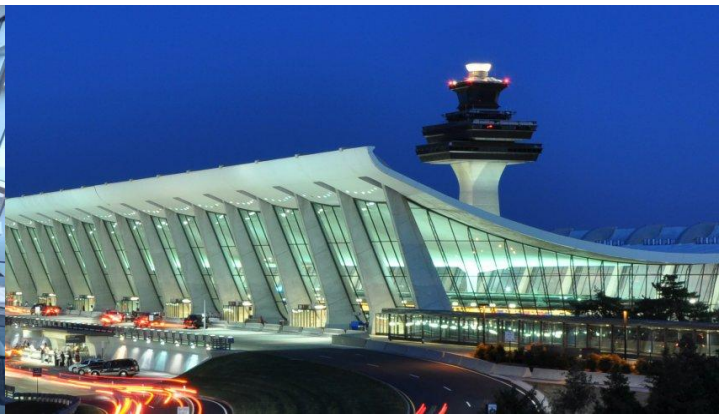
Data Science Project Report:

Determining the best large US airport to open a new restaurant

Allen Wu

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Introduction

The United States is the most visited country in the world, attracting international residents with economic opportunities, tourist destinations, and cultural experiences. Central to the majority of international travel are more than 5000 public use and 14000 private use airports which help move over 849 million annual passengers.

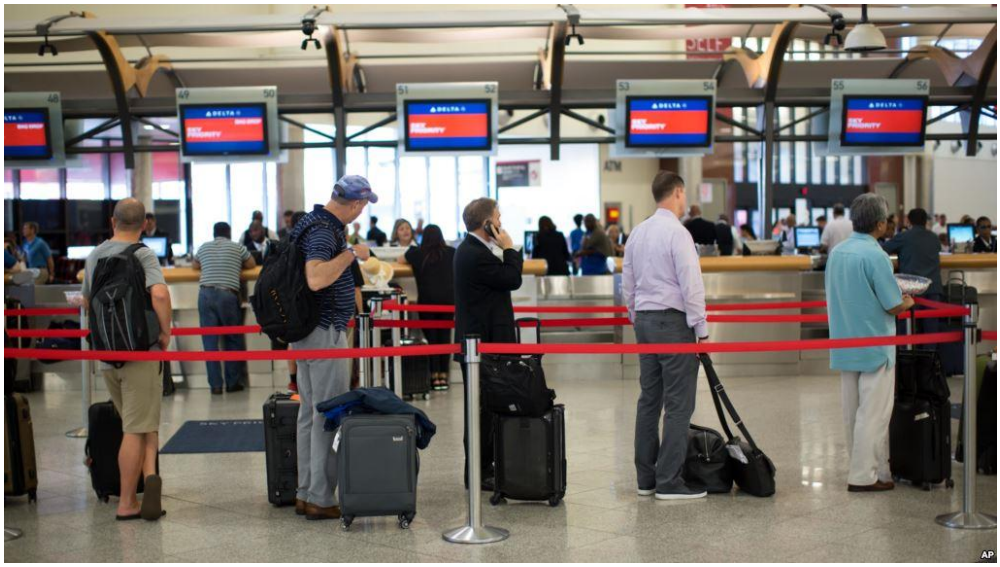

Figure 1: Inside Atlanta Hartsfield-Jackson International Airport, the largest airport by passenger traffic in the United States

As a result, large airports across the United States are often hubs for consumer spending, especially in the food and retail section. With so many customers and the potential for huge annual sales, airports are an enticing place for restaurant owners to set up shop and make a profit. However, the important question is which large airport would be the ideal location to open a new restaurant business? Throughout the report, this question will be investigated using a variety of data sources and tools.

The target audience of this report includes:

1. New restaurant owners seeking to serve a large number of domestic and international customers through opening an airport location
2. Existing restaurant franchises and chains which are seeking to open new locations within airports
3. Investors seeking to determine airports and restaurant types which may generate the greatest return on their investment in future years

Business Understanding

US international airports offer vendors heavy foot traffic with millions of yearly customers. If a good location is selected, a US airport restaurant can be incredibly successful and profitable.

However, opening a new restaurant is no easy feat, and especially not in an airport. Unlike regular restaurant establishments, airport restaurants must contend with a myriad of other factors to operate. For one, there are strict regulations to comply with in opening an airport restaurant. For instance, at many US airports including the busiest: Atlanta's Hartsfield Jackson International Airport, restaurant vendors are required to remain open until the last flight leaves. In addition, airports charge on average 12% of yearly gross sales of a restaurant, on top of paying already high rental costs.

Figure 2: A restaurant/bar operating in John F Kennedy International Airport in New York

As a result, all of these factors lead to higher costs of operation. Thus, not carefully selecting a location can have incredibly high stakes for the owner, and it is imperative that a data-driven approach is required to find the best location.

Data Requirements

The project will determine an airport or cluster of airports where it is most ideal to open a new restaurant based on features such as yearly passenger traffic, rental prices, and existing number of restaurants and venues.

First, web data will be of importance. The BeautifulSoup library will be used to scrape Wikipedia in order to obtain the name of each airport, the metropolitan area they belong to, as well as yearly passenger traffic. The table provides information on the 46 busiest US airports by

total passenger traffic in 2016, and would be appropriate for use in this analysis. Further filtering can be conducted to only conduct analysis on airports which had a positive change from 2015-2016 in passenger growth, as restaurants would seek to open in areas with growing foot traffic.

Rank	Airport name	Location	IATA Code	Traffic		Aircraft	
				Passengers	% chg. 2015/16	Movements	% chg. 2015/16
1	Hartsfield–Jackson Atlanta International Airport	Atlanta, College Park, and Hapeville; Georgia	ATL	104,171,935	▲ 2.6	898,356	▲ 1.8
2	Los Angeles International Airport	Westchester, Los Angeles, California	LAX	80,921,527	▲ 8.0	697,138	▲ 6.3
3	Chicago O'Hare International Airport	Chicago, Illinois	ORD	77,960,588	▲ 1.3	867,635	▼ 0.9
4	Dallas/Fort Worth International Airport	Coppell, Euless, Grapevine, and Irving; Texas	DFW	65,670,697	▲ 0.2	672,748	▼ 1.3
5	John F. Kennedy International Airport	Queens, New York	JFK	59,105,513	▲ 3.9	452,415	▲ 3.0
6	Denver International Airport	Denver, Colorado	DEN	58,266,515	▲ 7.9	565,503	▲ 4.5
7	San Francisco International Airport	San Mateo County, California	SFO	53,099,282	▲ 6.1	450,388	▲ 4.8
8	McCarran International Airport	Paradise, Nevada	LAS	47,496,614	▲ 4.5	541,428	▲ 2.1
9	Seattle–Tacoma International Airport	SeaTac, Washington	SEA	45,736,700	▲ 8.0	412,170	▲ 8.1
10	Miami International Airport	Miami-Dade County, Florida	MIA	44,584,603	▲ 0.5	414,234	▲ 0.3
11	Charlotte Douglas International Airport	Charlotte, North Carolina	CLT	44,422,022	▼ 1.0	545,742	▲ 0.3
12	Phoenix Sky Harbor International Airport	Phoenix, Arizona	PHX	43,302,381	▼ 1.6	440,643	▲ 0.1
13	Orlando International Airport	Orlando, Florida	MCO	41,923,399	▲ 8.0	316,981	▲ 2.9
14	George Bush Intercontinental Airport	Houston, Texas	IAH	41,622,594	▼ 3.3	470,780	▼ 6.4
15	Newark Liberty International Airport	Newark and Elizabeth, New Jersey	EWR	40,563,285	▲ 8.2	435,907	▲ 5.3
16	Minneapolis–Saint Paul International Airport	Hennepin County, Minnesota	MSP	37,413,728	▲ 2.3	412,872	▲ 2.0
17	Logan International Airport	Boston and Winthrop, Massachusetts	BOS	36,356,917	▲ 8.5	372,930	▲ 2.5
18	Detroit Metropolitan Airport	Romulus, Michigan	DTW	34,401,254	▲ 2.9	393,427	▲ 3.7
19	Philadelphia International Airport	Philadelphia and Tinicum Township, Pennsylvania	PHL	30,155,090	▼ 4.1	394,022	▼ 4.2
20	LaGuardia Airport	Queens, New York	LGA	29,786,769	▲ 4.7	369,987	▲ 2.7

From here, the airport names can be passed into a Python geocoder API which will determine latitude and longitude figures for individual airports. The coordinates of an airport can be passed into the Foursquare API, which can determine information about existing venues and restaurants near airports. Some features which can be examined include the ratio of passengers to restaurants at airports, average income of metropolitan areas, and the types of existing venues within and nearby airports to determine which types of restaurants are already successful and where future opportunities may lie.