The Pitfalls of Using IP Address Search Data for Airport Catchment Area Analysis

Executive Summary

As airports and airlines seek a deeper understanding of their true market reach, digital data sources—particularly online travel search activity—have become popular for catchment area analysis. Some data vendors offer products that map traveler "demand" by tracking the IP addresses of users searching for flights. While this approach appears reasonable, it introduces two critical flaws that can significantly distort the real picture of airport demand and passenger origins. If uncorrected, these flaws can misrepresent airport traffic, mislead strategic decisions, and hinder air service development.

Introduction

In today's data-driven environment, accurately defining an airport's catchment area is essential for air service development, route planning, and strategic investment. With the advent of digital analytics, IP address-based search data has been used to estimate regional demand. However, this method contains fundamental biases that can misguide airport strategies and mask opportunities for growth.

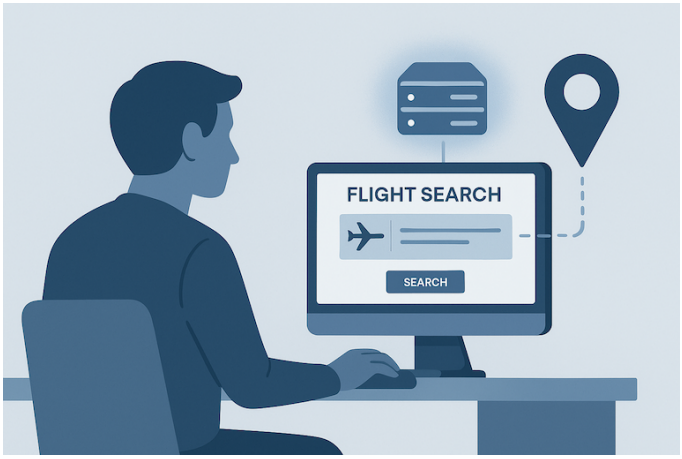

Figure 1: Flight Search

The Two Core Problems

1. IP Address ≠ Traveler's Home Address

- **Misplaced Origin:**
  An IP address shows only where a user was connected to the internet at the time of their search—not where they reside or intend to begin their trip. People frequently search for flights from workplaces, hotels, airports, or while traveling, rather than from home.

- **Technical Distortions:**
  Mobile networks, VPNs, public Wi-Fi, and shared connections can obscure a user's true location, sometimes linking searches to an ISP's headquarters instead of the actual location.
- **Geolocation Inaccuracy:**
  In rural or low-density areas, IP geolocation can point to the wrong town or even a nearby city.

Impact:
Catchment area studies that rely on IP data may falsely map airport "demand" to the wrong ZIP codes, cities, or regions, distorting the true geographic reach of the airport.

2. Search Data ≠ Actual Travel Demand

- **Not All Searches Lead to Bookings:**
  Many people search for flights out of curiosity or to compare prices, but never book a ticket.
- **Multiple Searches per Trip:**
  Travelers—especially in regions with fewer options—often perform many searches before making a booking.
- **Behavioral Differences:**
  Big-city travelers may book quickly or use corporate portals and frequent flyer programs, resulting in fewer personal searches. In contrast, travelers in smaller or rural markets conduct more extensive, repeated searches.

Impact:
Search data can significantly overestimate true demand in some areas while underestimating it in others, resulting in inaccurate allocations of total traffic via an airport.

Why These Issues Matter for Catchment Area Studies

These two biases—misplaced origin and inflated/deflated demand—can have a direct and negative impact on catchment area studies:

- **Misrepresentation of True Traffic:**
  Airports may appear to have larger or smaller catchment areas than they actually do. This leads to overestimating demand from some ZIP codes while missing genuine demand elsewhere.
- **Misguided Strategic Decisions:**
  Airlines and airports may target the wrong communities for marketing, outreach,

or service improvements. Investments in ground transportation or new routes may be based on a flawed understanding of passenger origins.

- **Undercounting Key Segments:**
  Populations less likely to use digital search tools—such as the elderly—may be underrepresented, resulting in gaps in service and missed opportunities.

Case Study: A Secondary Airport Near Major Hubs in the Northeast

Travelers living within 45 miles of a secondary airport near large metropolitan hubs often conduct **more searches per trip** than residents of major cities. This difference in search behavior is driven by:

- **Fewer Nonstop Options:**
  Travelers must weigh trade-offs between price, layovers, or driving to a larger airport, resulting in more comparative searches across multiple airports.
- **Greater Sensitivity to Price and Schedule:**
  Limited flight choices make early departures or long layovers more consequential, prompting more extensive searching for optimal itineraries.
- **Uncertainty Around Airport Choice:**
  The decision between using a smaller local airport or a distant hub isn't always clear, leading to more multi-airport searches.
- **Lower Familiarity with Booking Tools:**
  Some demographic segments conduct more searches before feeling comfortable booking, due to less familiarity with digital tools.

In contrast, many travelers in large cities book through corporate channels or frequent flyer programs and have higher airport or airline loyalty, resulting in fewer searches.

How These Biases Affect Analysis

- **Inflated Demand for Major Airports:**
  Local travelers' extensive comparative searching artificially increases the apparent share of major hubs within the smaller airport's catchment area.
- **Understated Local Loyalty:**
  Big-city travelers who book quickly or through channels not captured by search data create less appearance of their areas for the big airports.

Result:

Catchment area studies based solely on search data **overstated the influence of major airports** in local markets and inflate "leakage" estimates from the secondary airport—misleading growth and service strategies.

Overcoming These Problems: Better Data Sources

Ticketing data with traveler addresses would be ideal for airport catchment analysis, but privacy restrictions and industry practices make it difficult to obtain. Some solutions are based on reservation (MIDT) data from Global Distribution Systems (GDS) or ticketing data aggregated by the Airline Reporting Corporation (ARC). However, there are limitations of those data.

Limitations of Ticketing Data

- For corporate travels, the billing addresses often reflect a company's headquarters rather than the actual traveler's home.
- These datasets cover agency sales. Two important tickets are missing:
    - Low-cost carriers who don't use ARC's settlement system or GDS
    - Direct bookings of legacy carriers

Why Air Mobility Data Offers a Better Solution

Air Mobility data, derived from anonymized cell phone location records, addresses both major challenges:

1. **True Home-to-Airport Patterns:**
    - Air Mobility data tracks actual device movements from real home locations to the airport on the day of travel.
    - Home locations are identified based on repeated overnight presence, providing greater accuracy than IP-based methods.
2. **Reflects Actual Travel, Not Just Interest:**
    - Air Mobility data captures only those who physically travel to the airport, eliminating inflation from repeat searches or "lookers."
    - All traveler types are represented, regardless of how they booked.

Air Travel Conversion Funnel

Figure 2 illustrates the Air Travel Conversion Funnel. For airport catchment analysis, the most critical metric is the number of actual Pax Trips. As shown from left to right,

each stage in the funnel introduces potential discrepancies. Not everyone who searches for a flight ends up booking one. Not every booking results in a ticket, and even among ticketed passengers, some may not show up for the flight.

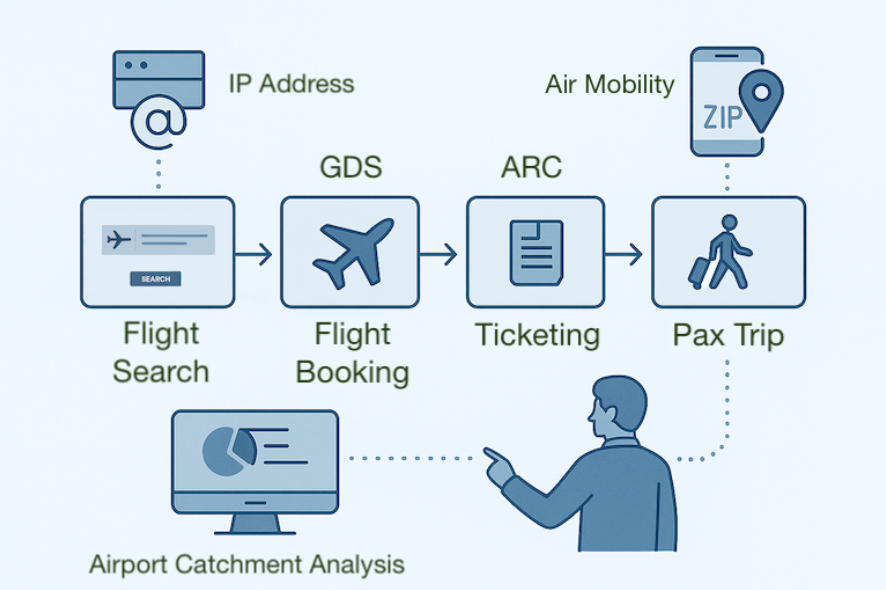

Figure 2: Air Travel Conversion Funnel

Different data sources align with different stages of this funnel:

- IP address–based search data captures activity at the *Flight Search* stage—the point furthest from actual travel and most prone to error.
- GDS MIDT data reflects the *Flight Booking* phase.
- ARC data captures the *Ticketing* stage.
- Only Air Mobility data captures the *Pax Trip* itself.

Because it tracks actual travel behavior, Air Mobility data provides the most accurate and realistic view of an airport's catchment area, moving beyond online intent to reveal where passengers truly originate and travel.

Recommendations

- Airports and their partners should move beyond IP address-based search data for catchment area studies.
- Leverage Air Mobility data or comprehensive ticketing datasets to gain accurate insights into traveler origins and behavior.
- Invest in robust, reliable data sources to support smart, effective air service development strategies.

Conclusion

IP address-based search data, while readily available, introduces substantial biases that can distort catchment area analysis. By adopting advanced data sources such as Air Mobility data, airports can obtain actionable, trustworthy insights—empowering them to better serve their markets and make informed strategic decisions.

For more information or to discuss how advanced mobility data can improve your airport's catchment area analysis, contact us at clement.zhang@flightbi.com.