

Assignment 1: Air Transportation

Date Due: January 27, 2023

Instructor: Trani

Problem 1

Familiarize yourself with the Great Circle Mapper application (<http://www.gcmap.com/>). Plan two trips from Cleveland airport as follows: 1) CLE to DCA and 2) CLE to LAX.

- Extract the great circle distance for these flights.
- Now use the Flightaware web application (<http://flightaware.com/>) and extract flight information for two flights flown between those cities in the past 10 day (your choice).
- Compare the actual distances filed in the pilot's flight plan (these are typically stated as "Planned" in Flightaware.com) versus the great circle distances. Comment on the detour factor observed for each of the flights. The detour factor is the ratio of the distance flown and the great circle distance calculated by the mapper <http://www.gcmap.com/>.
- State the cruise flight levels (i.e., altitude in feet / 100) for the flights selected in part(b) and comment on the altitudes flown. Comment on the altitudes used for Westbound versus Eastbound flights.

Problem 2

Use airport and airline passenger data available at the BTS site.

- Use the Aviation Database T-100 Domestic Market to extract the number of **passengers enplaned** at Cleveland Hopkins International Airport (CLE) and Atlanta Jackson International Airport (ATL) airports in the past 3 years. Make a plot and comment on the results observed. The T-100 database is available at the BTS web site (www.transtats.bts.gov).
- Show the effect of Covid (years 2020-2022) in the number of flights at CLE and ATL. Comment on possible reasons for differences observed.

Problem 3

BTS airline fares and emplacement data.

- Use the Aviation Database **T-100 Domestic Segment** to extract the number of **enplaned passengers** and **seats offered** at the Los Angeles International Airport (LAX) in years 2016 - 2021. Make a plot (or a bar chart) and comment on the results observed.
- Plot the on-time performance of flights at LAX in the same period. Comment on the on-time performance during Covid.
- Air fares are critical in the estimation of aviation demand. Use the BTS site to estimate average fares in the US for the period 2112-2021. Comment on the possible explanation about the decrease in air fares over time.

Problem 4

Fuel consumption and Greenhouse gases.

- Plot the fuel cost paid by (in \$/gallon) of the US commercial airlines with scheduled service (more than \$20 million in revenue per year) for years 2010-2022. The fuel consumption data can be found at the BTS web site (<https://www.transtats.bts.gov/fuel.asp>). Comment on the observed trends.
- Plot the fuel consumption (in gallons) of the US commercial airlines with scheduled service (more than \$20 million in revenue per year) for years 2010-2022. The fuel consumption data can be found at the BTS web site (<https://www.transtats.bts.gov/fuel.asp>).
- Estimate the Greenhouse Gases (GHG) produced by US commercial airlines in 2019 knowing that a pound of Jet-A fuel produces 3.125 pounds of CO₂. Compare the Greenhouse emissions of 2019 and the first year of Covid (2020).

D) Overall, what was the reduction in GHG during Covid?

E) Read the Executive Summary of the Sustainable Aviation Fuel Report (<https://www.energy.gov/sites/prod/files/2020/09/f78/beto-sust-aviation-fuel-sep-2020.pdf>) and comment on some of the ways to make aviation more environmentally sustainable.