

# **IDENTIFYING LIKELY WAREHOUSE LOCATIONS**



#### **BACKGROUND**

Over the past ten years, retail giants such as **Amazon** and **Walmart** have rapidly expanded their distribution center locations.

The construction of these warehouses are usually incentivized through **tax cuts** and can have a large **economic impact** on the surrounding geography.

#### WHY IS THIS USEFUL?

Being able to predict likely locations can aid local governments in their decision-making process.

This information can also aid investors in real estate when making investment decisions.





## DATA APPROACH



#### COUNTY-LEVEL APPROACH

Our analysis included **2364** out of roughly 3000 counties in the United States. This provided a good combination of practicality and interpretability. Analysis was narrowed to **Amazon** and **Walmart** locations.

#### **DATA SOURCES**

Data primarily sourced from:

- U.S. Census Bureau ACS Survey
- 7illow Home Value Index
- USDA Economic Research Service Surveys
- Publicly-available warehouse location data

#### **ANALYSIS OF KEY DEMOGRAPHIC INFORMATION**

- Demographic characteristics were examined for prediction
- Including: population density, median household income, unemployment rate, education level, net migration rate.



# VISUALIZING WAREHOUSE LOCATIONS

Where are retail warehouses usually concentrated in the United States?

# **METHODOLOGY**



#### **CLASSIFICATION MODEL**

Model was used to predict the probability of a certain county containing a major retail warehouse.

Prediction was based on the examination of key **demographic**, **economic**, and **geographic** characteristics.

#### **EVALUATION AND CRITERIA**

Used **false positive** classifications as a proxy for likely warehouse locations.

Desired evaluation metrics placed equal emphasis on:

- Correctly identifying all retail warehouses
- Having a high threshold of accuracy for all the warehouses the model identified

# **CONFUSION MATRIX**



|                   | Predicted<br>Present | Predicted<br>Absent |
|-------------------|----------------------|---------------------|
| Actual<br>Present | 91                   | 27                  |
| Actual<br>Absent  | 383                  | 1153                |

#### **KEY PERFORMANCE METRICS:**

- Out of 118 total warehouses, 91 or **77.1%** were correctly identified
- Out of the 474 predicted warehouses, 91 or **19.2%** were truly correct
- This results in an overall accuracy rating of 75.2%
- The blue-shaded region shows total false positives 383 likely counties for future retail warehouse locations

F1-score: 0.307

|                                      | (TOP 50) | TRUE LUCATIONS |
|--------------------------------------|----------|----------------|
| Population                           | 944,947  | 525,784        |
| Land Area<br>(sq mi)                 | 1442.4   | 1273.5         |
| Median HH<br>Income                  | \$70,087 | \$58,589       |
| Unemp. Rate                          | 4.2%     | 4.4%           |
| Graduated<br>High School             | 87.9%    | 86.9%          |
| Net Migration<br>Rate                | 10.6%    | 6.1%           |
| Population<br>Density<br>(per sq mi) | 1133.1   | 513.1          |

LIKELY LOCATIONS

TRUE LOCATIONS

### **RECOMMENDATIONS**



#### **EXAMINING THE TOP LOCATIONS BY PROBABILITY:**

- 1. San Diego County, CA
- **2.** Orange County, CA
- **3.** Broward County, FL
- 4. Santa Clara County, CA
- **5.** Middlesex County, MA
- 6. Palm Beach County, FL
- **7.** Orange County, FL
- 8. Travis County, TX
- **9.** Collin County, TX
- **10.** Oakland County, MI
  - Seemed to favor larger, more populated counties

## PREDICTING ON THE ULTIMATE "TEST" SET

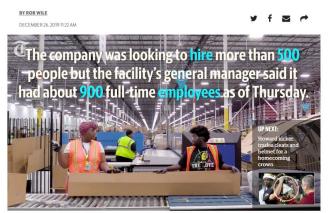


# Amazon Adding 1,500 Workers For New Distribution Center In West Jefferson



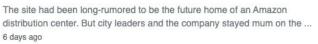


Amazon opening a new Florida fulfillment center with promise of 500 new jobs





#### Construction begins on Amazon distribution center in Nampa







#### Amazon building new distribution center in south Sarasota County

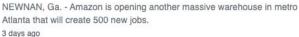
Land is currently being cleared in Venice on commerce drive off of I-75 and Jacaranda Boulevard where the future Amazon Distribution Center ... 5 days ago





Amazon to open new massive warehouse in Georgia, creating 500 jobs

Atlanta that will create 500 new jobs.





## **FUTURE STEPS TO TAKE**



#### Utilize a time-series approach

# Include more omitted characteristics

# Study the economic impact

The data used was mostly cross-sectional data, with few change over time factors included. This posed challenging as warehouses were constructed across many different years.

Some characteristics such as tax incentives and distance to metropolitan areas were difficult to obtain and omitted from the model.

A follow-up study should be conducted to estimate the impact of new warehouses on the surrounding area, including factors such as: population, food prices, income, property values, and job creation.