

CONTENT BY
JONATHAN SILVERBERG, CTO AIRSAGE INC.



AIRSAGE



DATA QUALITY OVERVIEW

WHERE WE ARE NOW

IN DATA WE TRUST

We believe in building a better future based on understanding human movement.

AirSage taps into the power of billions of location signals. We extract geospatial insights from raw data using a patented big data approach. Our team leverages 20 years of experience in location intelligence to deliver industry-leading accuracy.

Quality has always been the foundation of AirSage's business. Our initial goal was to revolutionize various industries by providing them with high quality, accurate, actionable data to replace older sources of information used for decision making. Now we are proudly serving such digital-enabled traditional industries as urban planning, transportation and mobility, healthcare and natural resource management.

We have helped the transportation planning industry replace old travel surveys based on interviews with hundreds of commuters with Nationwide Trip Matrixes based on millions of travelers' movement data. This has increased the efficiency of multiple cities and regions.

Similarly, we replaced manual visitor counts at parks which takes months of labor and coordination with mobile device-based visitation data, providing greater spatio-temporal coverage time savings, and reduced cost.

Another example is the alternative (financial) data market. AirSage has provided high-quality quantitative data to help answer questions that could not be answered based on less accurate information in the past. This opens new business opportunities.

All of AirSage's clients rely on getting data that is rich in detail, accurate, and timely. In this document, we describe how these are achieved.

DETAILS

AirSage's geospatial insights include a very rich set of attributes that provide the widest possible set of answers to our clients' questions.

These attributes include for example:

For visits:

- Numbers of visitors.
- Time spent at locations.
- Frequency of visits.
- Density of visitation on location.

For movements:

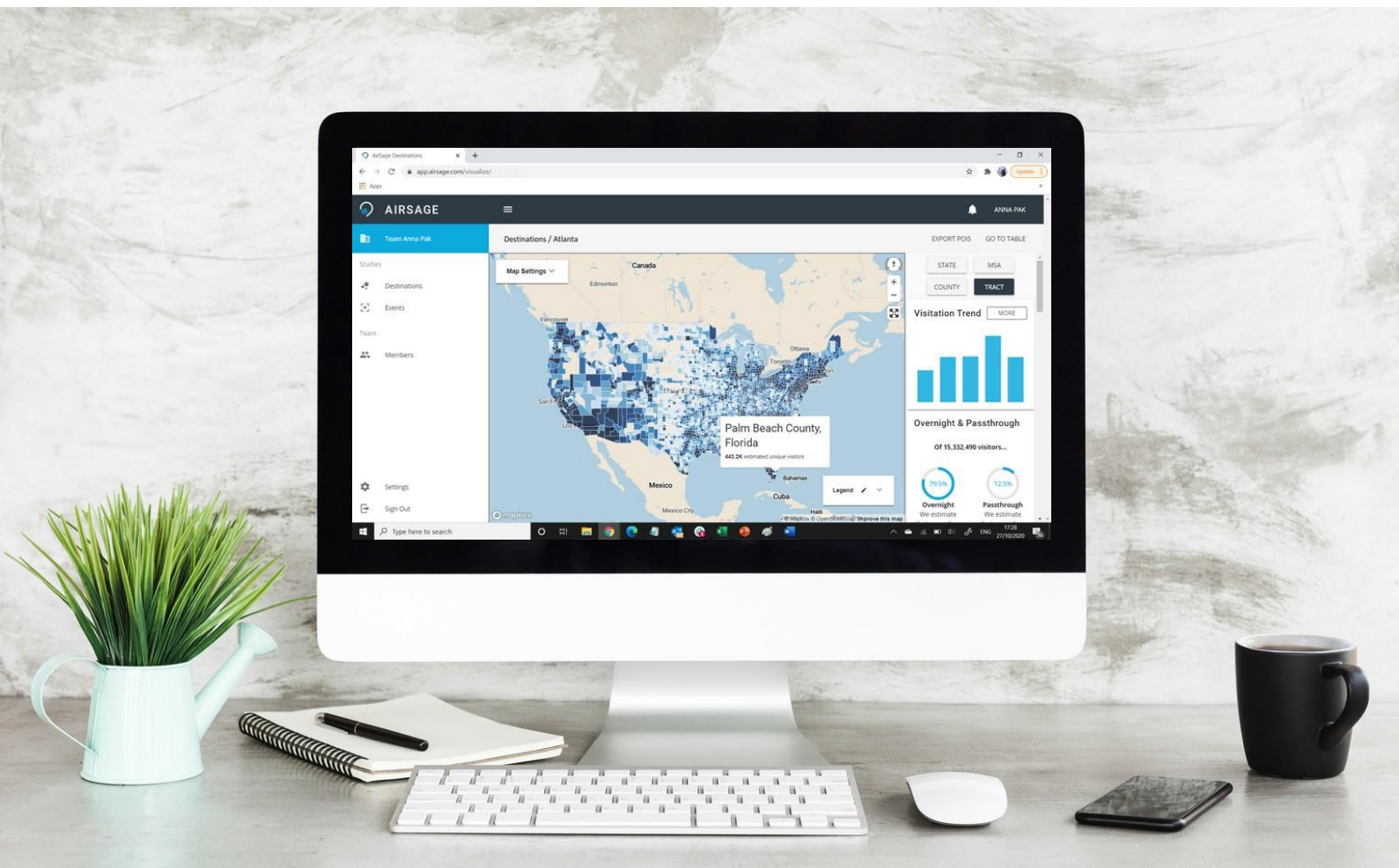
- Trip purpose.
- Trip lengths.
- Speed of travel.
- Mode of travel.

Data aggregated by hours of day and day of the week.

Home and Work locations of visitors and travelers.

Detailed demographics:

- Age.
- Gender.
- Ethnicity.
- Household income.
- Education.



ACCURACY

AirSage's data accuracy is achieved based on several components: Data sources, Data processing, and Extrapolation.

Sourced Data

With more than a decade of experience with sourcing various types of anonymous location data (carrier data, connected vehicle data, fleet data, smartphone data, and more), AirSage has developed an expertise in sourcing the best available data and building an optimal data panel.

Nearly all data available in the open market for large scale sourcing has been evaluated and considered by

AirSage to enter its panel. Each such candidate passes a thorough and efficient evaluation process that ultimately reveals its data volume, coverage, uniqueness, and multiple other quality metrics, all relevant for the AirSage analytics use cases.

Data that has been chosen to enter the panel goes through similar ongoing evaluation to make sure that the highest quality standards are also kept through time. Data feeds that fail to maintain such standards are removed from the panel.



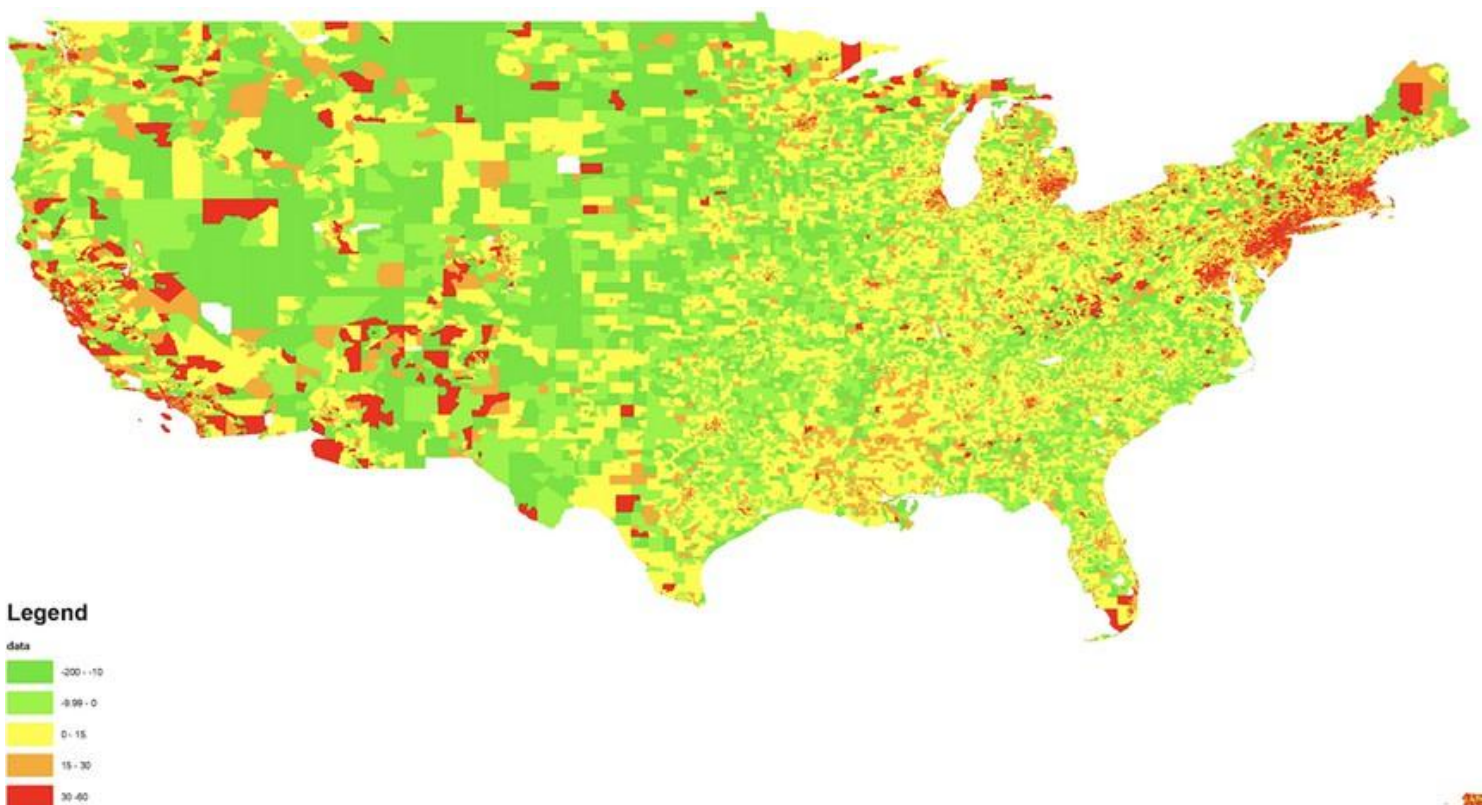
Data Processing

Sourced data is normalized and archived in AirSage's Big Data system in a secure and accessible format. Irrespective of the final use case, proprietary preprocessing is run on the data. This includes some unique features such as:

- Accurate point classification: every user location is classified whether it represents a person in motion or stationary. This is very critical, for example, when trying to count visitation to a location and differentiate between people who just passed by and those who actually spent time at the location.

In a recent comparison of the AirSage point classification with an independent source, we found that the AirSage data was **more than 99.9% accurate**.

- Home/Work assignment: Several use cases require high-quality assignment of the location in which the mobile device holders live and work. These assignments need to be able to cope with unique cases, such as people relocating to a vacation home for a few weeks, people working night shifts regularly, and more.

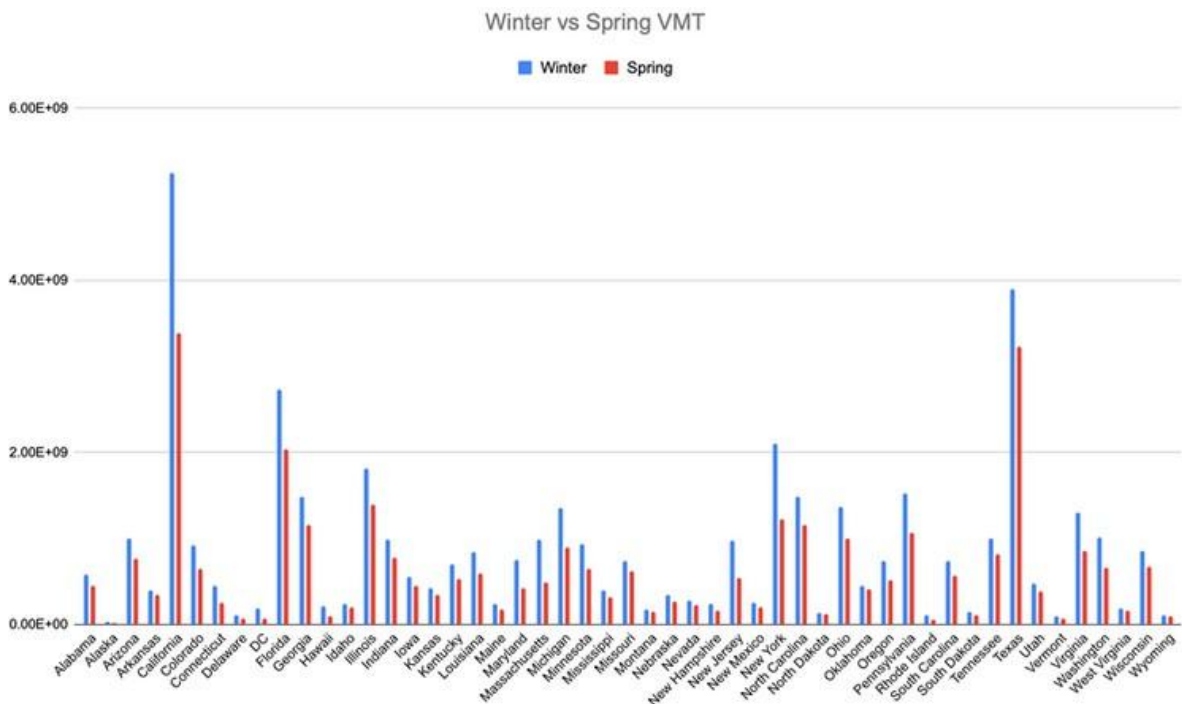
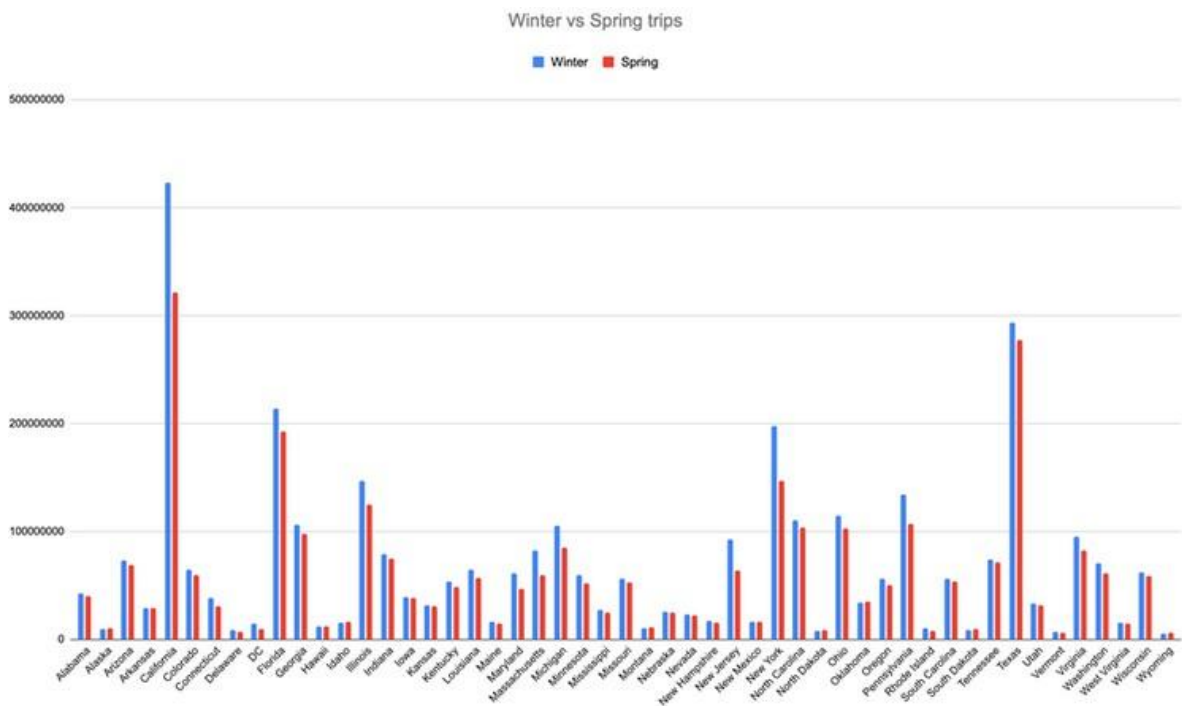


Difference in trip frequency in all US counties Winter 2019-20 vs. Spring 2020

Extrapolation

One of the biggest challenges in the geospatial Big-Data analytics space is translating the results generated from a varying sample of mobile devices into insights about the full population.

AirSage has developed the most efficient methodologies to do so. This is done by maximizing and validating the correlation to independent sources such as updated census data, high-quality traffic counts, and attendance reports.



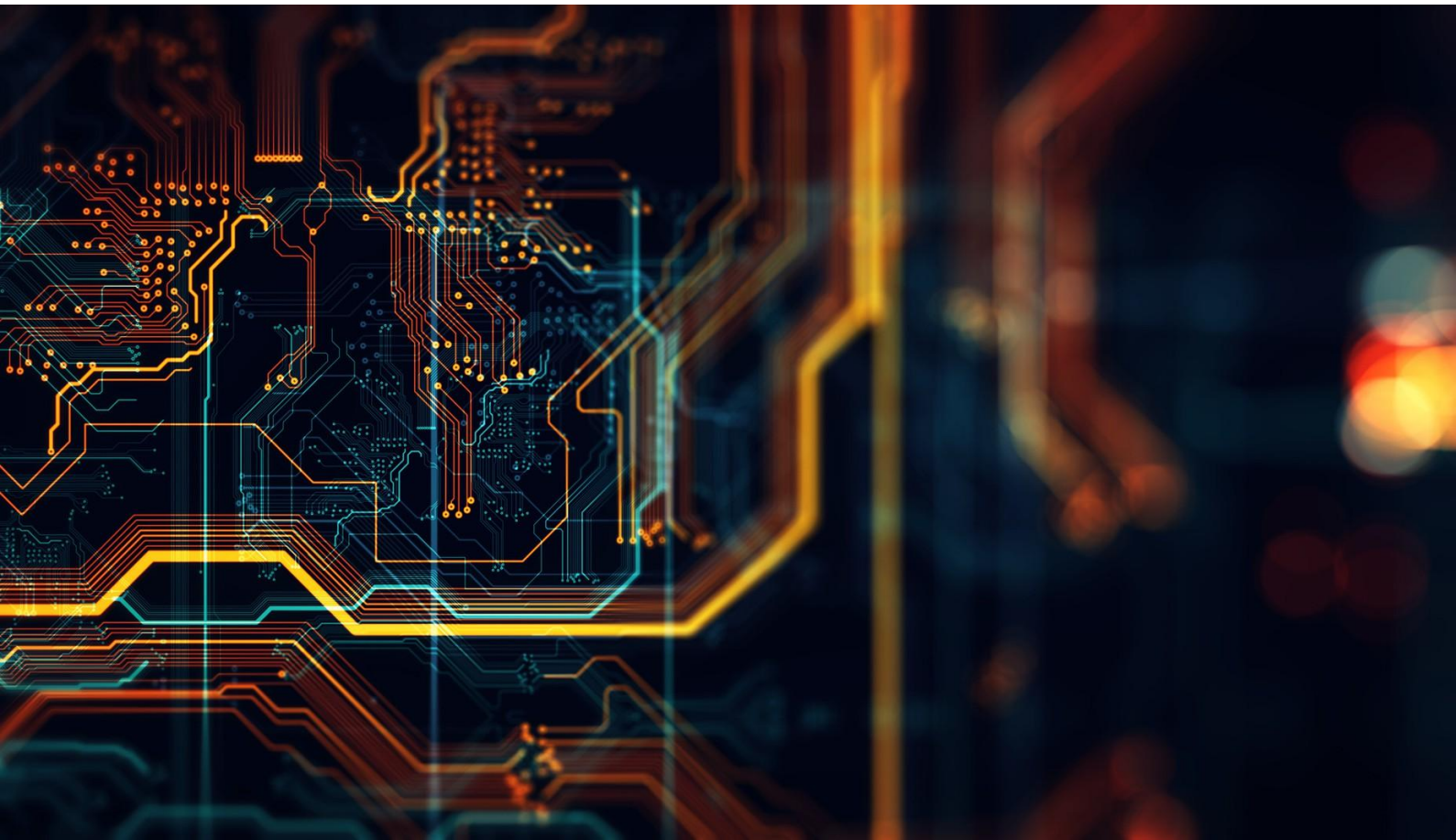
Difference in trip frequency and VMT in US counties Winter 2019-20 vs. Spring 2020

TIMELINESS & HISTORY

Most of the AirSage data use cases leverage location data collected from mobile devices. The AirSage Team provides processed insights, usually within one week from time of data acquisition to result. Other use cases (such as traffic monitoring) are based on real-time data collected from connected GPS devices and processed in near real-time.

As the pioneer in big data location analytics, AirSage has extensive experience with collecting data.

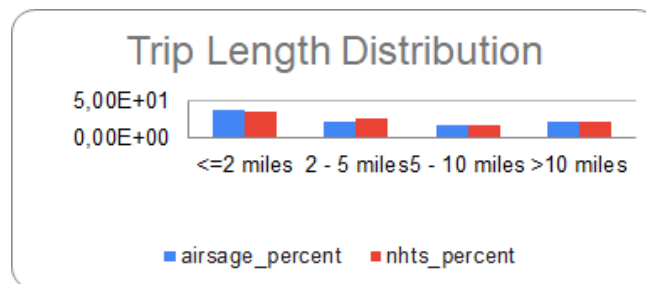
Our high-quality GPS data goes back to 2018. With access to the raw data, we can go back in time and reprocess data as new requirements come up to answer new questions even if they were not originally asked. The same goes for our ability to strive to improve our outputs by processing historical data with the newest methodologies as they are developed and become available.



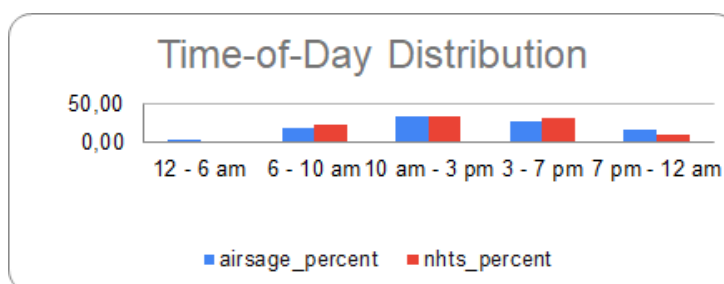
QUALITY TESTS

Inter- and intra segment plausibility checks:

- we test overall, within a segment (i.e. transportation) and between segments. (new)
- we check whether the data week to week is plausible.
- these checks are fully automated.



trip_length	airsage_trips	airsage_percent	nhts_trips	nhts_percent	relative_difference	absolut_difference
<=2 miles	1,40E+09	3,87E+01	3,45E+08	36,27	-6,620	2,40
2 - 5 miles	7,96E+08	2,20E+01	2,50E+08	26,25	0,163	4,28
5 - 10 miles	6,32E+08	1,74E+01	1,59E+08	16,72	-0,041	0,72
>10 miles	7,95E+08	2,19E+01	1,98E+08	20,77	-0,053	1,16



day_parts	airsage_trips	airsage_percent	nhts_trips	nhts_percent	relative_difference	absolut_difference
12 - 6 am	1,57E+08	4,38	2,19E+07	2,30	-90,283	2,08
6 - 10 am	6,90E+08	19,21	2,13E+08	22,41	14,273	3,20
10 am - 3 pm	1,18E+09	32,73	3,18E+08	33,47	2,209	0,74
3 - 7 pm	9,93E+08	27,64	2,94E+08	30,92	10,599	3,28
7 pm - 12 am	5,76E+08	16,04	1,04E+08	10,90	-47,116	5,14

Comparison of AirSage data and National Household Travel Survey (NHTS) data based on trip length and time of the day distribution.



sales@airsage.com
(404) 809-2499
2146 Roswell Rd, Suite 108, PMB 862,
Marietta, GA 30062
<https://www.airsage.com/>