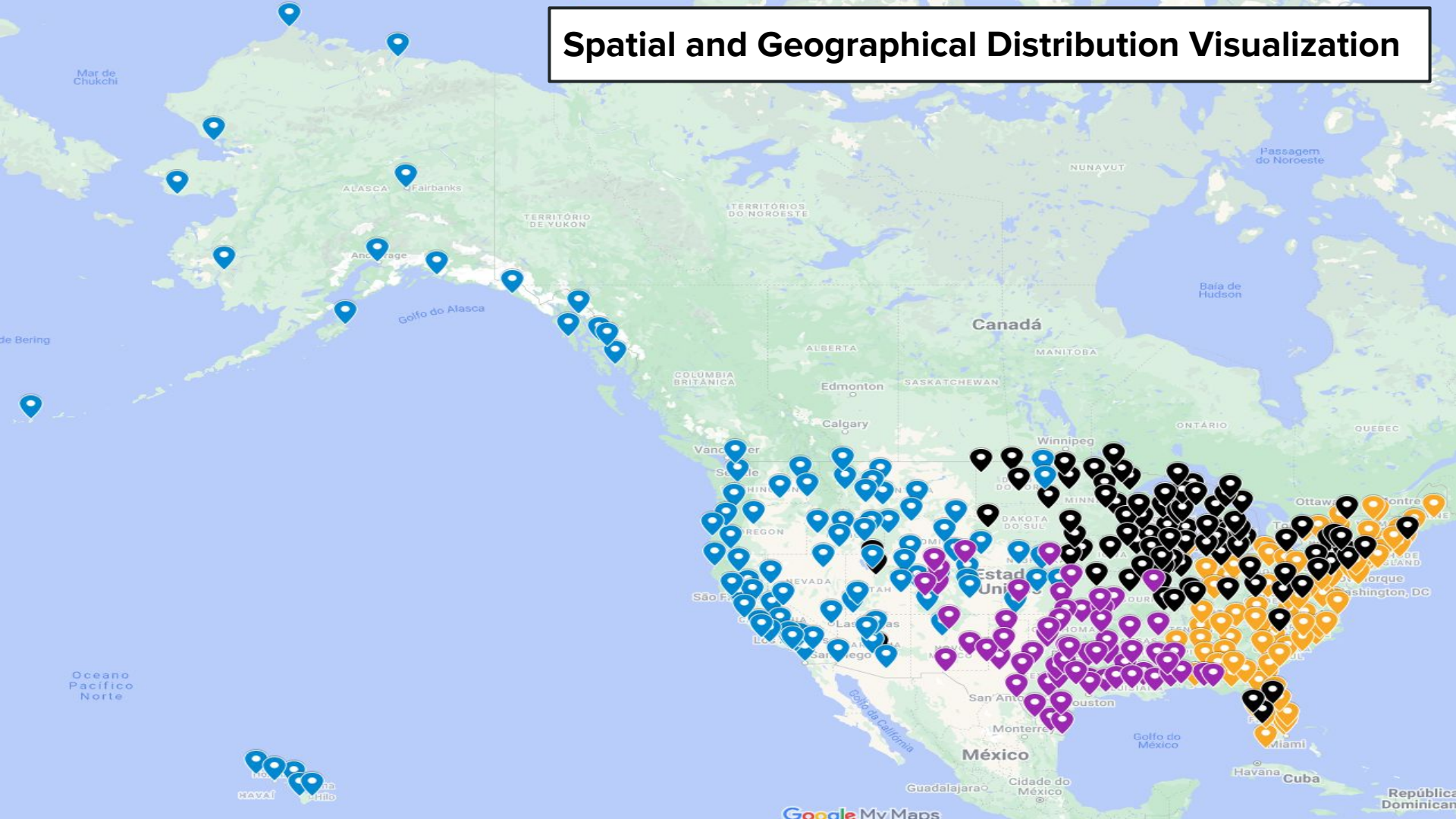


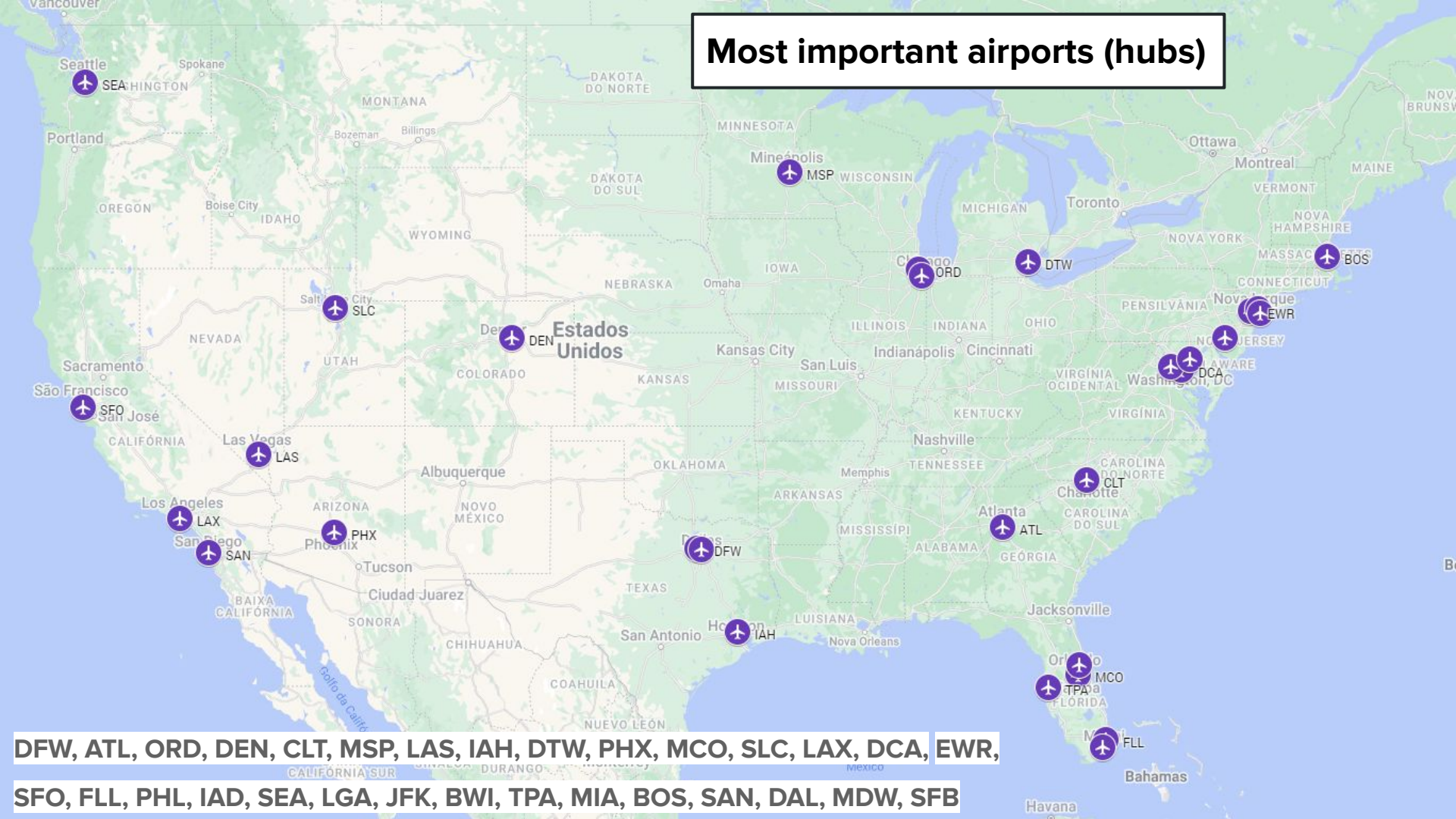


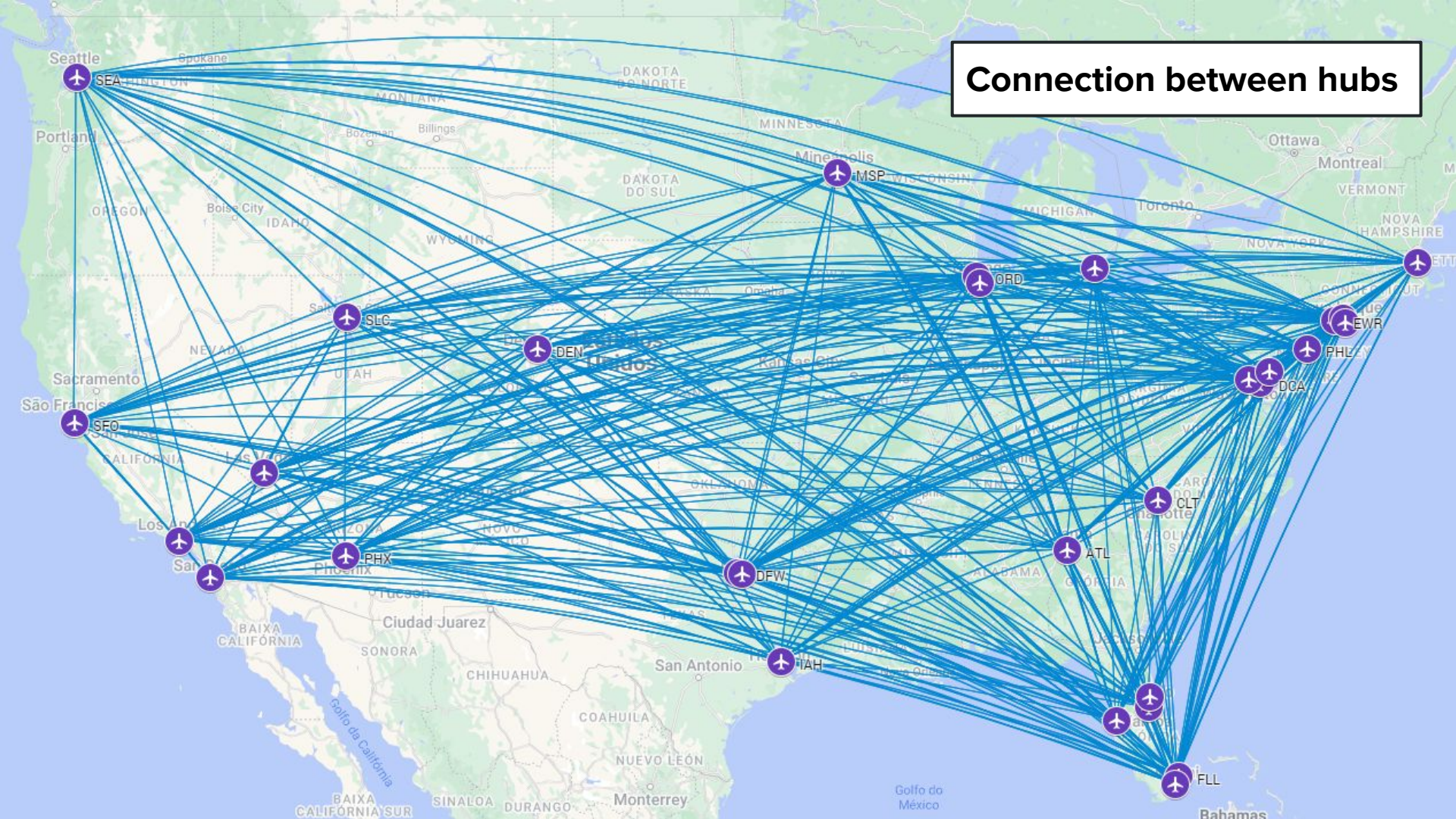
Ranking Visualization



Spatial and Geographical Distribution Visualization




Most important airports (hubs)
SEA
MSP
ORD
DTW
BOS
EWR
SLC
DEN
Estados Unidos
DCA
SFO
LAS
CLT
LAX
PHX
SAN
DFW
ATL
IAH
MCO
TPA
FLL
DFW, ATL, ORD, DEN, CLT, MSP, LAS, IAH, DTW, PHX, MCO, SLC, LAX, DCA, EWR,
SFO, FLL, PHL, IAD, SEA, LGA, JFK, BWI, TPA, MIA, BOS, SAN, DAL, MDW, SFB


Connection between hubs
SEA
MSP
ORD
SLC
DEN
SFO
PHX
DFW
IAH
ATL
CLT
DCA
PHL
EWR
FLL

Considerations

Identification of Critical Hubs: We identified key airports essential for U.S. air traffic connectivity, aiding airport authorities and airlines in route and resource planning.

Community Structure: The modularity class analysis reveals the community structure within the flight network. This could help to understand the regional clusters of airports and their connectivity.

Network Vulnerability Analysis: We assessed how network resilience is affected by disruptions, such as operational issues at major hubs, to inform the development of risk mitigation and contingency plans.

Impact of Delays/Cancellations: We identified patterns common delay and cancellation types and values, providing data to help airlines and airports to improve their efficiency and minimize delays.

Spatial and Geographical Visualization: By mapping airports and connections, underrepresented regions in air connectivity can be identified, guiding infrastructure policies and airline strategies.

References

Dataset:

https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/WTZS4K

Project Repository:

https://github.com/lhleonardo/flights-network-project