



# PREDICTING RETAIL WAREHOUSE LOCATIONS



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# 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
- Zillow 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.*

A vertical strip on the left side of the slide showing a close-up of a concrete floor with visible expansion joints and small dark spots.

# 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 Present	Predicted Absent
Actual Present	<b>91</b>	<b>27</b>
Actual Absent	<b>383</b>	<b>1153</b>

## 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

### LIKELY LOCATIONS (TOP 50)

### TRUE LOCATIONS

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

## 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

By DEBBIE HOLMES • JAN 15, 2020



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

BY ROB WILE

DECEMBER 26, 2019 11:22 AM



7 KTVB.com

Construction begins on Amazon distribution center in Nampa

The site had been long-rumored to be the future home of an Amazon distribution center. But city leaders and the company stayed mum on the ...  
6 days ago



WWSB

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



5 FOX 5 Atlanta

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

NEWNAN, Ga. - Amazon is opening another massive warehouse in metro Atlanta that will create 500 new jobs.  
3 days ago





# FUTURE STEPS TO TAKE



## Utilize a time-series approach

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.

## Include more omitted characteristics

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

## Study the economic impact

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.*