GT homes

A Renting Assistant for jackets
Providing personalized Ratings for the user's various requirements

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Motivation

Before we came to the Georgia Tech, we all met one problem, how to rent a suitable house? There are many factors like distance, price, convenience, safety we would consider. To find the info for those factors, we have to visit various website which is time consuming. So it is important to develop a web application to provide specific renting suggestions to a specific GT student user. GT Home give the solution to this issue.

Approaches

Algorithm

1. Algorithm for forecasting price

- *Why use this algorithm*

Help the users who have very little knowledge of the real estate market in the city of Atlanta get the approximate price to start off the searching process.

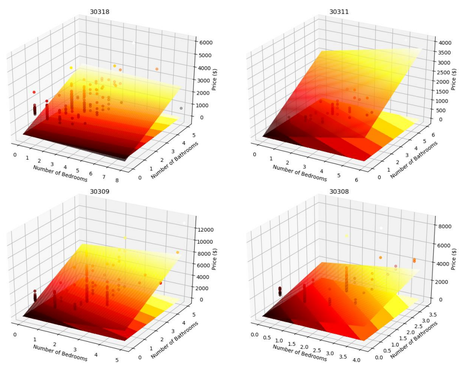

Fig1. Linear Regression

- *What is this algorithm*

Build a linear model based on the number of beds and baths of the house.

$$y = b_1 x_1 + b_2 x_2$$

x_1: number of beds of the house, x_2: number of baths of the house

2. Algorithm for ratings calculating

- *Why use this algorithm*

There are many factors users take into consideration and different users have different rankings for different factors. This algorithm can calculate the personalized ratings of the houses which make the web app more user-friendly.

- *What is this algorithm*

We calculate the ratings separately according to the initial data we get. we calculate safety, convenience, distance, price ratings as follows:

$$safty\ rating = \frac{\max - number\ of\ the\ crime\ occurrence\ of\ the\ region}{the \max number\ of\ the\ crime\ occurrence\ of\ all\ regions} \times 100$$

$$convenience\ rating = \frac{number\ of\ the\ groceries\ of\ the\ region}{the \max number\ of\ the\ groceries\ of\ all\ regions} \times 100$$

$$\text{distance } rating = \frac{\text{the min } distance\ between\ all\ houses\ and\ campus}{the\ distance\ between\ the\ specific\ house\ and\ the\ campus} \times 100$$

$$price\ rating = \frac{the \min price\ of\ all\ houses}{the\ price\ of\ the\ specific\ house} \times 100$$

Then we calculate the total rating according to the importance user choose. Highly important: 100%, very important: 75%, moderately important: 50%, slightly important: 25%, unimportant: 0%.

$$total\ rating = \frac{\sum_{i=1}^{3} rating_i \times importance_i}{\max of\ (\sum_{i=1}^{3} rating_i \times importance_i) of\ all\ regions} \times 100$$

3. Algorithm for similarity recommendation

- *Why use this algorithm*

Once the user finds a good listing, it is very likely that the user wants to see some similar listings; therefore, GT homes will support displaying similar recommendation.

- *What is this algorithm*

We used k-nearest neighbors algorithm to give the similarity recommendation. We used number of beds, number of baths, room's area and price as the feature vector of a house. Then calculated the distance between the target house and other houses and found the first k nearest neighbors.

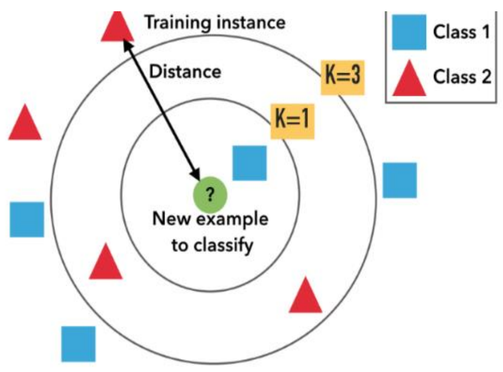

Fig2 KNN

Approaches

Innovation

- Use linear regression to provide the overview of approximated price of different types from each region so that users can quickly figure out which region they would like to live in.
- Set up a rating method to separately evaluate safety, convenience, distance to Georgia Tech and price, then give the overall rating for each house according to different users' choice.
- Use KNN to provide similar recommendation

Data

- **Position Info**

Use Google API to get the longitude and latitude of each point.

- **Houses data**

Scrape from Zillow: houses info around Georgia Tech as a Json file(1.01 MB, 2685 entries)

- **Crime data**

Download from Atlanta Police Department: crime records from 01/01/2019 to 11/13/2019 as a CSV file(3.19 MB, 21620 entries)

- **Grocery data**

Use Yelp API: grocery store data locations around Georgia Tech as a Json file(1.5MB, 2685 entries).

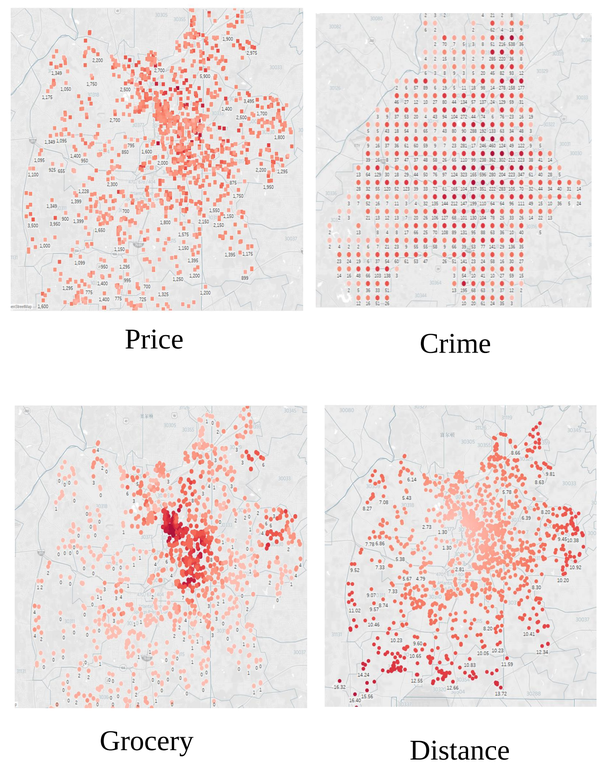

Fig 3. Data visualization

Experiments and Results

Case Test: A student want to rent a 1b1b house

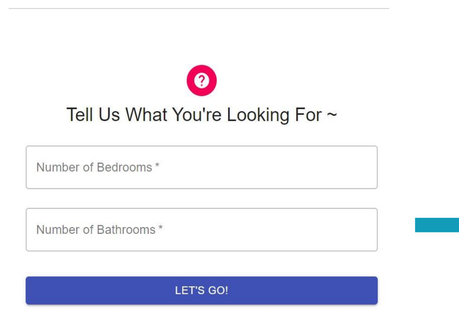

Fig4 Fill in 1b1b in the first page

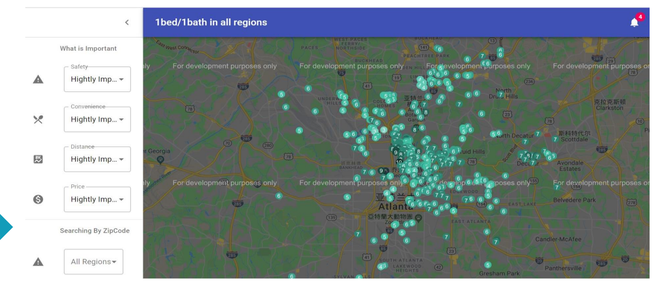

Fig5 Roughly look at the ratings rank of all houses

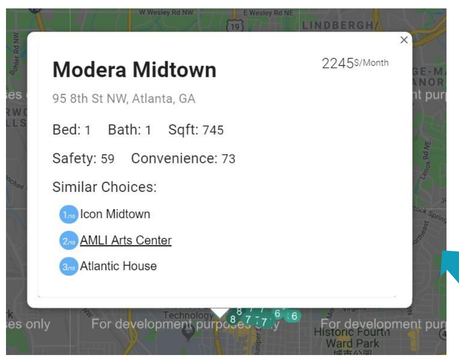

Fig8 Click one house and get the detailed info, link, the three other similarity recommendations

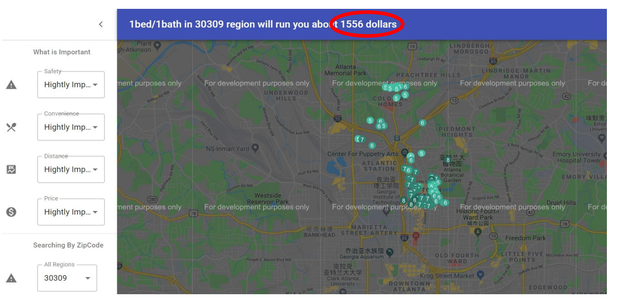

Fig6 Select one zipcode and get the predicted price

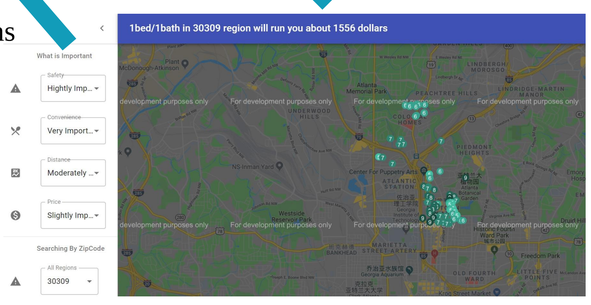

Fig7 Change the importance of different factors and get the new total rating rank

These legends mean total rating ranks

1 2 3 4 5 6 7 8 9 10

Evaluate

- The algorithm is guaranteed to get an optimal solution to GT students renting problem.
- Running time is very consistently fast(<1 second).
- It can provide the price prediction, the separate ratings and the total rating rank according to users which other apps don't have.