STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

An Analysis of New York Flight Connections

Tengyue Chen

STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

1. Introduction
2. Dataset and Descriptive Statistics
3. Dataset Clean
4. Methods
5. Results
6. Conclusions

Introduction

- New York is one of the busiest areas in the world.
- More than 3,000 flights pass through New York City Airport daily (Rapler, 2015).
- By the number of flights, we can find out which airports are most closely related to the three airports of New York Airport.
- Because airline is one of the main means of transportation in the United States, the flight network can see the degree of connection between New York and other regions.
- The purpose of this project is to explore the areas most connected to the New York area by flight.

Dataset and Descriptive Statistics

- The dataset contains information on flights in the United States in January 2022.
- The information includes flight number, destination, place of departure, departure time, arrival time, etc.

- U. S. Department of Transportation
- https://www.transtats.bts.gov/PREZIP/On_Time_Reporting_Carrier_On_Time_Performance_1987_present_2022_1.zip

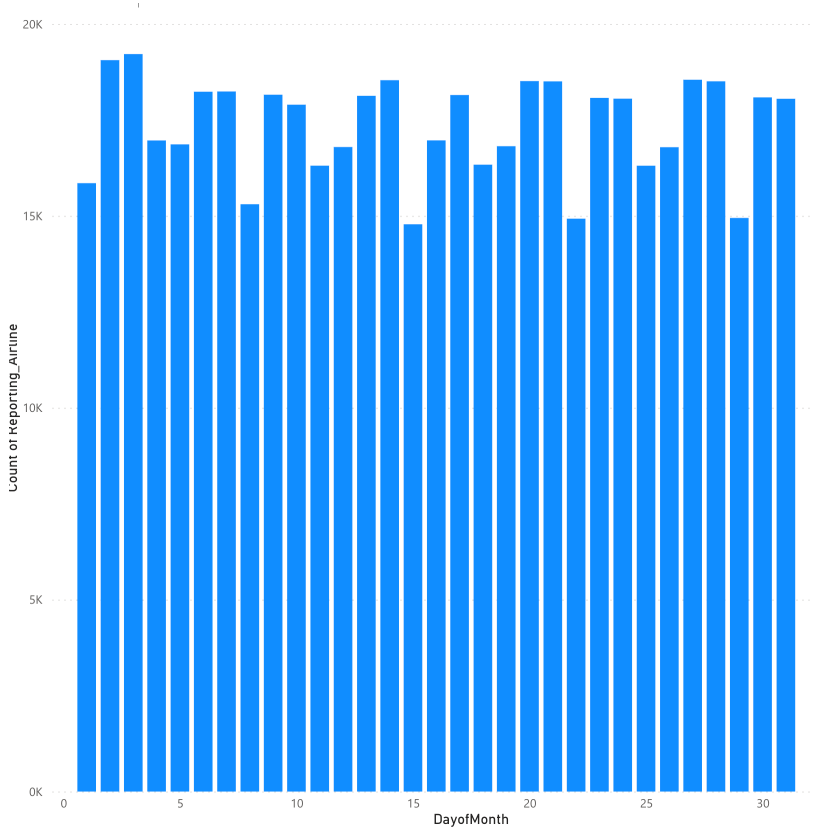
STEVENS INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

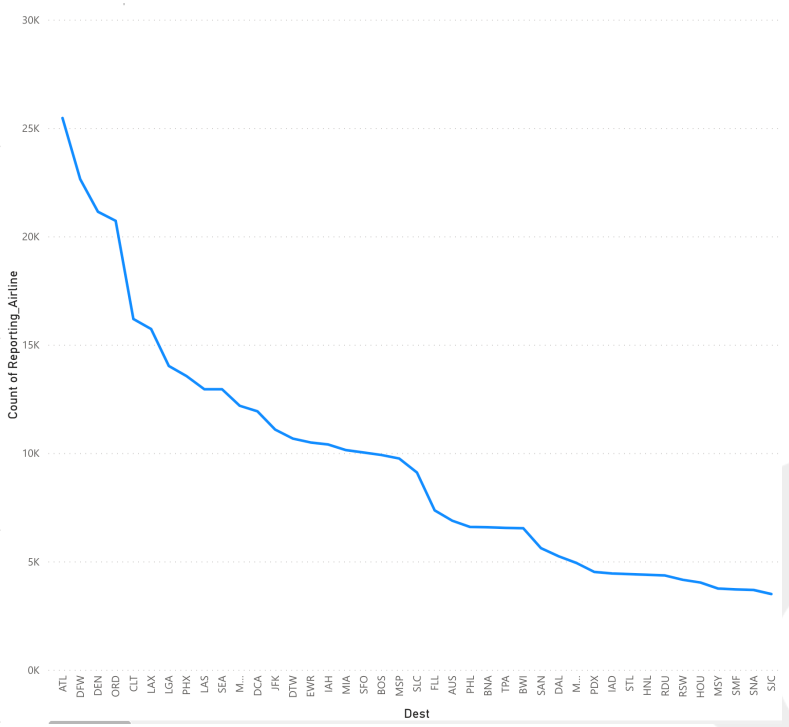
Dataset and Descriptive Statistics

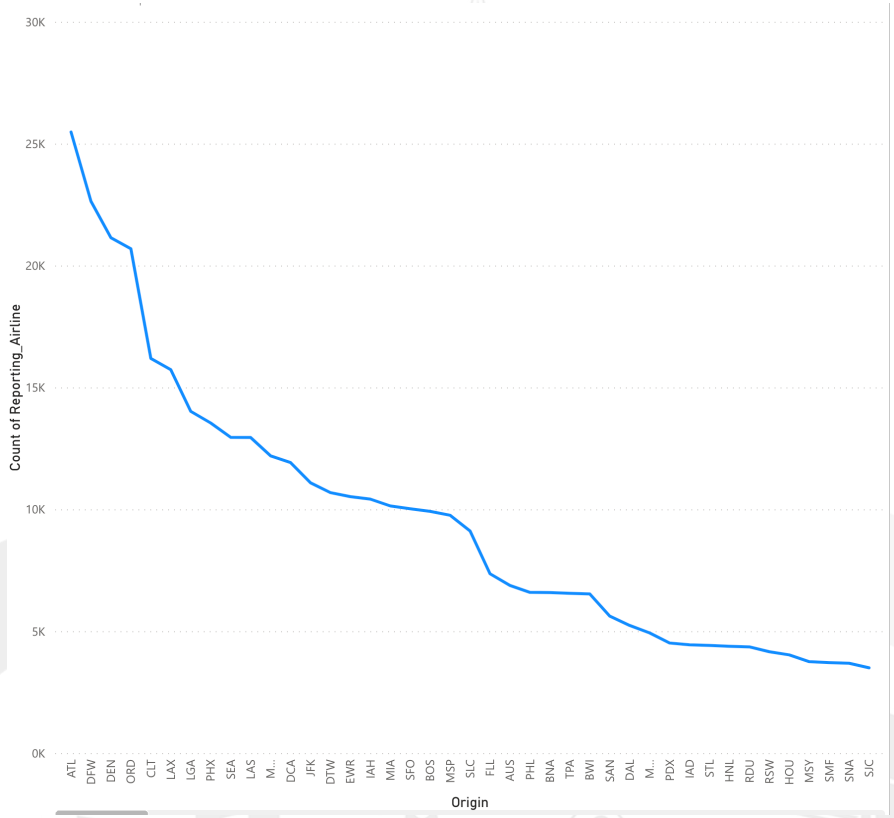
Year	Year
Quarter	Quarter (1-4)
Month	Month
DayofMonth	Day of Month
DayOfWeek	Day of Week
FlightDate	Flight Date (yyyymmdd)
Reporting_Airline	Unique Carrier Code. When the same code has been used by multiple carriers, a numeric suffix is used for earlier users, for example, PA, PA(1), PA(2). Use this field for analysis across a range of years.
DOT_ID_Reporting_Airline	An identification number assigned by US DOT to identify a unique airline (carrier). A unique airline (carrier) is defined as one holding and reporting under the same DOT certificate regardless of its Code, Name, or holding company/corporation.
IATA_CODE_Reporting_Airline	Code assigned by IATA and commonly used to identify a carrier. As the same code may have been assigned to different carriers over time, the code is not always unique. For analysis, use the Unique Carrier Code.
Tail_Number	Tail Number
Flight_Number_Reporting_Airline	Flight Number
OriginAirportID	Origin Airport, Airport ID. An identification number assigned by US DOT to identify a unique airport. Use this field for airport analysis across a range of years because an airport can change its airport code and airport codes can be reused.
OriginAirportSeqID	Origin Airport, Airport Sequence ID. An identification number assigned by US DOT to identify a unique airport at a given point of time. Airport attributes, such as airport name or coordinates, may change over time.
OriginCityMarketID	Origin Airport, City Market ID. City Market ID is an identification number assigned by US DOT to identify a city market. Use this field to consolidate airports serving the same city market.
Origin	Origin Airport
OriginCityName	Origin Airport, City Name
OriginState	Origin Airport, State Code
OriginStateFips	Origin Airport, State Fips
OriginStateName	Origin Airport, State Name
OriginWac	Origin Airport, World Area Code
DestAirportID	Destination Airport, Airport ID. An identification number assigned by US DOT to identify a unique airport. Use this field for airport analysis across a range of years because an airport can change its airport code and airport codes can be reused.
DestAirportSeqID	Destination Airport, Airport Sequence ID. An identification number assigned by US DOT to identify a unique airport at a given point of time. Airport attributes, such as airport name or coordinates, may change over time.
DestCityMarketID	Destination Airport, City Market ID. City Market ID is an identification number assigned by US DOT to identify a city market. Use this field to consolidate airports serving the same city market.
Dest	Destination Airport
DestCityName	Destination Airport, City Name
DestState	Destination Airport, State Code
DestStateFips	Destination Airport, State Fips
DestStateName	Destination Airport, State Name
DestWac	Destination Airport, World Area Code
CRSDepTime	CRS Departure Time (local time: hhmm)
DepTime	Actual Departure Time (local time: hhmm)
DepDelay	Difference in minutes between scheduled and actual departure time. Early departures show negative numbers.
DepDelayMinutes	Difference in minutes between scheduled and actual departure time. Early departures set to 0.
DepDel15	Departure Delay Indicator, 15 Minutes or More (1=Yes)
DepartureDelayGroups	Departure Delay intervals, every (15 minutes from <-15 to >180)
DepTimeBlk	CRS Departure Time Block, Hourly Intervals
TaxiOut	Taxi Out Time, in Minutes
WheelsOff	Wheels Off Time (local time: hhmm)
WheelsOn	Wheels On Time (local time: hhmm)
TaxiIn	Taxi In Time, in Minutes
CRSArrTime	CRS Arrival Time (local time: hhmm)
ArrTime	Actual Arrival Time (local time: hhmm)
ArrDelay	Difference in minutes between scheduled and actual arrival time. Early arrivals show negative numbers.
ArrDelayMinutes	Difference in minutes between scheduled and actual arrival time. Early arrivals set to 0.
ArrDel15	Arrival Delay Indicator, 15 Minutes or More (1=Yes)
ArrivalDelayGroups	Arrival Delay intervals, every (15-minutes from <-15 to >180)
ArrTimeBlk	CRS Arrival Time Block, Hourly Intervals
Cancelled	Cancelled Flight Indicator (1=Yes)
CancellationCode	Specifies The Reason For Cancellation
Diverted	Diverted Flight Indicator (1=Yes)
CRSElapsedTime	CRS Elapsed Time of Flight, in Minutes
ActualElapsedTime	Elapsed Time of Flight, in Minutes
AirTime	Flight Time, in Minutes
Flights	Number of Flights
Distance	Distance between airports (miles)
DistanceGroup	Distance Intervals, every 250 Miles, for Flight Segment
CarrierDelay	Carrier Delay, in Minutes
WeatherDelay	Weather Delay, in Minutes
NASDelay	National Air System Delay, in Minutes
SecurityDelay	Security Delay, in Minutes
LateAircraftDelay	Late Aircraft Delay, in Minutes
FirstDepTime	First Gate Departure Time at Origin Airport
TotalAddGTime	Total Ground Time Away from Gate for Gate Return or Cancelled Flight
LongestAddGTime	Longest Time Away from Gate for Gate Return or Cancelled Flight

STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

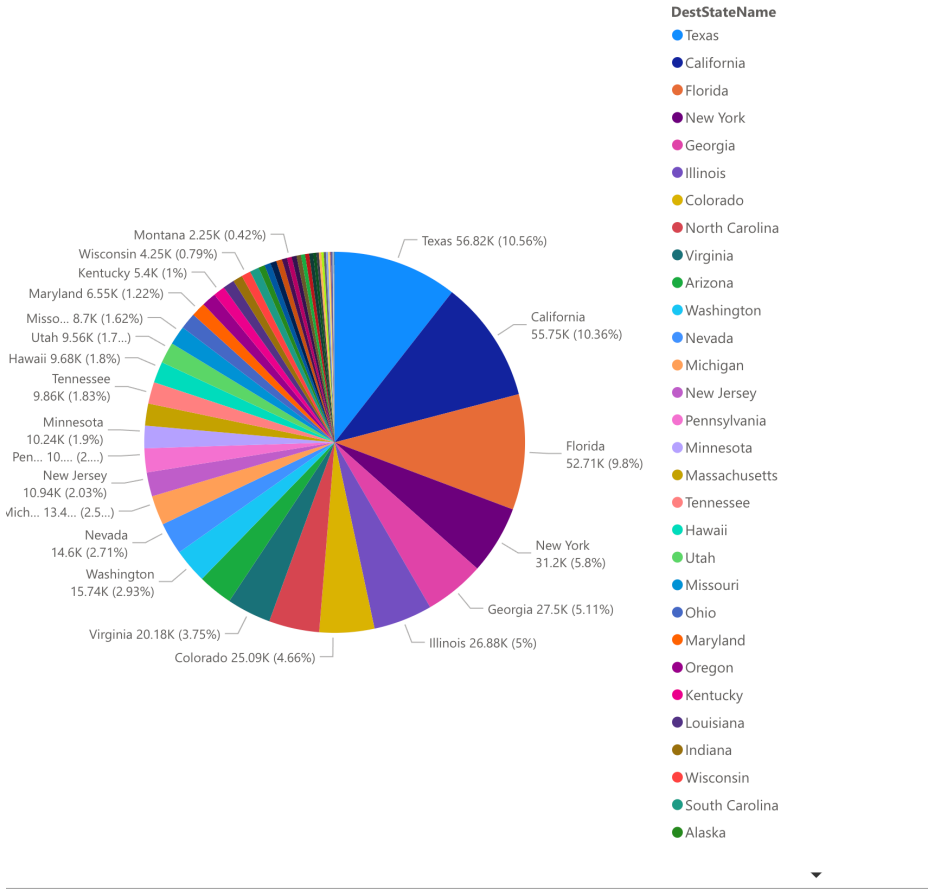
Dataset and Descriptive Statistics

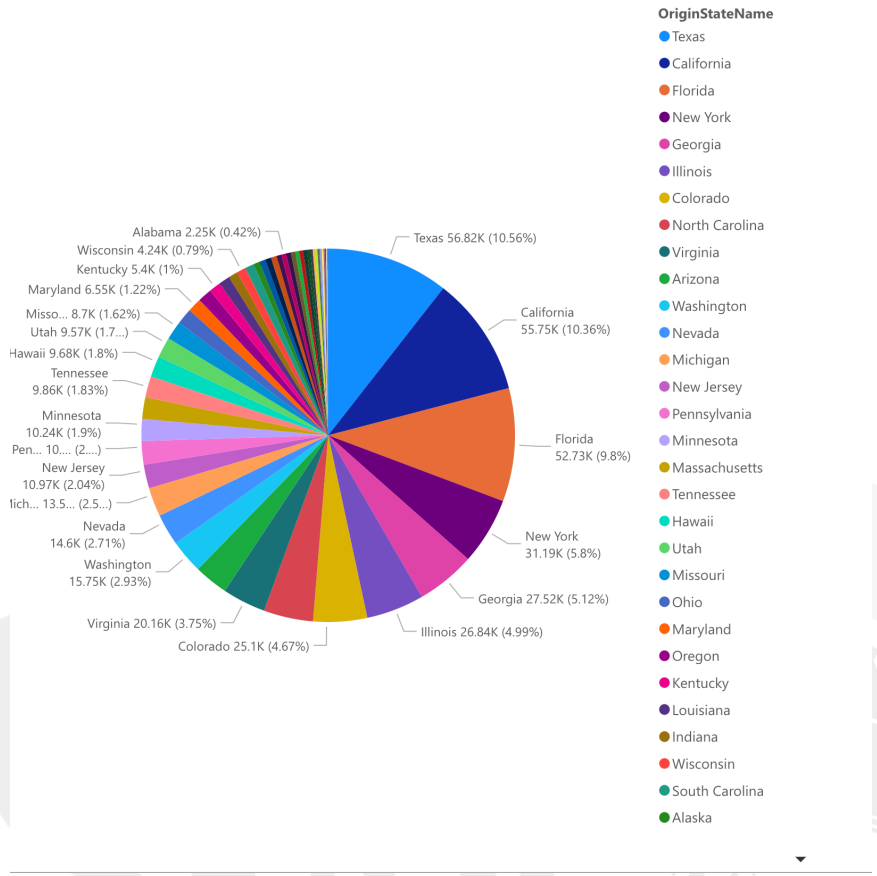






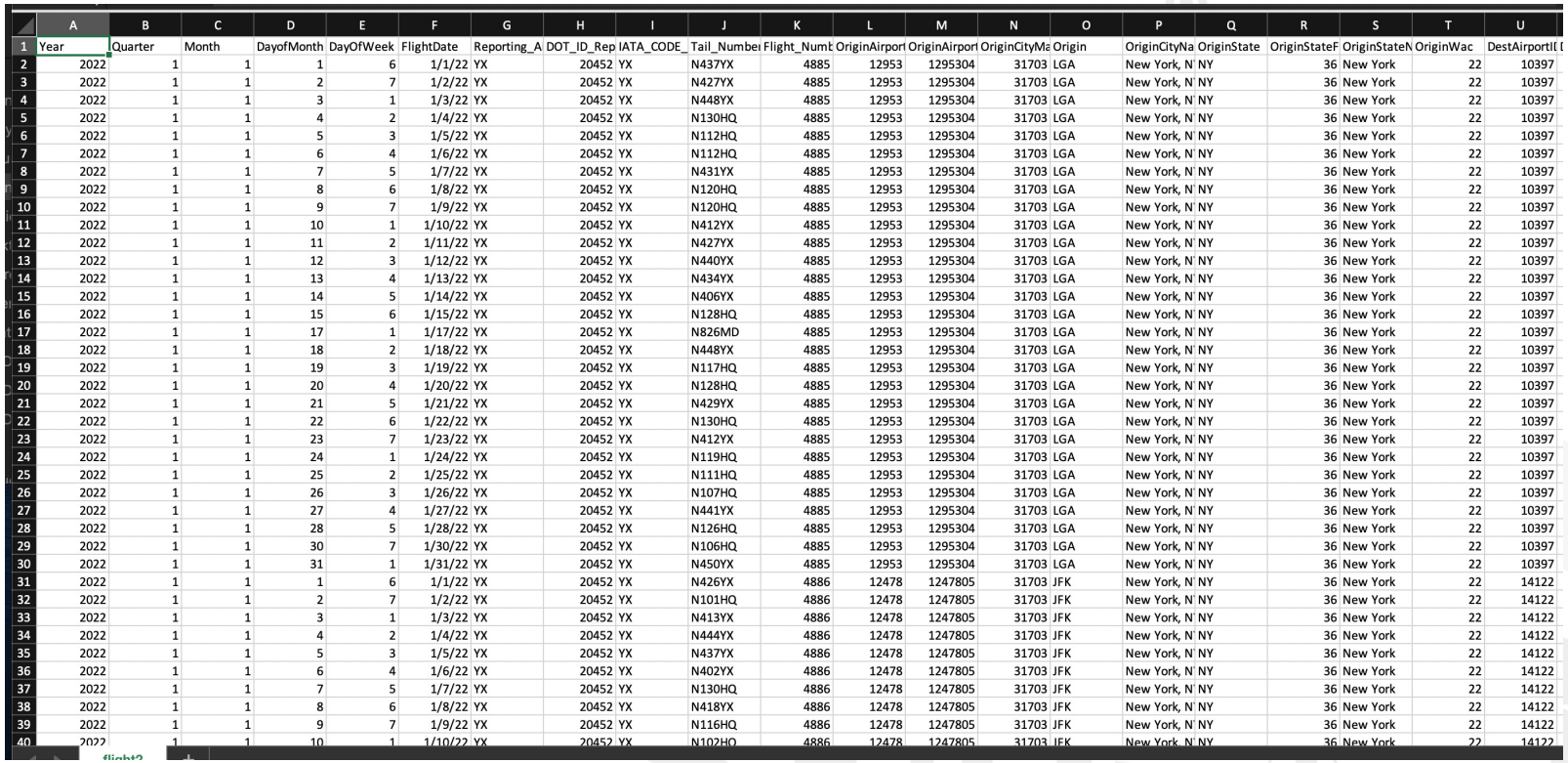
Dataset and Descriptive Statistics





Dataset Clean

- Clean the dataset
- 1. Clean the null value.
- 2. Remove the cancellation flight data
- 3. Select the data that arrive and departure is the three airports in New York area.
- Deleted the unnecessary data (TaxiOut, WheelsOff, WheelsOn,etc).



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Year	Quarter	Month	DayofMonth	DayOfWeek	FlightDate	Reporting_A	DOT_ID_Rep	IATA_CODE_	Tail_Numbe	Flight_Numb	OriginAirport	OriginAirport	OriginCityMa	Origin	OriginCityNa	OriginState	OriginStateF	OriginStateN	OriginWac	DestAirportI
2	2022	1	1	1	6	1/1/22	YX	20452	YX	N437YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
3	2022	1	1	2	7	1/2/22	YX	20452	YX	N427YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
4	2022	1	1	3	1	1/3/22	YX	20452	YX	N448YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
5	2022	1	1	4	2	1/4/22	YX	20452	YX	N130HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
6	2022	1	1	5	3	1/5/22	YX	20452	YX	N112HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
7	2022	1	1	6	4	1/6/22	YX	20452	YX	N112HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
8	2022	1	1	7	5	1/7/22	YX	20452	YX	N431YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
9	2022	1	1	8	6	1/8/22	YX	20452	YX	N120HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
10	2022	1	1	9	7	1/9/22	YX	20452	YX	N120HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
11	2022	1	1	10	1	1/10/22	YX	20452	YX	N412YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
12	2022	1	1	11	2	1/11/22	YX	20452	YX	N427YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
13	2022	1	1	12	3	1/12/22	YX	20452	YX	N440YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
14	2022	1	1	13	4	1/13/22	YX	20452	YX	N434YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
15	2022	1	1	14	5	1/14/22	YX	20452	YX	N406YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
16	2022	1	1	15	6	1/15/22	YX	20452	YX	N128HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
17	2022	1	1	17	1	1/17/22	YX	20452	YX	N826MD	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
18	2022	1	1	18	2	1/18/22	YX	20452	YX	N448YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
19	2022	1	1	19	3	1/19/22	YX	20452	YX	N117HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
20	2022	1	1	20	4	1/20/22	YX	20452	YX	N128HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
21	2022	1	1	21	5	1/21/22	YX	20452	YX	N429YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
22	2022	1	1	22	6	1/22/22	YX	20452	YX	N130HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
23	2022	1	1	23	7	1/23/22	YX	20452	YX	N412YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
24	2022	1	1	24	1	1/24/22	YX	20452	YX	N119HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
25	2022	1	1	25	2	1/25/22	YX	20452	YX	N111HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
26	2022	1	1	26	3	1/26/22	YX	20452	YX	N107HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
27	2022	1	1	27	4	1/27/22	YX	20452	YX	N441YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
28	2022	1	1	28	5	1/28/22	YX	20452	YX	N126HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
29	2022	1	1	30	7	1/30/22	YX	20452	YX	N106HQ	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
30	2022	1	1	31	1	1/31/22	YX	20452	YX	N450YX	4885	12953	1295304	31703	LGA	New York, N	NY	36	New York	22	10397
31	2022	1	1	1	6	1/1/22	YX	20452	YX	N426YX	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
32	2022	1	1	2	7	1/2/22	YX	20452	YX	N101HQ	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
33	2022	1	1	3	1	1/3/22	YX	20452	YX	N413YX	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
34	2022	1	1	4	2	1/4/22	YX	20452	YX	N444YX	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
35	2022	1	1	5	3	1/5/22	YX	20452	YX	N437YX	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
36	2022	1	1	6	4	1/6/22	YX	20452	YX	N402YX	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
37	2022	1	1	7	5	1/7/22	YX	20452	YX	N130HQ	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
38	2022	1	1	8	6	1/8/22	YX	20452	YX	N418YX	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
39	2022	1	1	9	7	1/9/22	YX	20452	YX	N116HQ	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122
40	2022	1	1	10	1	1/10/22	YX	20452	YX	N102HQ	4886	12478	1247805	31703	JFK	New York, N	NY	36	New York	22	14122

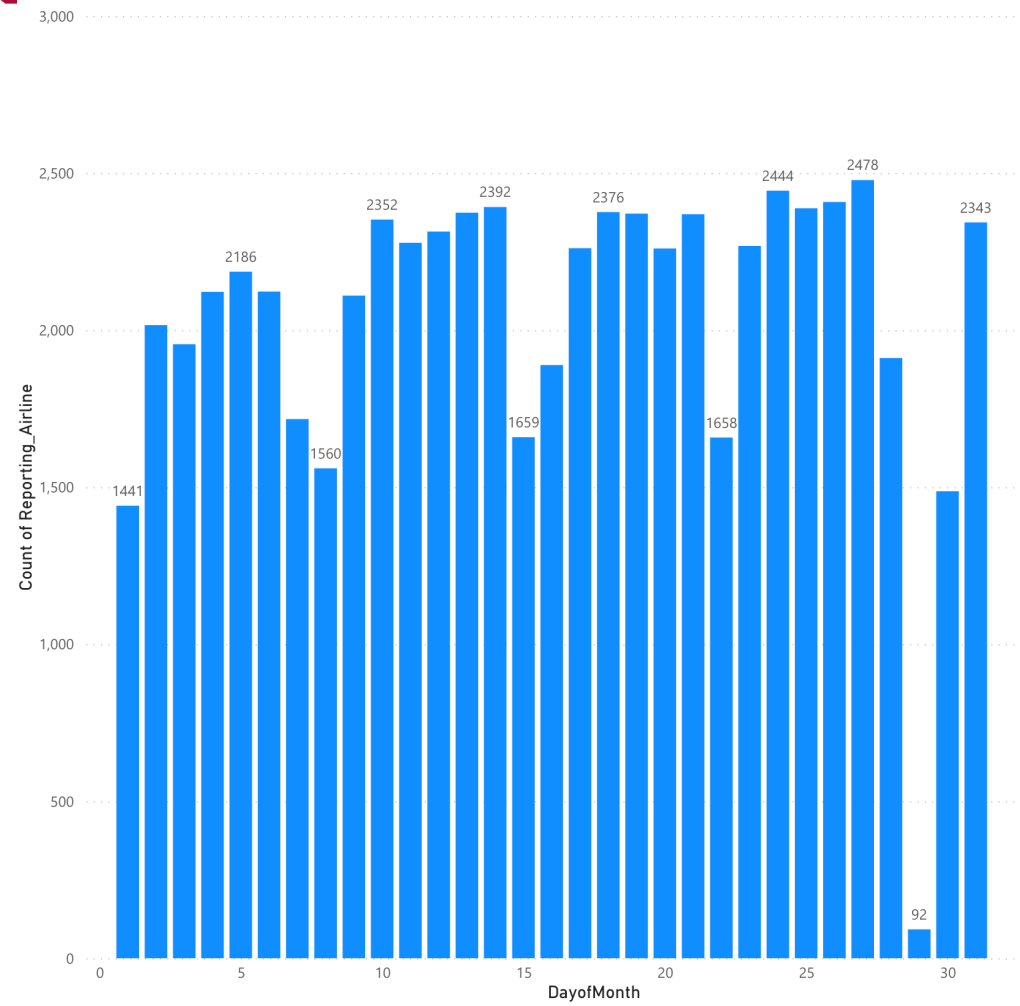
Dataset Clean

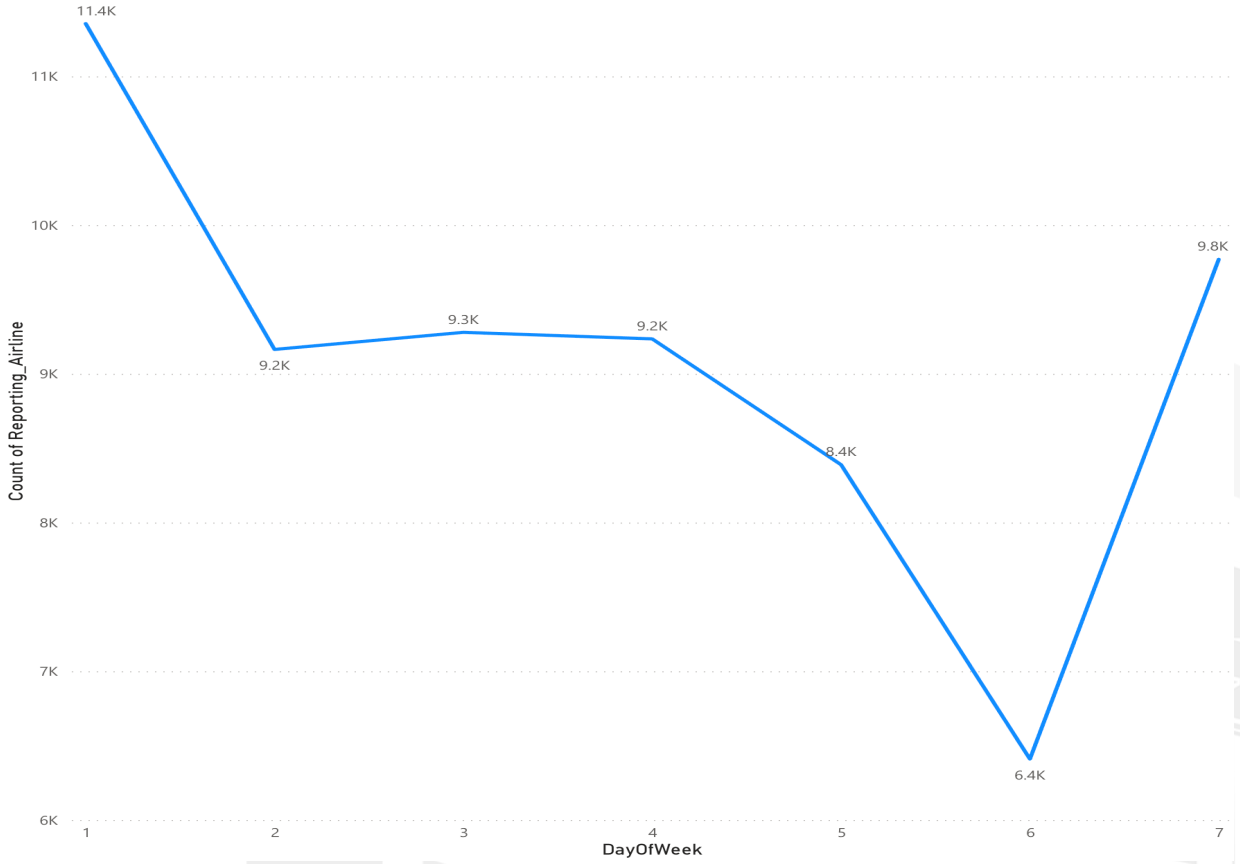
The describes of the dataset

	A	B
1	Attributes	describe
2	Year	Year
3	Quarter	Quarter (1-4)
4	Month	Month
5	DayofMonth	Day of Month
6	DayOfWeek	Day of Week
7	FlightDate	Flight Date (yyyymmdd)
8	Reporting_Airline	Unique Carrier Code.
9	DOT_ID_Reporting_Airline	An identification number assigned by US DOT to identify a unique airline (carrier).
10	IATA_CODE_Reporting_A	Code assigned by IATA and commonly used to identify a carrier.
11	Tail_Number	Tail Number
12	Flight_Number_Reporting	Flight Number
13	OriginAirportID	Origin Airport, Airport ID.
14	OriginAirportSeqID	Origin Airport, Airport Sequence ID.An identification number assigned by US DOT to identify a unique airport at a given point of time.
15		Airport attributes, such as airport name or coordinates, may change over time.
16	OriginCityMarketID	Origin Airport, City Market ID.City Market ID is an identification number assigned by US DOT to identify a city market.
17		Use this field to consolidate airports serving the same city market.
18	Origin	Origin Airport
19	OriginCityName	Origin Airport, City Name
20	OriginState	Origin Airport, State Code
21	OriginStateFips	Origin Airport, State Fips
22	OriginStateName	Origin Airport, State Name
23	OriginWac	Origin Airport, World Area Code
24	DestAirportID	Destination Airport, Airport ID.
25	DestAirportSeqID	Destination Airport, Airport Sequence ID.
26	DestCityMarketID	Destination Airport, City Market ID.
27	Dest	Destination Airport
28	DestCityName	Destination Airport, City Name
29	DestState	Destination Airport, State Code
30	DestStateFips	Destination Airport, State Fips
31	DestStateName	Destination Airport, State Name
32	DestWac	Destination Airport, World Area Code
33	CRSDepTime	CRS Departure Time (local time: hhmm)
34	DepTime	Actual Departure Time (local time: hhmm)
35	DepDelay	Difference in minutes between scheduled and actual departure time. Early departures show negative numbers.
36	DepDelayMinutes	Difference in minutes between scheduled and actual departure time. Early departures set to 0.
37	DepDel15	Departure Delay Indicator, 15 Minutes or More (1=Yes)
38	DepartureDelayGroups	Departure Delay intervals, every (15 minutes from <-15 to >180)
39	DepTimeBlk	CRS Departure Time Block, Hourly Intervals
40	CRSArrTime	CRS Arrival Time (local time: hhmm)
41	ArrTime	Actual Arrival Time (local time: hhmm)
42	ArrDelay	Difference in minutes between scheduled and actual arrival time. Early arrivals show negative numbers.
43	ArrDelayMinutes	Difference in minutes between scheduled and actual arrival time. Early arrivals set to 0.

STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

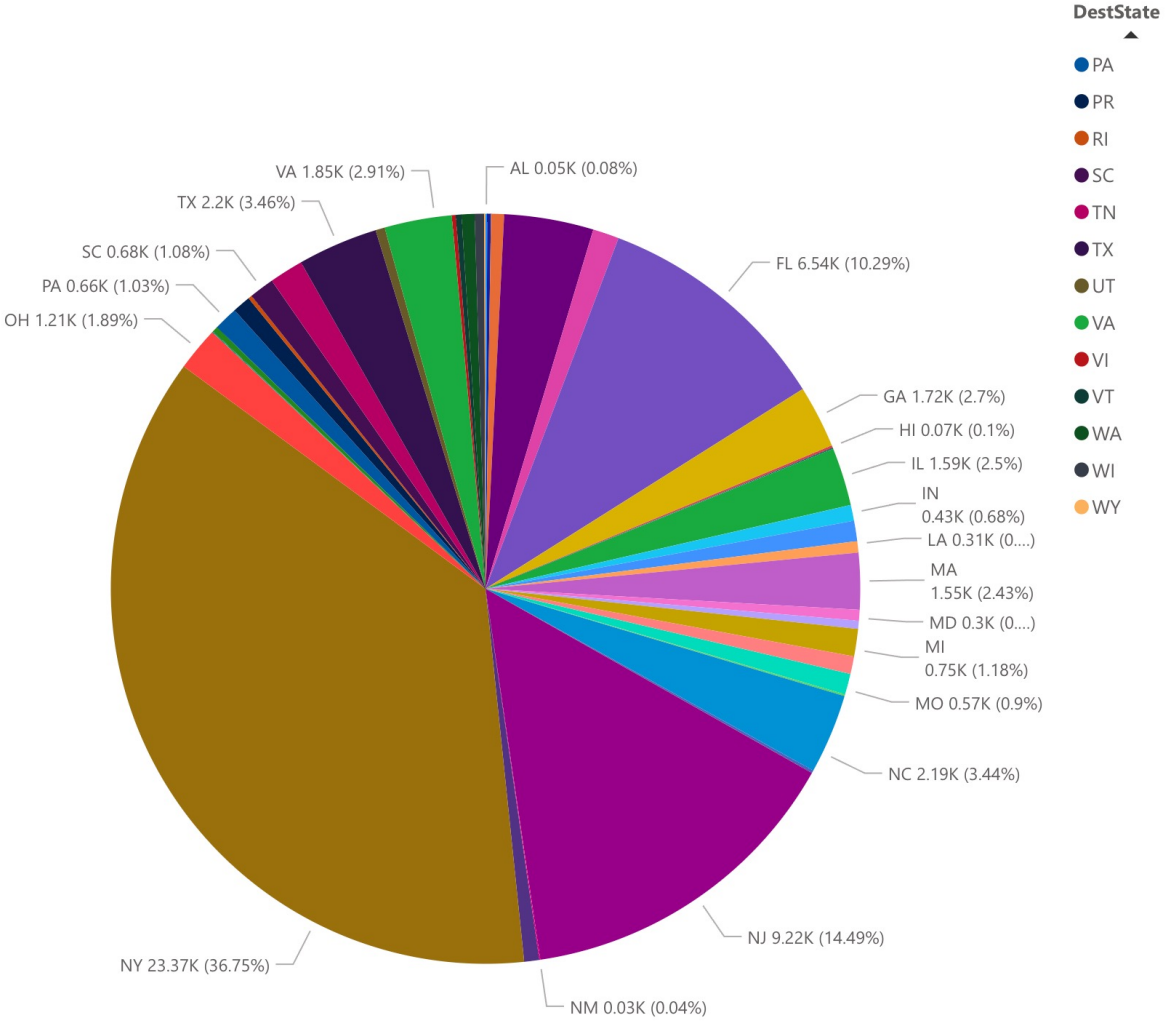
Methods





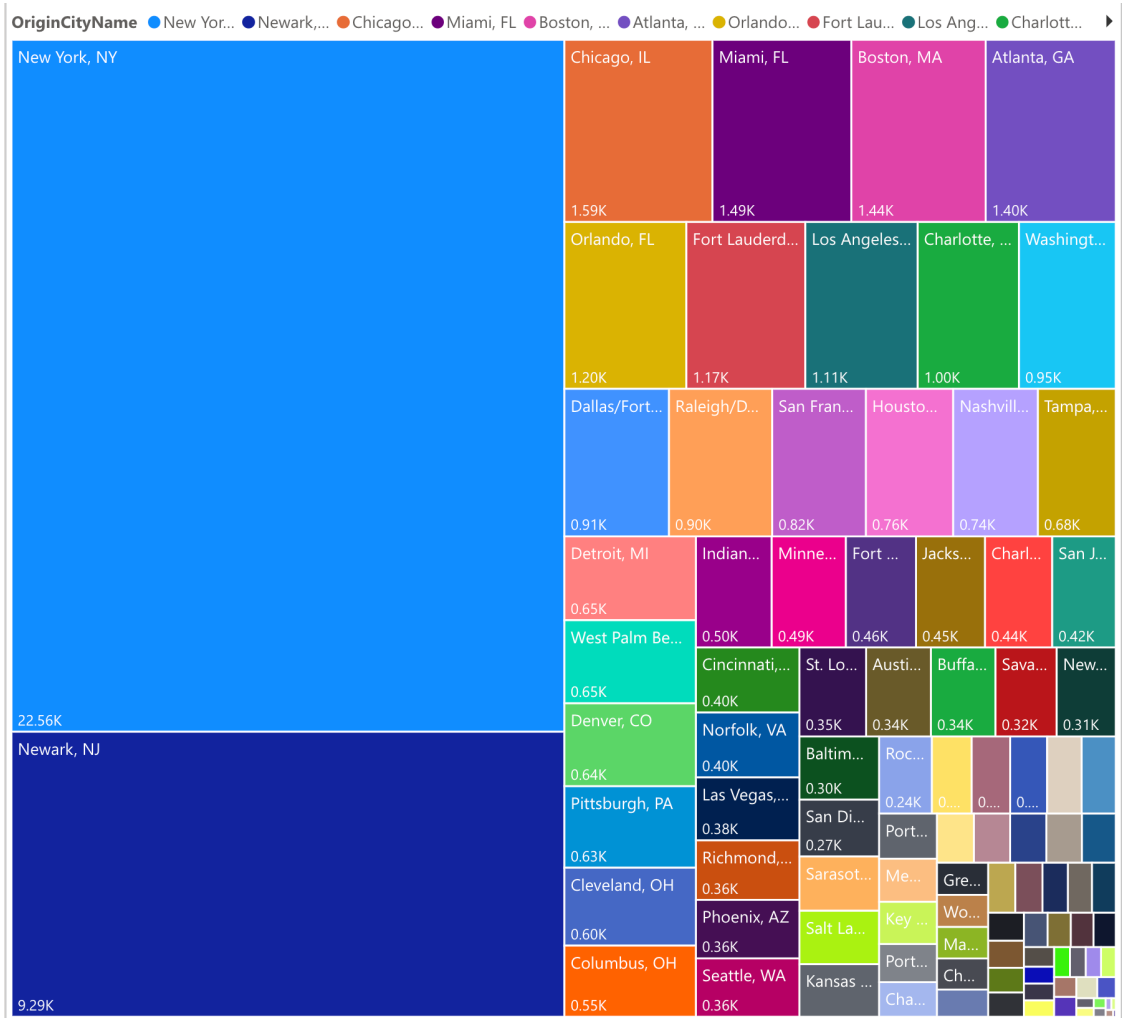
STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

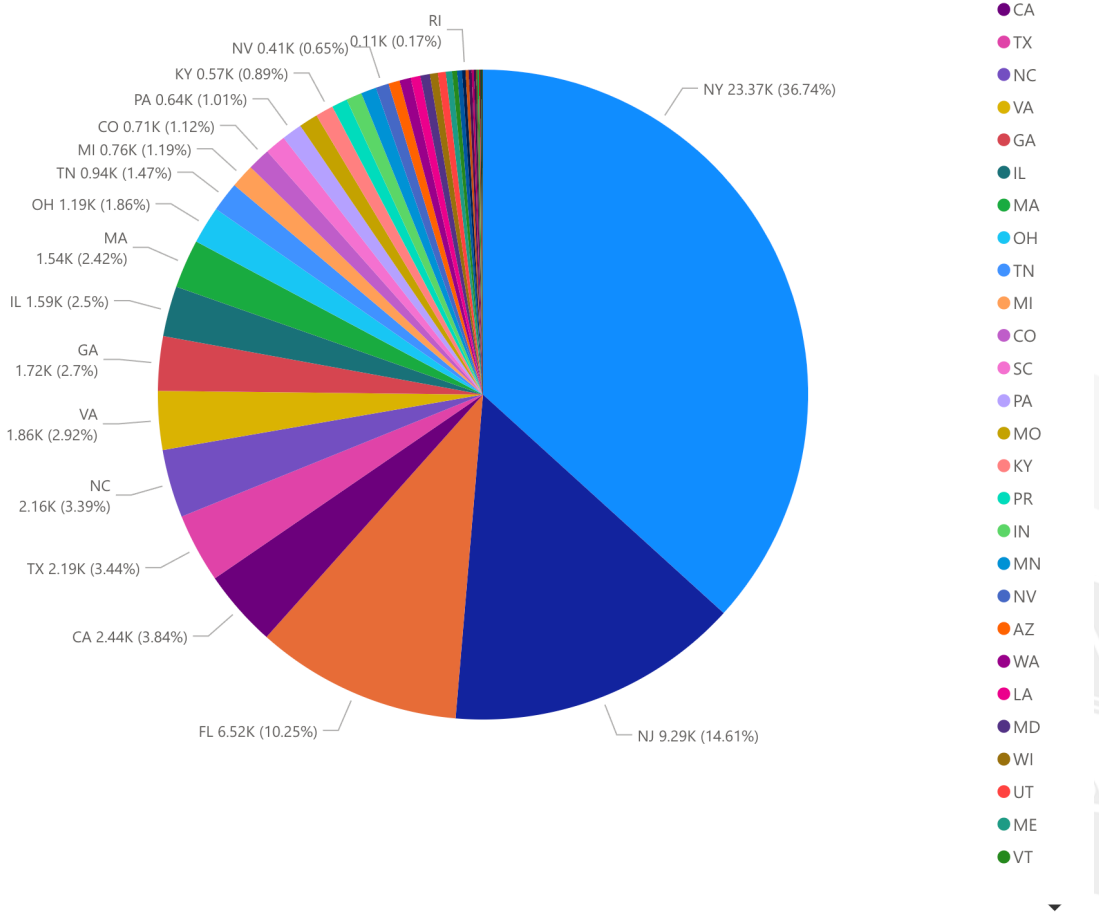
Methods



STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

Methods





Methods

- Gephi
- Step:
- 1. Basic on the dataset, creating the node and edge csv file.
- 2. Input the csv to the Gephi
- 3. Using the appearance and layout.

Methods

- **Node**
- The node label is airport name.
- The degree is the total number of flights (destination and origin)in the airport.
- Degree= number of flights as destination airport + number of flights as origin airport
- The State means that the state in which the airport is located

	A	B	C	D	E
1	Id	Label	timeset	Degree	State
2	0	SAT		150	TX
3	1	ABQ		53	NM
4	2	ALB		122	NY
5	3	ATL		2792	GA
6	4	AUS		681	TX
7	5	AVL		14	NC
8	6	BGR		143	ME
9	7	BHM		96	AL
10	8	BNA		1471	TN
11	9	BOS		2893	MA
12	10	BQN		162	PR
13	11	BTV		309	VT
14	12	BUF		674	NY
15	13	BUR		93	CA
16	14	BWI		595	MD
17	15	BZN		94	MT
18	16	CAE		48	SC
19	17	CHO		237	VA
20	18	CHS		894	SC
21	19	CLE		1222	OH
22	20	CLT		2027	NC
23	21	CMH		1109	OH
24	22	CVG		787	KY
25	23	DAL		211	TX
26	24	DAY		60	OH
27	25	DCA		1456	VA
28	26	DEN		1293	CO
29	27	DFW		1825	TX
30	28	DSM		59	IA
31	29	DTW		1294	MI
32	30	EGE		114	CO
33	31	EWR		18505	NJ
34	32	EYW		286	FL
35	33	FLL		2342	FL
36	34	GRR		212	MI
37	35	GSO		350	NC
38	36	GSP		200	SC
39	37	HDN		8	CO

STEVENS INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

Methods

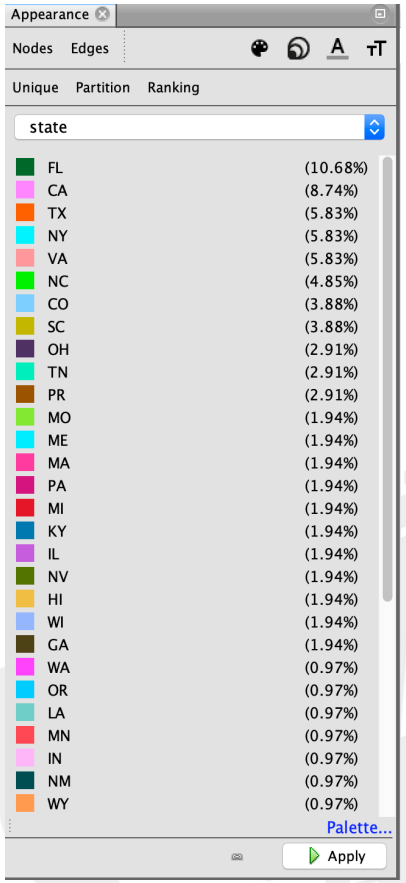
- Edges
- The source is the origin airport
- The target is destination airport.
- The type is Directed.
- The weight is the total number of flights between the origin and destination.
- For example: SAT to ERW have 47 flights,
- 0 directed 31,weight 47

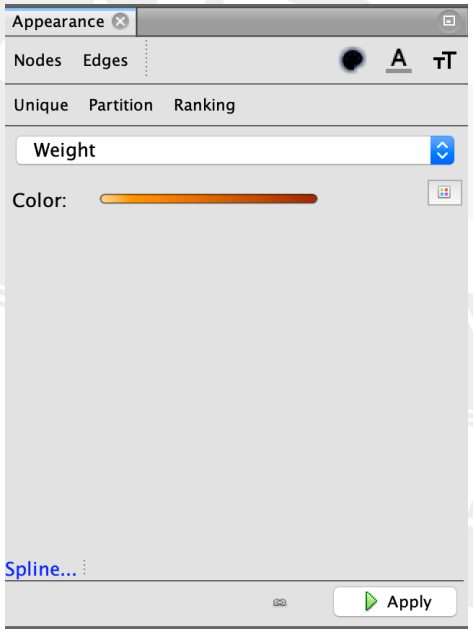
	A	B	C	D	E	F	G
1	Source	Target	Type	Id	Label	timeset	Weight
2	0	31	Directed	0			47
3	0	46	Directed	1			28
4	1	46	Directed	2			26
5	2	31	Directed	3			4
6	2	49	Directed	4			47
7	3	31	Directed	5			464
8	3	46	Directed	6			270
9	3	49	Directed	7			663
10	4	31	Directed	8			158
11	4	46	Directed	9			182
12	5	31	Directed	10			7
13	6	49	Directed	11			71
14	7	49	Directed	12			48
15	8	31	Directed	13			186
16	8	46	Directed	14			162
17	8	49	Directed	15			389
18	9	31	Directed	16			268
19	9	46	Directed	17			566
20	9	49	Directed	18			609
21	10	31	Directed	19			31
22	10	46	Directed	20			49
23	11	31	Directed	21			2
24	11	46	Directed	22			81
25	11	49	Directed	23			72
26	12	31	Directed	24			29
27	12	46	Directed	25			196
28	12	49	Directed	26			114
29	13	46	Directed	27			46
30	14	46	Directed	28			223
31	14	49	Directed	29			74
32	15	31	Directed	30			29
33	15	46	Directed	31			18
34	16	49	Directed	32			23
35	17	49	Directed	33			118
36	18	31	Directed	34			149
37	18	46	Directed	35			170
38	18	49	Directed	36			121
39	19	31	Directed	37			168

Results

- **First social network model**

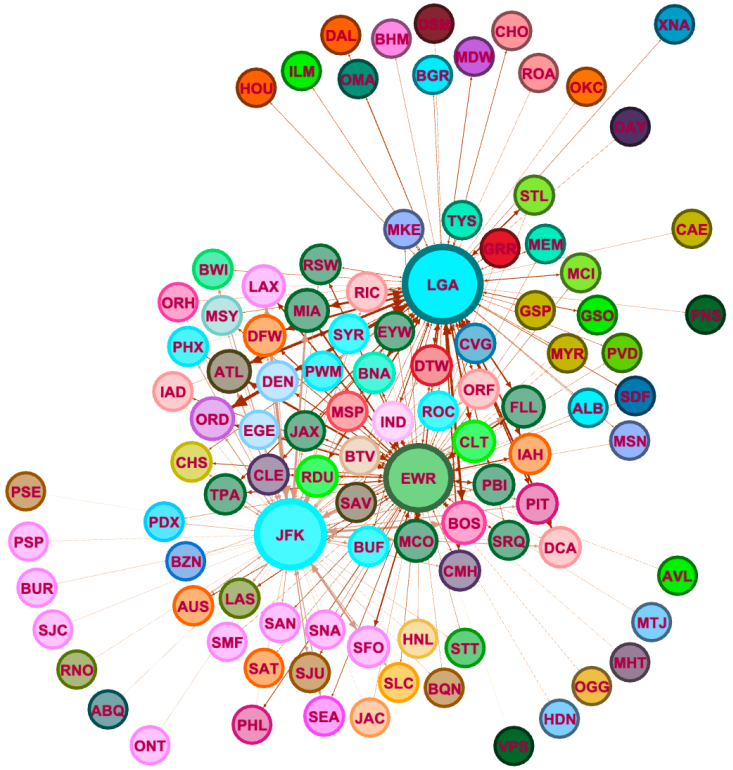
- Partitioning of Nodes: Using colors to represent different States
- Size of Nodes: Using the node size to rank the degree (total number of flights)
- Color & Sizes of Edges: Using the ranking of weight (total number of directed flights between the nodes) to design the color.
- Run the Yifan Hu layout by Gephi





STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

Results

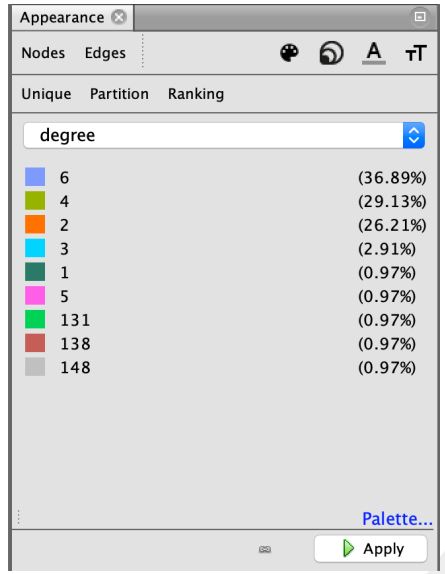


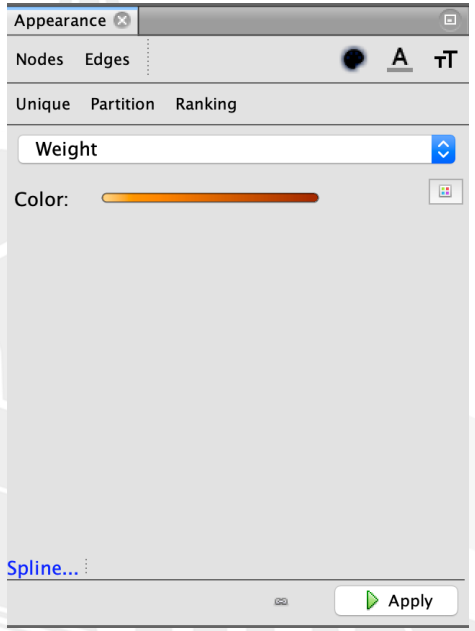
Yifan Hu layout

Results

- **Second social network model**

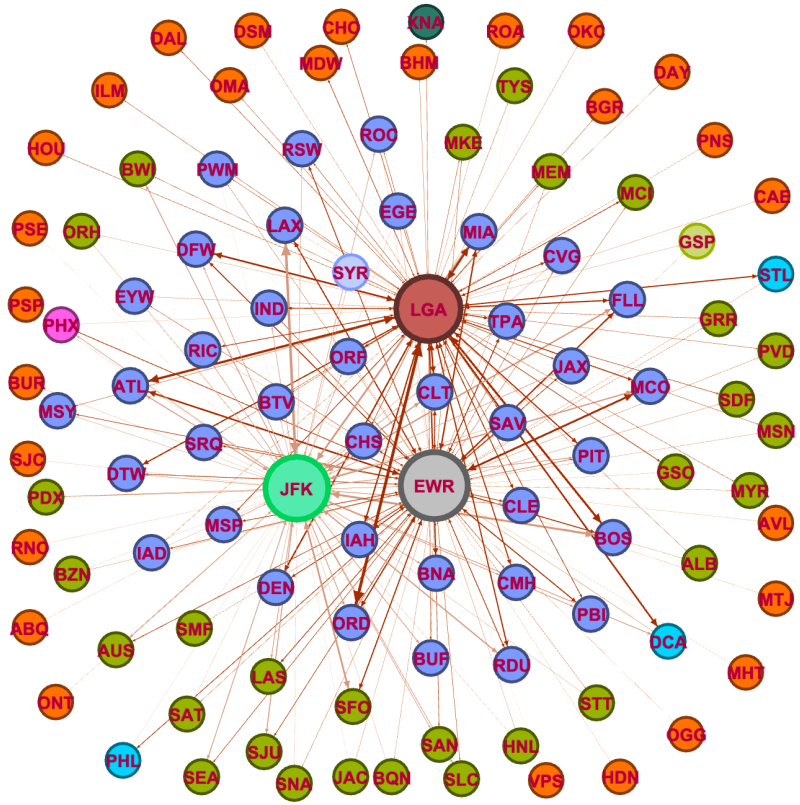
- Partitioning of Nodes: Using colors to represent the number of degree (total number of flights)
- Size of Nodes: Using the node size to rank the degree (total number of flights)
- Color & Sizes of Edges: Using the ranking of weight (total number of directed flights between the nodes) to design the color
- Run the Fruchterman Reingold layout by Gephi





STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

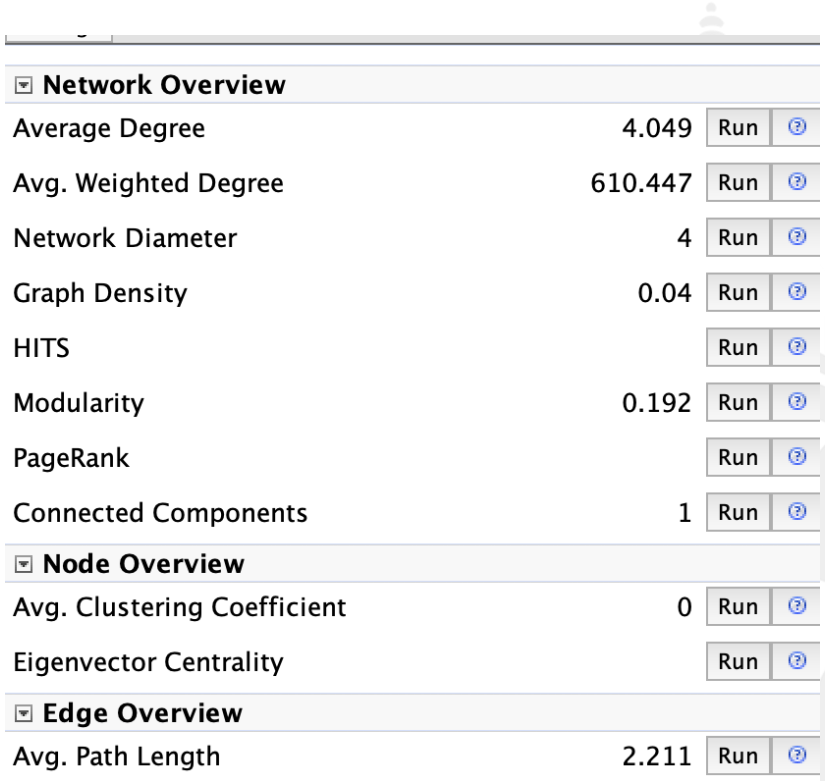
Results



Fruchterman Reingold layout

Conclusions

- The average Degree is 4.049
- The average weighted degree is 610.447.
- The Network Diameter is 4.
- The Graph Density is 0.04.
- The Modularity is 0.192.
- The Average Path Length is 2.211.



STEVENS INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

Conclusions

- The Results Calculated by Gephi:

- Eccentricity
- Closeness centrality
- Harmonic closeness centrality
- Betweenness centrality
- Eigen centrality

Data Table

Nodes | Edges | Configuration | Add node | Add edge | Search/Replace | Import Spreadsheet | Export table | More actions | Filter: | Label

Id	Label	Interval	degree	state	In-Degree	Out-Deg...	Weighted In-De...	Weighted Out-De...	Weighted De...	Eccentric...	Closeness Cent...	Harmonic Closeness Cen...	Betweenness Cent...	Authority	Hub	Modularity C...	Page...	Componen...	Strongly-Connect...
5	AVL		2	NC	1	1	7.0	7.0	14.0	4.0	0.396887	0.437908	0.0	0.047582	0.0	0	0.003387	0	2
37	HDN		2	CO	1	1	4.0	4.0	8.0	4.0	0.396887	0.437908	0.0	0.047582	0.0	0	0.003387	0	2
54	MHT		2	NH	1	1	2.0	3.0	5.0	4.0	0.396887	0.437908	0.0	0.047582	0.0	0	0.003387	0	2
60	MTJ		2	CO	1	1	9.0	9.0	18.0	4.0	0.396887	0.437908	0.0	0.047582	0.0	0	0.003387	0	2
62	OGG		2	HI	1	1	6.0	6.0	12.0	4.0	0.396887	0.437908	0.0	0.047582	0.0	0	0.003387	0	2
101	VPS		2	FL	1	1	1.0	1.0	2.0	4.0	0.396887	0.437908	0.0	0.047582	0.0	0	0.003387	0	2
102	XNA		1	AR	1	0	75.0	0.0	75.0	0.0	0.0	0.0	0.0	0.042344	0.0	2	0.003395	0	0
6	BGR		2	ME	1	1	72.0	71.0	143.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
7	BHM		2	AL	1	1	48.0	48.0	96.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
16	CAE		2	SC	1	1	25.0	23.0	48.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
17	CHO		2	VA	1	1	119.0	118.0	237.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
23	DAL		2	TX	1	1	106.0	105.0	211.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
24	DAY		2	OH	1	1	30.0	30.0	60.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
28	DSM		2	IA	1	1	29.0	30.0	59.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
39	HOU		2	TX	1	1	81.0	82.0	163.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
42	ILM		2	NC	1	1	79.0	80.0	159.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
52	MDW		2	IL	1	1	148.0	147.0	295.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
63	OKC		2	OK	1	1	29.0	29.0	58.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
64	OMA		2	NE	1	1	74.0	70.0	144.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
74	PNS		2	FL	1	1	26.0	26.0	52.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
82	ROA		2	VA	1	1	27.0	27.0	54.0	4.0	0.384906	0.428105	0.0	0.042344	0.0	2	0.003395	0	2
96	STL		3	MO	1	2	326.0	350.0	676.0	4.0	0.470046	0.491013	4.892007	0.042344	0.0	2	0.003395	0	2
1	ABQ		2	NM	1	1	27.0	26.0	53.0	4.0	0.373626	0.418301	0.0	0.042814	0.0	1	0.003401	0	2
13	BUR		2	CA	1	1	47.0	46.0	93.0	4.0	0.373626	0.418301	0.0	0.042814	0.0	1	0.003401	0	2
65	ONT		2	CA	1	1	27.0	26.0	53.0	4.0	0.373626	0.418301	0.0	0.042814	0.0	1	0.003401	0	2
75	PSE		2	PR	1	1	3.0	3.0	6.0	4.0	0.373626	0.418301	0.0	0.042814	0.0	1	0.003401	0	2
76	PSP		2	CA	1	1	26.0	26.0	52.0	4.0	0.373626	0.418301	0.0	0.042814	0.0	1	0.003401	0	2
81	RNO		2	NV	1	1	28.0	28.0	56.0	4.0	0.373626	0.418301	0.0	0.042814	0.0	1	0.003401	0	2
90	SJC		2	CA	1	1	28.0	28.0	56.0	4.0	0.373626	0.418301	0.0	0.042814	0.0	1	0.003401	0	2
2	ALB		4	NY	2	2	71.0	51.0	122.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2
34	GRR		4	MI	2	2	107.0	105.0	212.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2
35	GSO		4	NC	2	2	175.0	175.0	350.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2
36	GSP		4	SC	2	2	103.0	97.0	200.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2
50	MCI		4	MO	2	2	246.0	247.0	493.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2
53	MEM		4	TN	2	2	146.0	147.0	293.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2
56	MKE		4	WI	2	2	161.0	157.0	318.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	0	0.005239	0	2
57	MSN		4	WI	2	2	99.0	95.0	194.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2
61	MYR		4	SC	2	2	102.0	103.0	205.0	4.0	0.470046	0.491013	10.461018	0.089926	0.0	2	0.005239	0	2

Conclusions

- Established a social network based on New York Airports.
- Social networks reflect the connection of New York and other areas.
- Airports of Orlando, Chicago, Miami and other cities have the closest ties to New York.
- Florida, California, and Texas appear to be the region with the closest ties to New York.

Conclusions

- The dataset contains only a few international flights. Therefore, future research needs to look for more international flight data.
- The main relationship established in this project is between airports. In the future, states or cities can be the main nodes.
- More transportation can be added in the future.

References:

- Dataset https://www.transtats.bts.gov/PREZIP/On_Time_Reporting_Carrier_On_Time_Performance_1987_present_2022_1.zip

- Rapier, Graham. "This Is Why New York City Can Be A Nightmare For Air Travelers". *Business Insider*, 2022, https://www.businessinsider.com/heres-why-new-york-city-air-traffic-is-so-congested-2015-7.

STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

Thank You

STEVENS

INSTITUTE *of* TECHNOLOGY

THE INNOVATION UNIVERSITY®

stevens.edu