How to Plan Your Trip?
--an Analysis of Flights Data (1989-2008)

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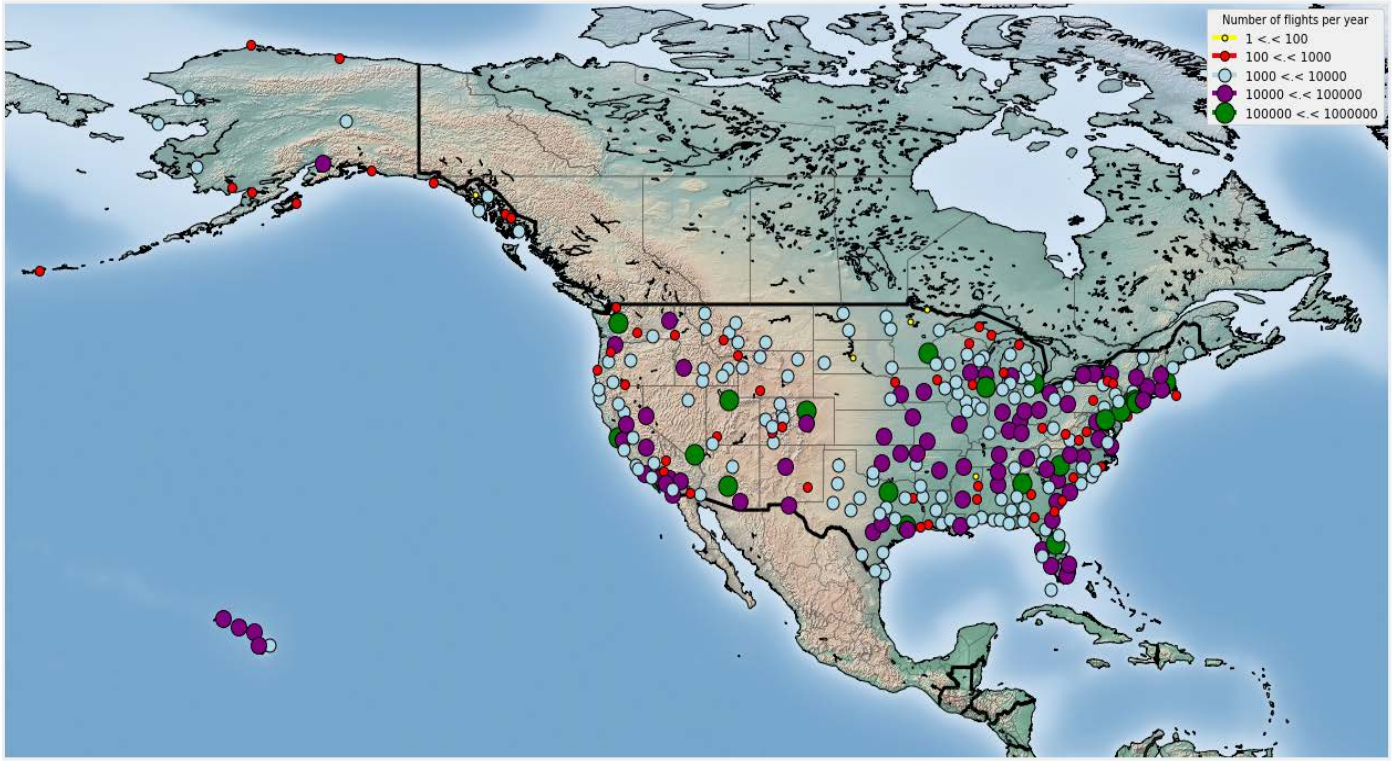


18.4%

2.6%

450

20 1/2

Catalog

Introduction

PART 1

Data Description

Flight Delays and Cancellation Dataset from Bureau of Transportation Statistics

726,919,200 lines of records

Over 450 airports in U.S. domestic market from 1989 to 2008.

Main Variables

CRSDepTime/CRSArrTime:
scheduled departure/arrival time (local, hhmm)

ArrDelay:
arrival delay, in minutes:

UniqueCarrier:
unique carrier code

Origin/Dest:
Origin/destination IATA airport code

FlightNum:
flight number

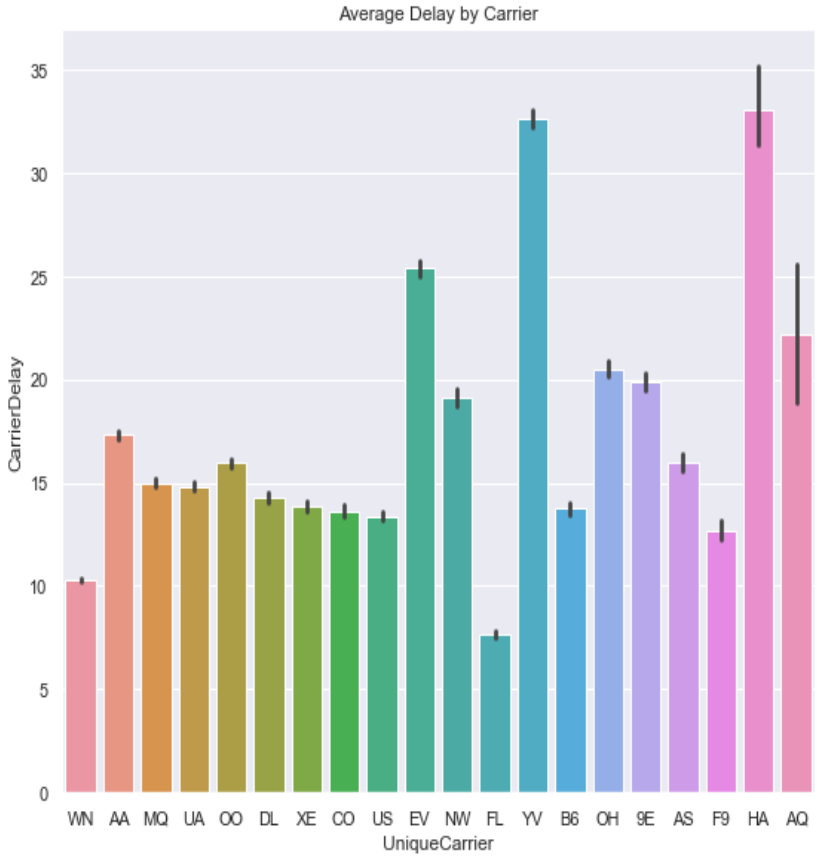
Date

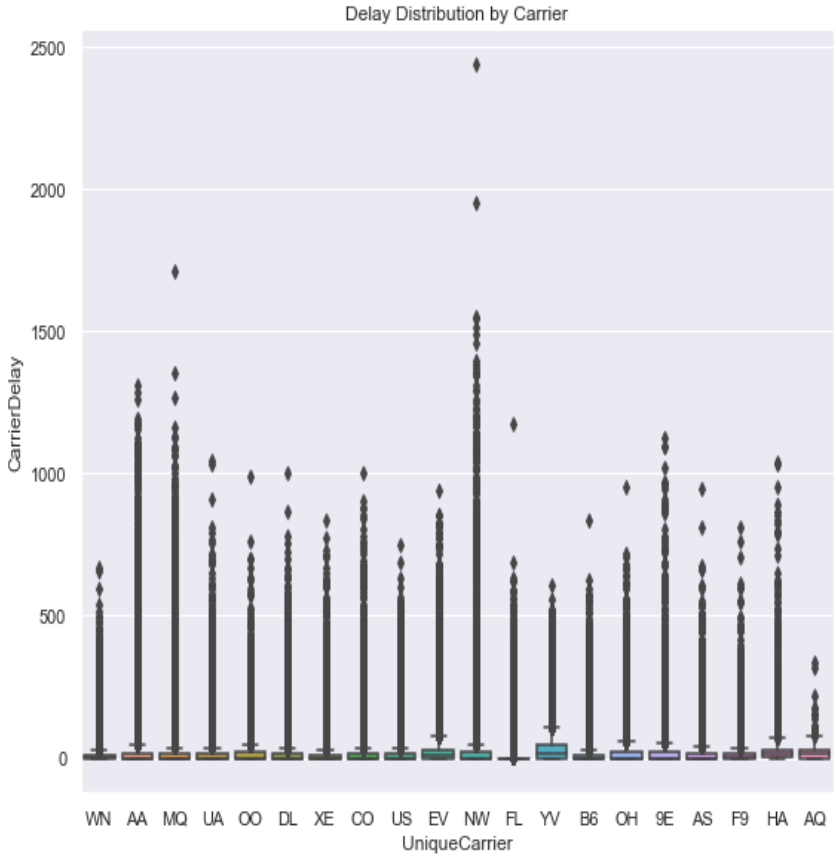
Descriptive Analysis

Delay Status

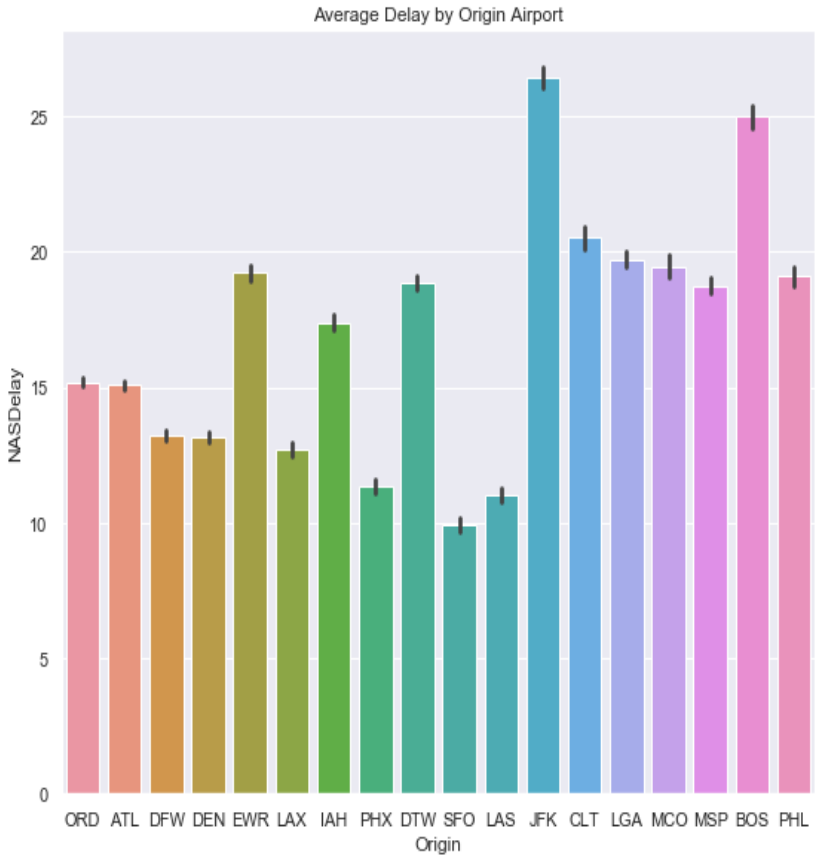
PART 2

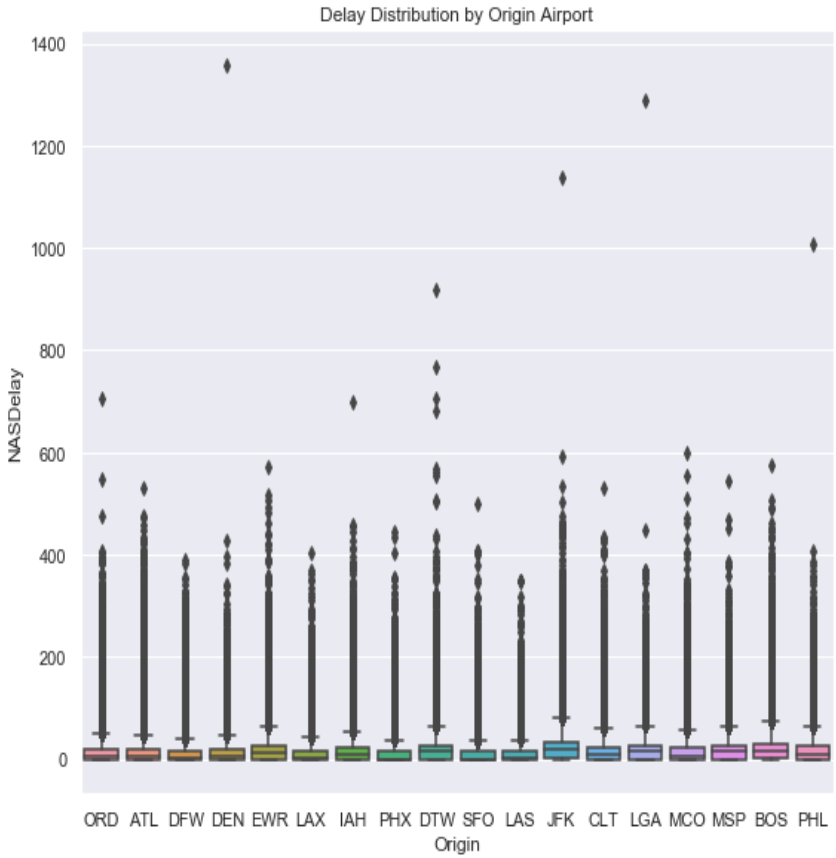
Delay by Carrier



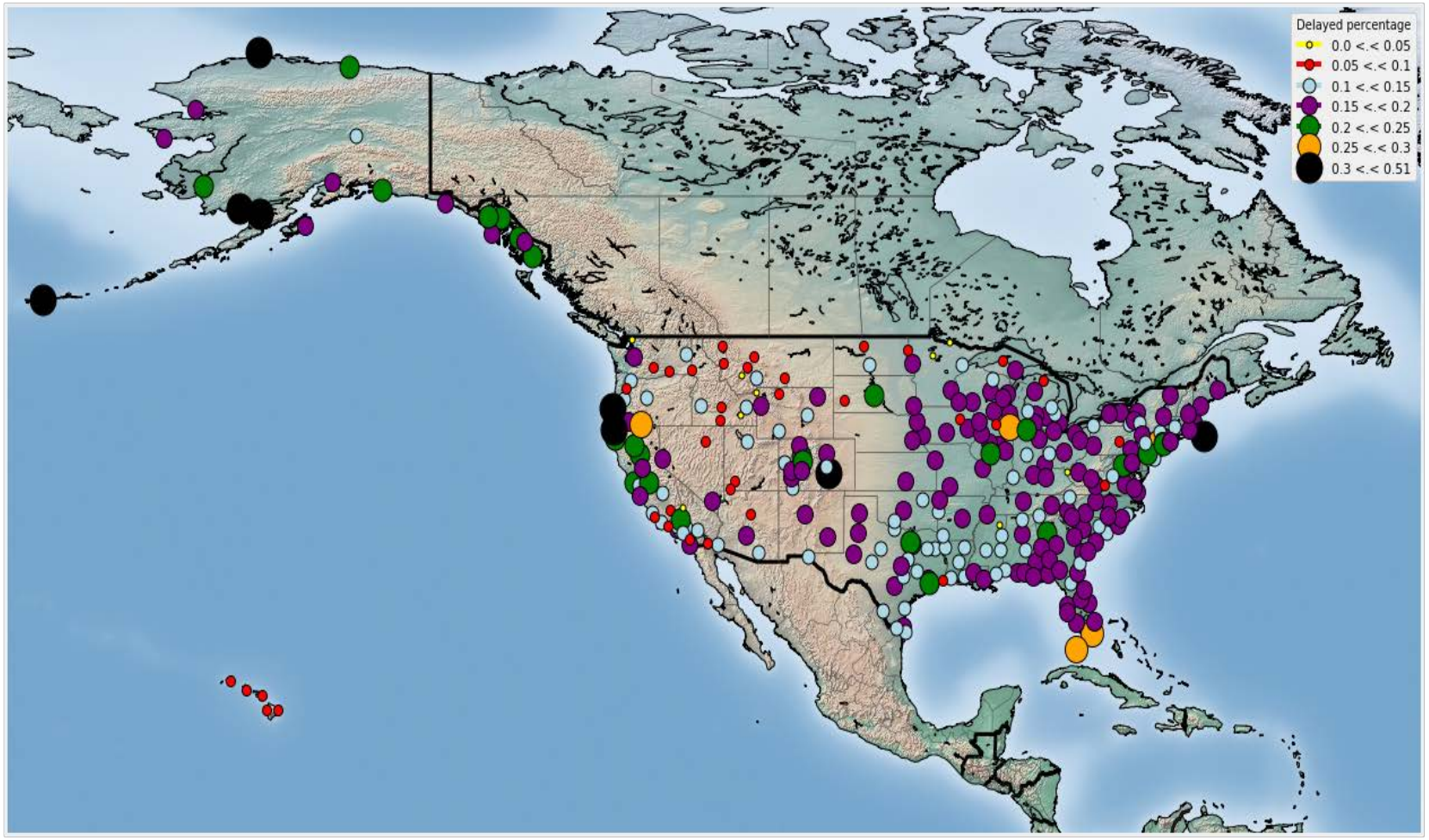


Delay by Airport





Delay by Location

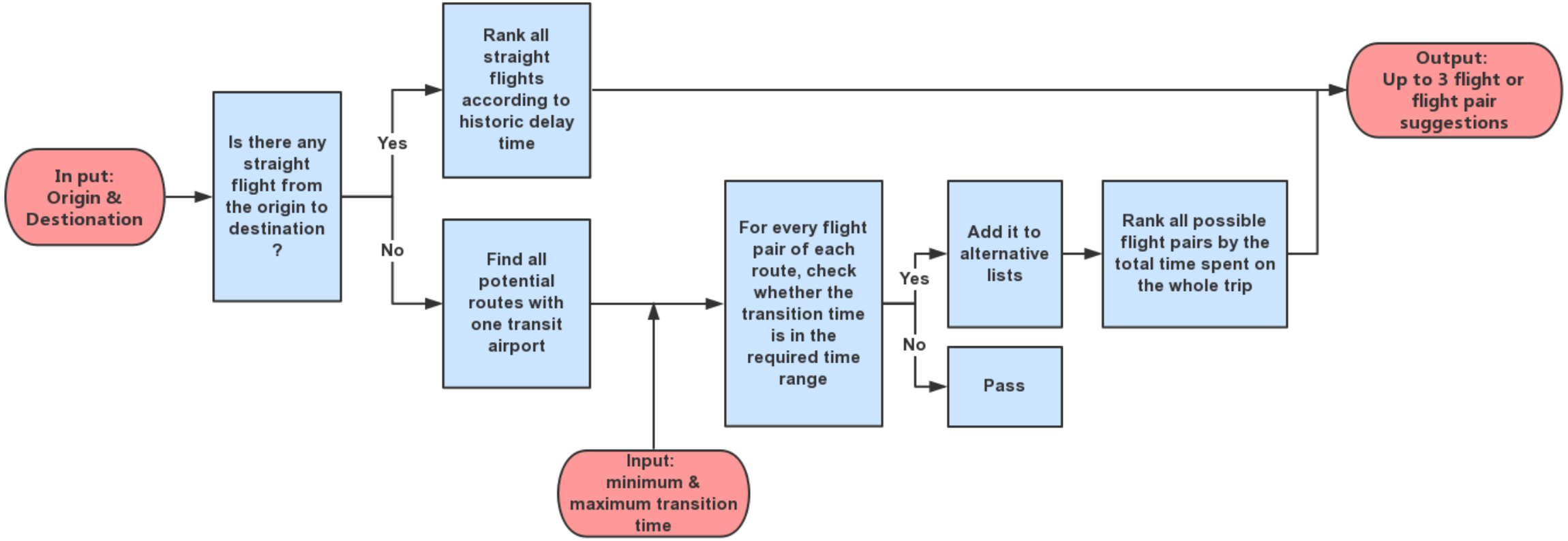


Search Engine

An App that recommends flights

PART 3

Search Engine: Algorithm



Search Engine: Information Collection

airportname.py

Use the airport IATA code as key, thus we can get those unique IATA codes. Later we will generate possible route with those airports.

timelist.py

Use a string including IATA codes of origin and destination as key, and a tuple consists of a string including carrier and flight number, departure time and arrival time as value. Thus we get information of all straight flights.

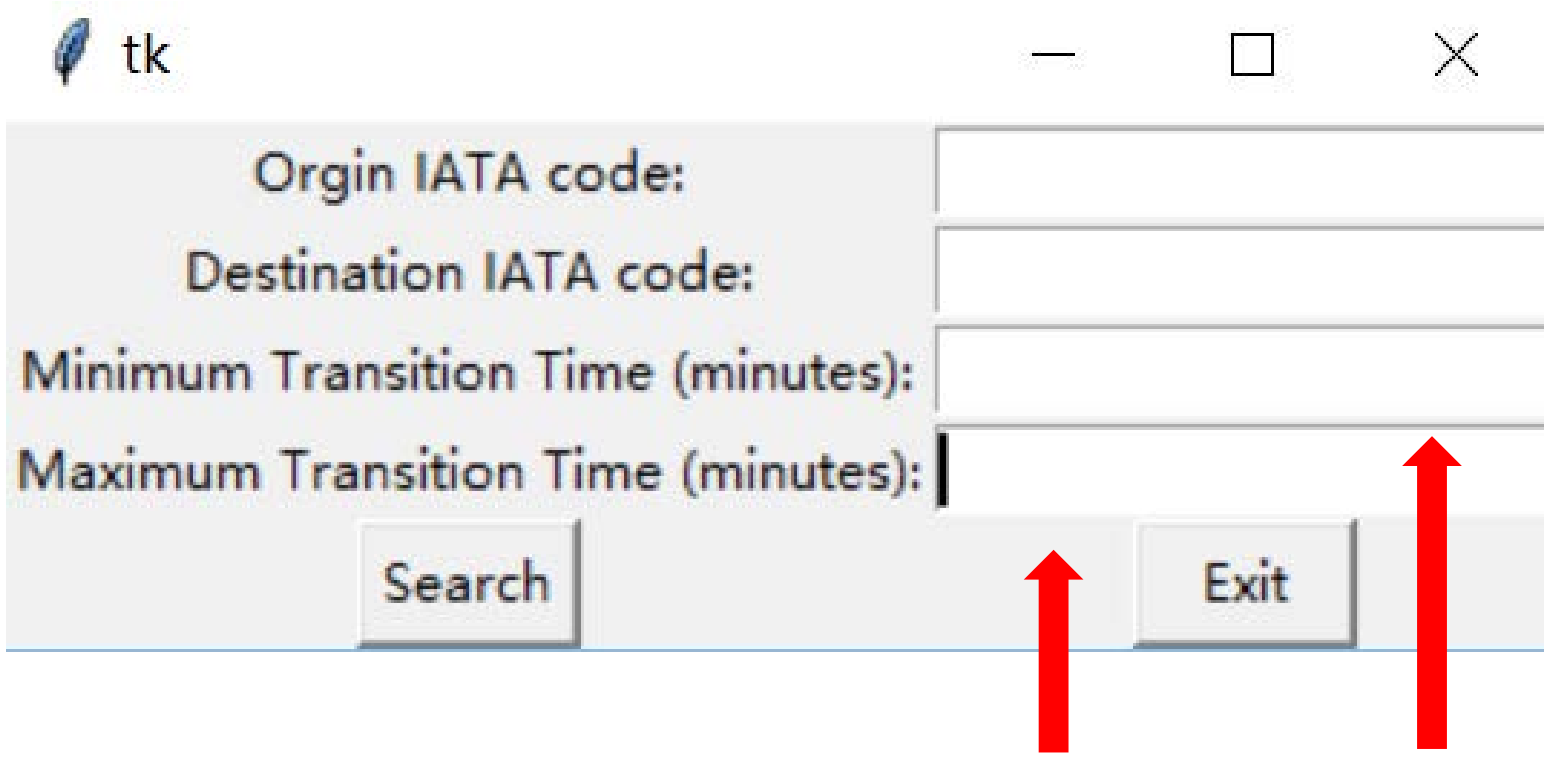
connecting.py

Use a string including information of every flight (IATA codes of origin and destination, carrier and flight number) as key, and a tuple consists of departure and arrival delay time as value. Then take average for every flight.

pair_generator.py

Generate two lists, including pairs of origin and destination with and without straight flight between them respectively. Generate a dictionary for pairs without straight flight between them and find possible transition airports for them.

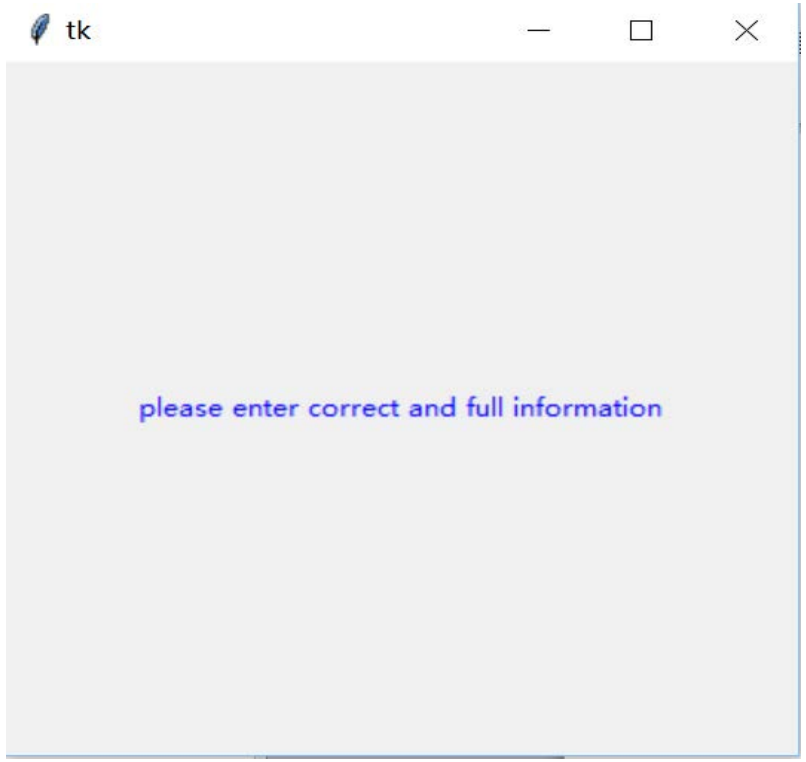
Search Engine: UI interface

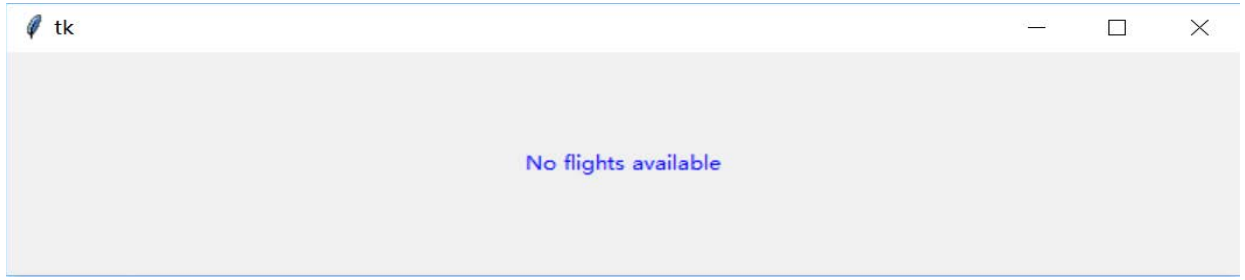


Enter IATA code (3 letters, both capital and small letter are acceptable)

Enter integar, then the time range is determined

Search Engine: Results – Error Warning





Two cases:

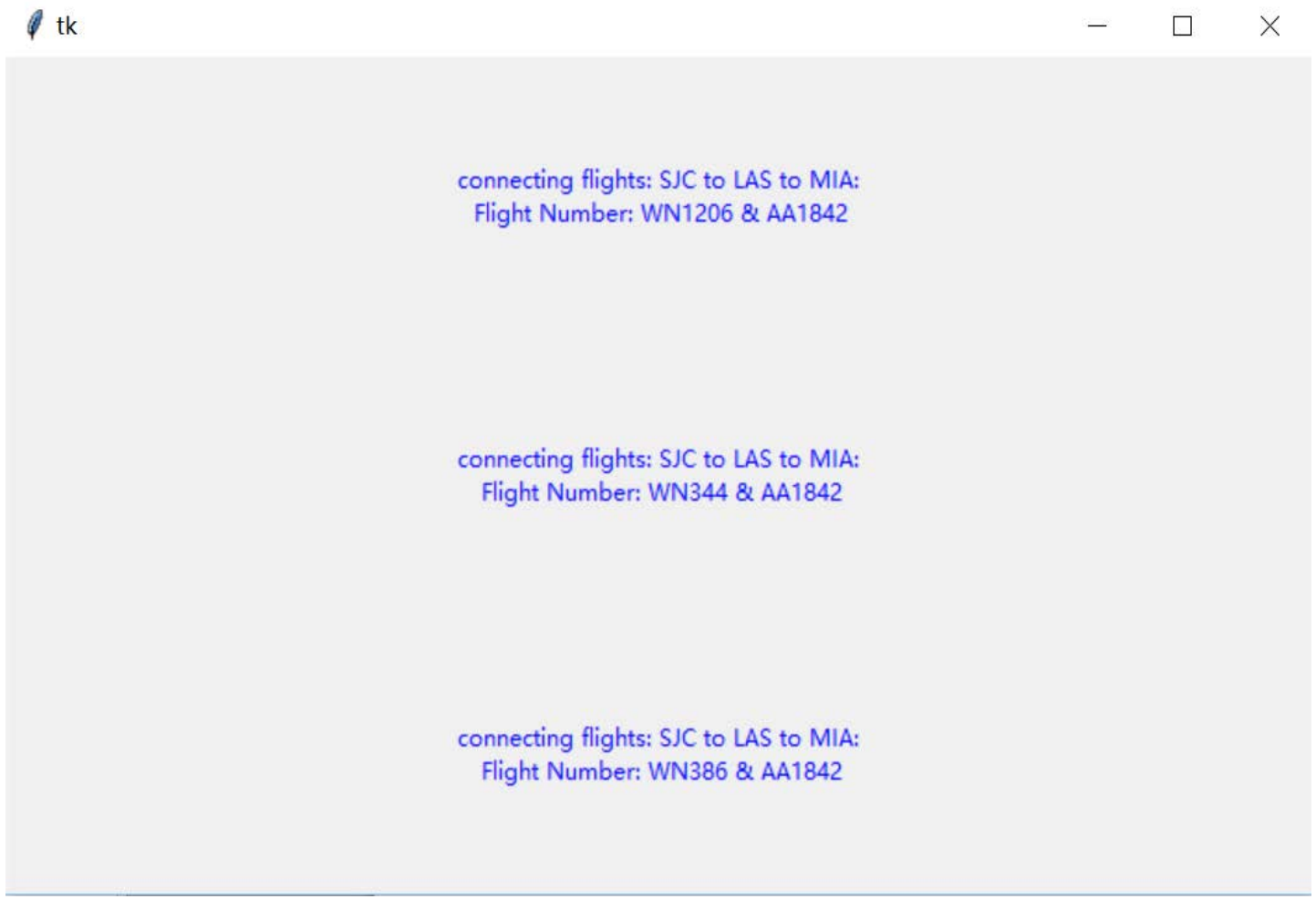
- The user enters wrong information or leaves some box blank
- The user enters correct and full information but our database doesn’t have related data to be analyzed

Search Engine: Results – Straight Flight

Information provided:

- Specific Flight Number (Short Name of Carrier and Flight Number)
- Planned Departure Time (24 hours)
- Planned Arrival Time (24 hours)

Search Engine: Results – Connecting Flights



Information provided:

- The whole route (IATA codes of Origin, Transition Airport, Destination)
- Specific Flight Number (Short Name of Carrier and Flight Number)

Weather Inference

Heatmap of
Flight Delay

PART 4

Weather Inference: Algorithm

Step 1: Pair all delayed flights in one day and calculate the crisscross points

Assumption: Crisscross points could be calculated based on plane coordinate system

Step 2: Round the latitude-longitude coordinates up to the nearest integers

Step 3: Divide the values of each grid by number of years

Step 4: Plot average number of delayed flights in the grid map

Weather Inference: Method

Dask

- primary parallel processing library in python

Dask.delayed() decorator

- stages operations that are to be parallelized
- any function touched becomes lazy and run later

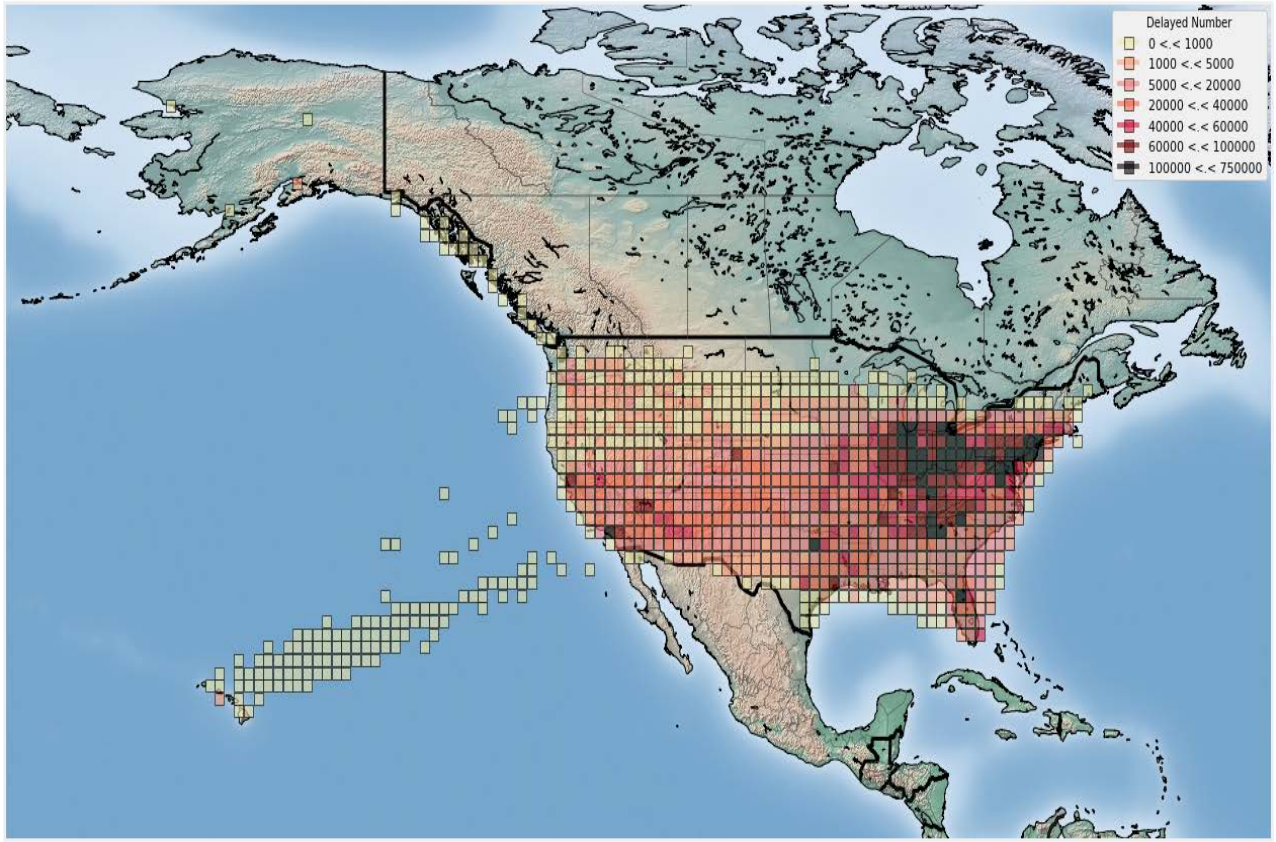
Dask.compute()

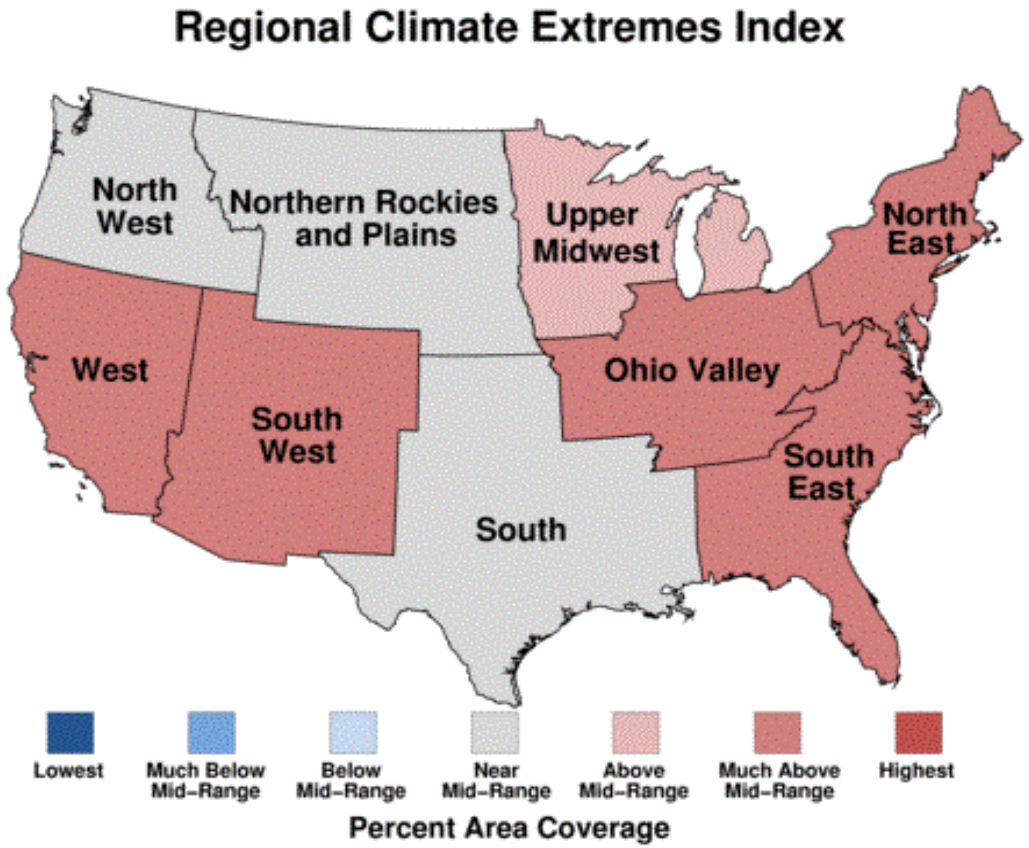
- runs delayed objects parallel

Time Reduction

- from 20 hours to 6 hours

Weather Inference: Results





Data Source: National Climate Data Center

THANK YOU