Optimizing Security Queue Wait Times at the Atlanta Hartsfield-Jackson International Airport

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Preface

Every day, there are millions of consumers who become passengers at one of the various airports around the world. With so many people on and off flights, it is crucial to streamline the process of a passenger in entirety at airports. At certain times, there will be greater or lesser passenger flow throughout the airport, at intervals described as peak times. By analyzing various data points associated with arrivals/departures, one can determine predict peak times for various days as ascertain the ideal number of Transportation Security Administration (TSA) Officers to assign at security checkpoints per day.

Objective

The objective of this capstone project is to analyze open source data associated with passenger loads of particular flights at the Hartsfield-Jackson International Airport (HJ-ATL) in Atlanta, Georgia, to determine the optimal number of TSA officers to schedule for optimal security queue throughput, thus reducing the amount of time that it takes for passengers to traverse through the entire security queue.

Data Sets

The data needed for this project will be centered around three types:

Flight Data: Logistical information on flights and times occuring at certain times at Hartsfield-Jackson. This data pool will come from the dynamic live flight tool and simulator, FlightRadar24 (flightradar24.com).

The primary data points that will be considered from this data set are:

1) Dynamic Flight Times
2) Departures or Arrivals Classification

3) Tail Numbers for Aircraft Used in Flights in their Database

Aircraft Data: Manufacturing information on the vessels used in the various flights found in the flight data. This data will be pulled from the Releasable Aircraft Database, provided publicly by the Federal Aviation Administration (https://www.faa.gov/licenses_certificates/aircraft_certification/aircraft_registry/ releasable_aircraft_download/). These data sets range from 2008-2017.

The primary data points that will be considered from this data set are:

1) Tail Numbers (verified by the tail numbers of the current flights from FlightRadar24)
2) Number of Seats in Each Aircraft with Registered Tail Number
3) Manufacturing Information for Aircrafts

Operational Data: Logistical Information on Hartsfield-Jackson, monthly data on enplaning and deplaning for domestic and international flights. This data will be pulled from the Operational Statistics page on the HJ-ATL website (https://www.atl.com/business-information/statistics/).

The primary data points that will be considered from this data set are:

1) Aggregate Deplaning and Enplaning Numbers for each month through the years 2013-2019
2) Yearly Comparisions of Data on a Monthly Basis (e.g., Data Comparisons for Feb. 2018 and Feb. 2019)
3) Enplaning and Deplaning based on Airlines.

A particular subpoint for (3) is to analyze separately the data associated with Delta Airlines. Because HJ-ATL is the home hub for Delta Airlines most of Delta's flights pass through or originate from the airport. This means that the data presented on Delta from HJ-ATL can give a good approximation of the airline's activity as well as the activity of the airport in general.

Other Notes

– While HJ-Atl, as well as other major airports probably currently have systems of algorithms in place to approximate the wait times, they are possibly based on other data sets, which would provide different estimates. Using varying data sets allows for the data to take the work into a different direction as the approximations change with respect to the data. Further, the data points on which this data will be analyzed (as aforementioned in the breakdown of data types to be used) can be expanded to include other airports as well.

This project will be presented as a Beamer presentation.