



# GIS and New Trader Joe's location in Colorado recommendation

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**Abstract.** As the development of network play an important role in recent years, recommendations systems and Geographic information system have a closer connection. GIS is a computer-based system to aid in the collection, maintenance, storage, analysis, output and distribution of spatial data and information. GIS and spatial analyses are concerned with the quantitative location of features, as well as properties and attributes of those features. There are three types of recommendation systems including content-based recommendations, collaborative filtering and hybrid systems. Content-based recommendation system use characteristics of an item, recommend items that have similar content to item user liked in the past or items that match pre-defined attributes of the user. The main idea of this approach is to recommend items to customers  $x$  that are similar to previous items rated highly by  $x$ .

**Keywords:** GIS, Recommendation system, Content-based, collaborative filtering, Buffer

## 1 INTRODUCTION

In this final project, the research used Arcmap to create buffers of two miles to generate features of two existing Trader Joes in Denver County, Colorado [1-3]. And then I randomly selected Fake location 1, fake location 2 and fake location 3. If any fake location's features have similarities with two existing Trader Joe's locations, then the fake location is possible to build a new Trader Joe's. In this case, the characteristics of two existing Trader Joe's locations in including races, gender, ages and education were collected and new possible Trader Joe's location will be collected based on those features. A GIS also provides an environment for making decisions which takes into account of location an enable people more easily visualize, analyze and understand patterns and relationships [4-7].

## 2 METHODOLOGY

Firstly, the dataset of the U.S Census in Denver County from my previous Cartography lab was collected. Since there is no known free Trader Joe's location data, all six locations of Trader Joe's in the state of Colorado in terms of Latitude, Longitude, address (street, county etc,) and zip code (See Table 1.0) were collected. One of the most challenging parts of this project was how to convert excel to shapefile, so that Arcmap was able to read this project's Trader Joe's location dataset. After inserting project's Trader Joe's location dataset in the map of Denver County, it indicates that there are two Trader Joe's locations inside the boundary of Denver County [8].

Secondly, random picked three locations as my fake one, fake two and fake three locations. And then round buffers of two miles were generated based on the mean of each element thanks to the professor's help. Data base, analytic base and management base are three main GIS components. Data base are the registered map layers. They are fallacies of GIS data model- flat, rectangular, discrete data boundaries and edges [9]. Management base handles data collection and storage, provides access and security and creates and supports metadata. Analytic base commands and scripting capabilities and measure distance and direction to build up measure of higher order pattern. There are four types of spatial association containing address matching, buffering, overlay and GIS modeling. A buffer is a reclassification based on distance: classification of within/without a given proximity. This part is the second most challenging part for me in the project because it was hard to figure out which layer should be generated buffers for. Particularly analyzing Races, gender, ages and education elements in this project were interested. Therefore, only those four factors were kept in excel to analyze [10].

**Table 1.** information of Trader Joe's locations in Colorado

Name	Latitude	Longitude	Address	County	State	Zip code
Trader Joe's	40.02009	-105.25664	1906 28th St	Boulder	Colorado	80301
Trader Joe's	40.59155	-105.06737	3500 S College Ave Ste110	Fort Collins	Colorado	80525
Trader Joe's	39.74674	-104.94961	750 N Colorado Blvd	Denver	Colorado	80206
Trader Joe's	39.73563	-104.98009	661 Logan St	Denver	Colorado	80203
Trader Joe's	39.62347	-105.09195	8055 W Bowles Ave Unit 3A	Littleton	Colorado	80123
Trader Joe's	39.61651	-104.95706	5910 S University	Greenwood Villages	Colorado	80121

			Blvd E1			
Trader Joe's	38.99629	-104.79726	5342 N Nevada Ave	Colorado Springs	Colorado	80918

### 3 Analysis

By calculating the absolute distance among fake 1, fake 2 and fake 3 and location 1 and location 2 and then sum up those value for fake 1, 2 and 3, whoever has the smallest value is probably the new location for Trader Joe's.

#### 3.1 Races

**Table 2.** the results of races

Races	Fake 1	Fake 2	Fake 3
White	129.5	274.5	190.5
Hispanic	338.5	313.5	2079
Black	581.5	317.5	296.5
Asian	73	19	75
Native American	10	6	82
Hawaii	0.2	0.95	0.96
Other races	162	73	588
Two or more races	17	8	44

Total	Fake 1	Fake 2	Fake 3
	1650.2	1012.45	3355.96

#### 3.2 Gender

**Table 3.** the results of genders

Gender	Fake 1	Fake 2	Fake 3
Famle	566.5	128.5	208.5

Male	215	19	203
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Total	Fake 1	Fake 2	Fake 3
	781.5	147.5	411.5

### 3.3 Ages

**Table 4.** the results of ages

Ages	Fake 1	Fake 2	Fake 3
< 5	215	19	203
5	180	28	187
10	114.5	30.5	172.5
15	64.5	16.5	98.5
20	179	146	68
30	189.5	115.5	76.5
40	200.5	39.5	39.5
50	85.5	40.5	40.5
60	23.5	31.5	58.5
70	23	28	18
80	29	66	13

Total	Fake 1	Fake 2	Fake 3
	1304	561	975

### 3.4 Education

**Table 5.** the results of education

Education	Fake 1	Fake 2	Fake 3
Nursery	63	7	20

Kindergarten	41.5	2.5	48.5
Grades	89	22.5	139.5
College	5.5	47	56.5
High school graduate	230.5	36.5	367.5
Some college	110.5	51.5	75.5
Bachelor's	92	87	1148

Total	Fake 1	Fake 2	Fake 3
	632	254	1855.5

## 4 Conclusion

Total	Fake 1	Fake 2	Fake 3
	4367.7	1954.95	6597.96

In conclusion, fake location 2 has the smallest value when summing all four factors up. Therefore, Fake location 2 could be a possible new location to open Trader Joe's. In the future, recommendation system and GIS could help environmental justice. Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work (Environmental justice).

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