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.*

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

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CONFUSION MATRIX

|	Predicted Present	Predicted Absent
Actual Present	**91**	**27**
Actual 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
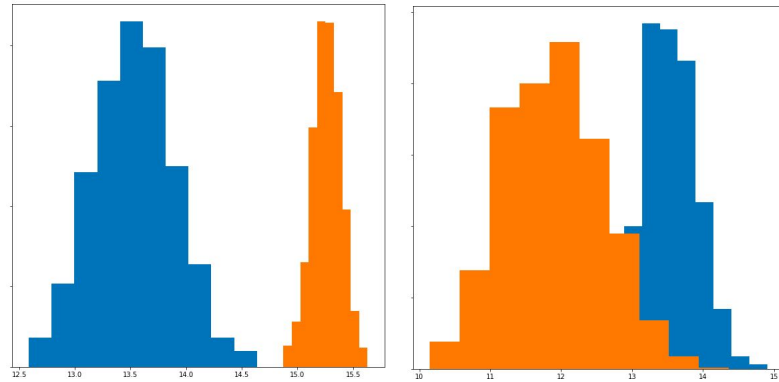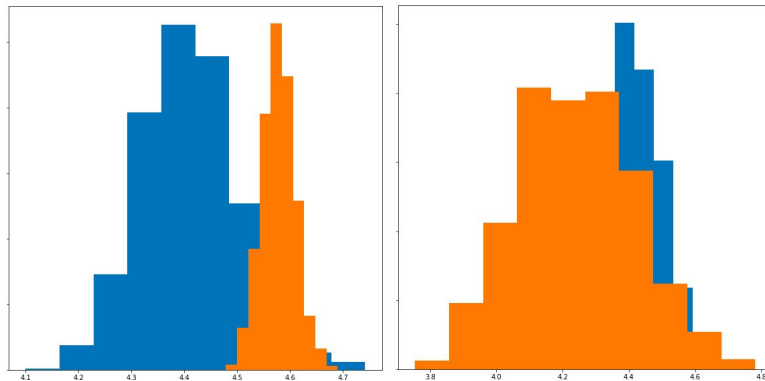
F1-score: 0.307

AREA (SQ MILES)
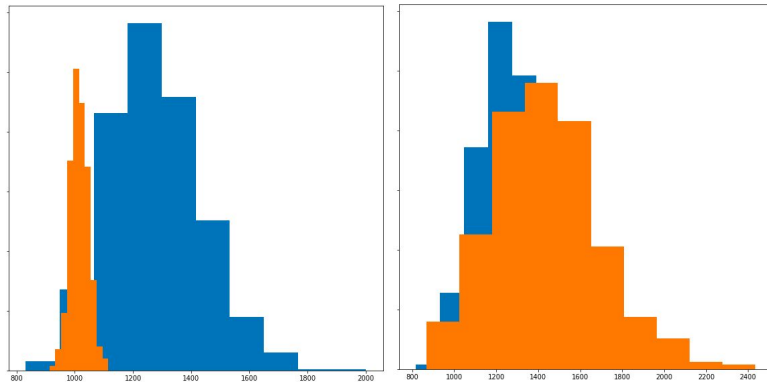
POVERTY RATE

UNEMPLOYMENT RATE

SIMILARITIES IN DEMOGRAPHICS

The **false positive** counties resemble the true warehouse locations more so than the true negative counties

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

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

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By DEBBIE HOLMES · JAN 15, 2020

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BY ROB WILE
DECEMBER 26, 2019 11:22 AM

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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.*

ROC CURVE