



THE UNIVERSITY OF TEXAS AT DALLAS

# Enhancing Place Recommendation Systems using Social events

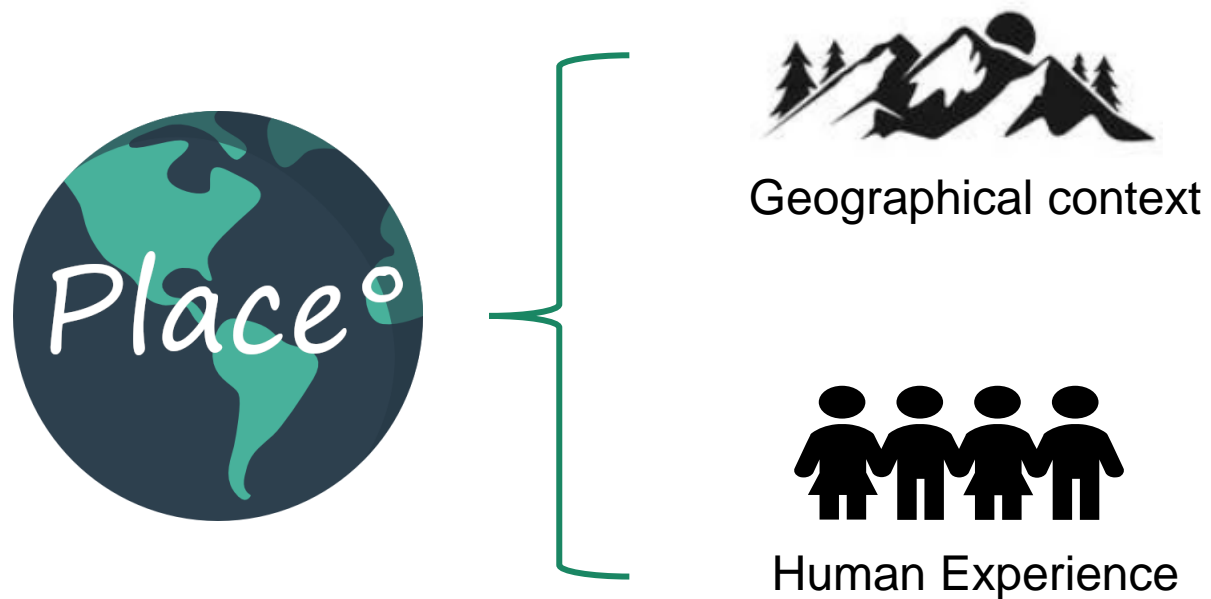
Yalin Yang, Dr. May Yuan, Geospatial Information Sciences

*“Space and place together define the nature of geography.”*

*“Place, like space, lies at the core of geographical discipline.”*

*“Place incarnates the experiences and aspirations of a people.”*

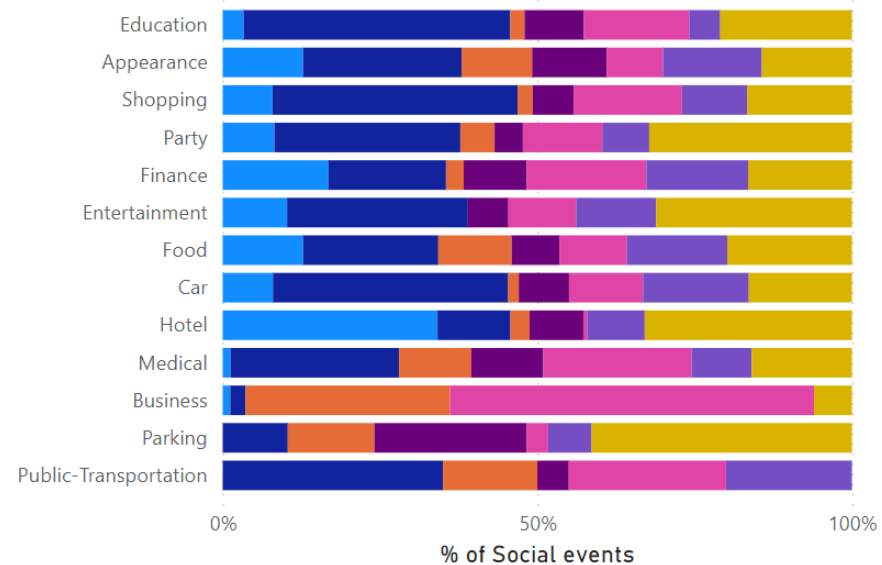
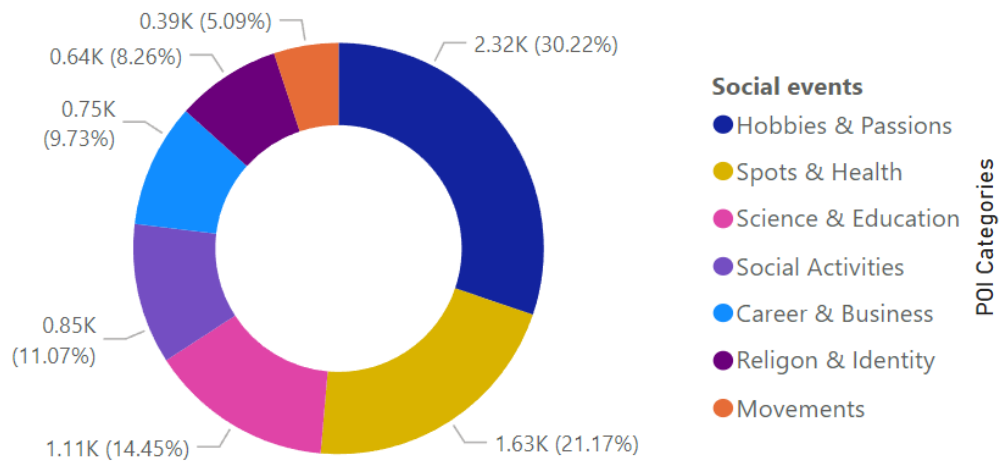
- Tuan, Y. (1979).



Previous Research: There is a significant spatial association between social events and POIs

Research Question: How these findings could help us understand the nature of places

1. How to find the best venue for different events hosting
2. Is there any potential events hosting place that remains undiscovered



## Recommender System of Movies

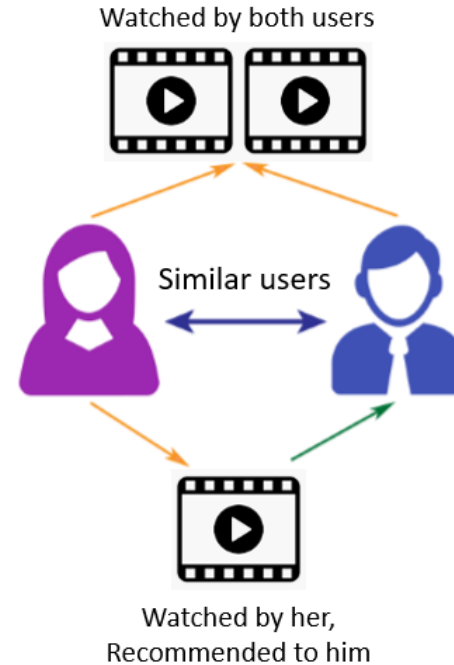
**Recommender system:** It uses historical data to suggest or recommend relative products to consumers.

**Collaborative filtering:** it recommends items (this is the filtering part) based on user preference information (this is the collaborative part). [more about behaviors]

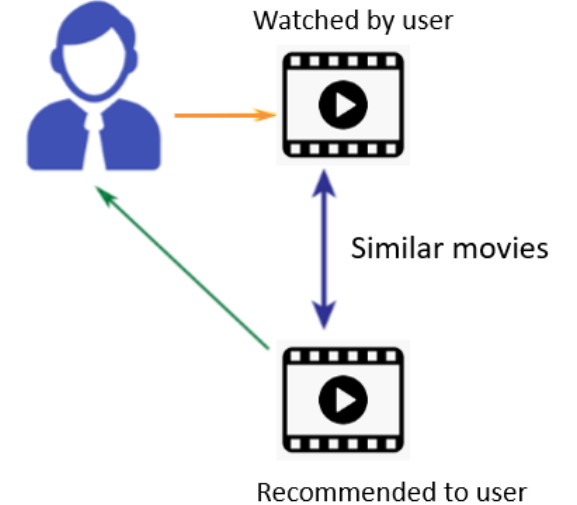
**Content-based filtering:** it uses the attributes or features of an item (this is the content part) to recommend other items similar to the user's preferences. [more about properties]

**Hybrid recommender systems:** combine the advantage of these two types of filtering.

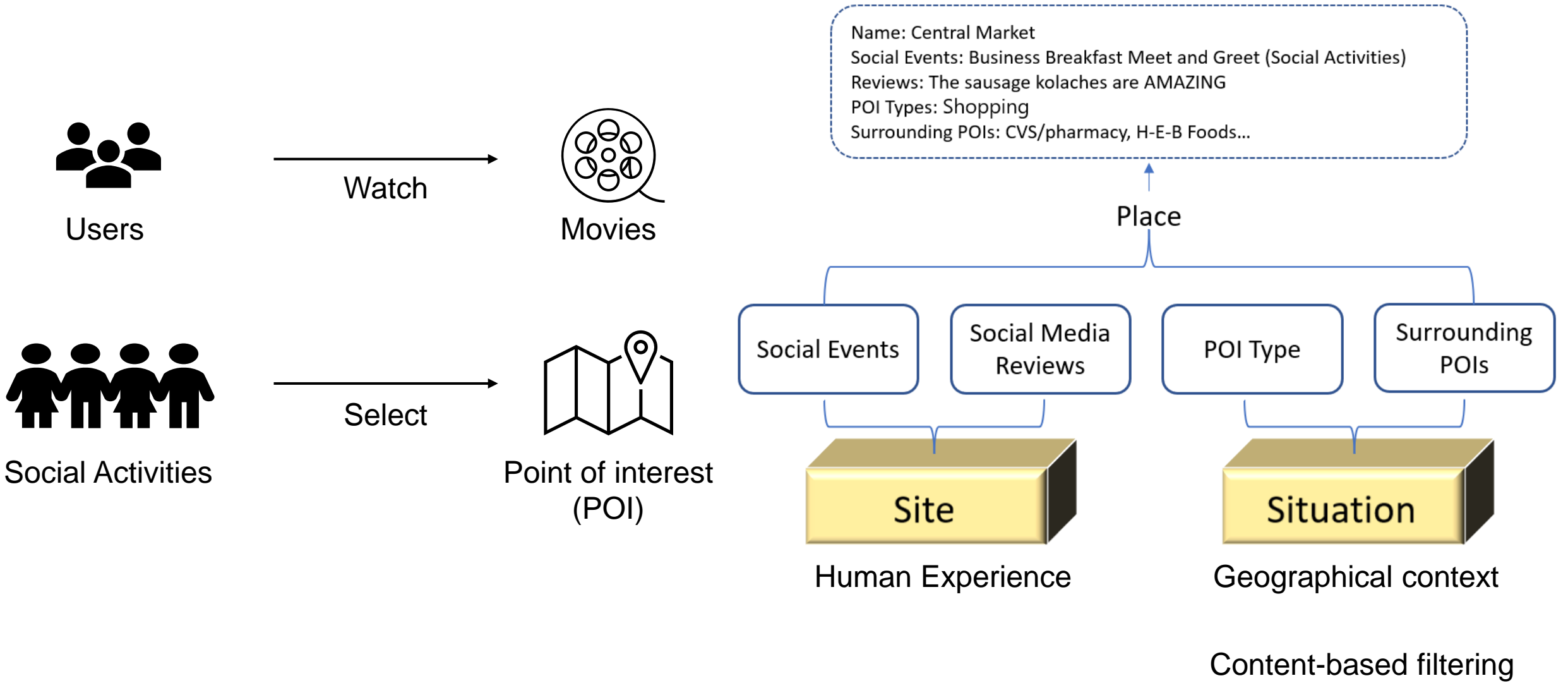
### Collaborative Filtering



### Content-Based Filtering



# Spatial Recommender system



## Study area and Data

### Social events data: meetup

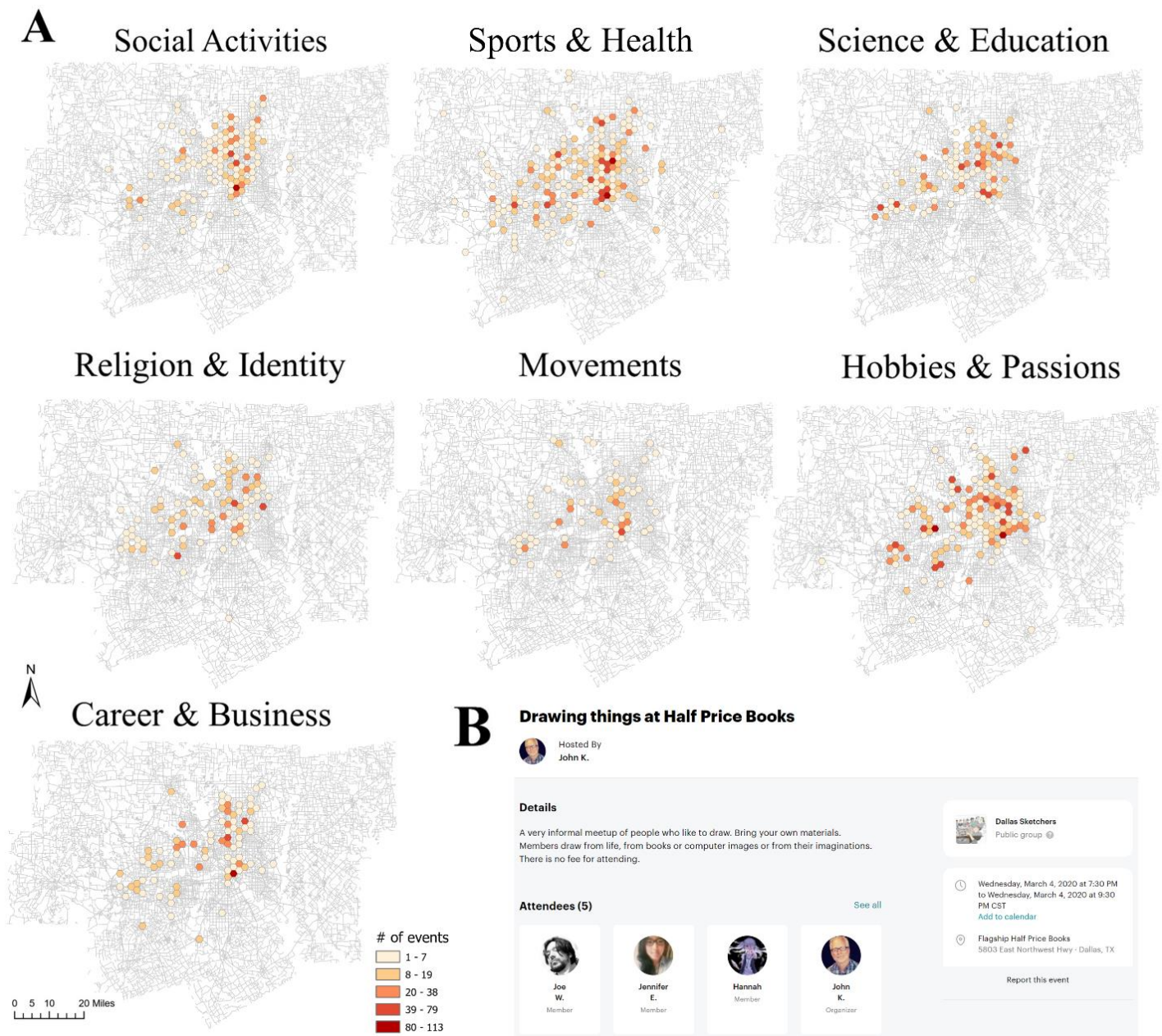
1. Short description
2. Category
3. Image
4. location

### Social media reviews: Foursquare

### POIs: Safegraph

1. POI name
2. Category
3. Location

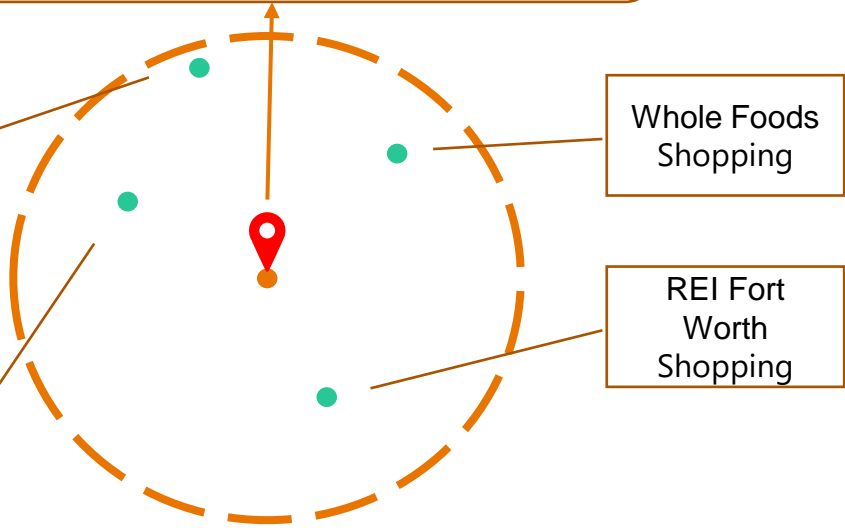
### Study Area: Dallas-Fort-Worth (DFW)



Name: McDonald's  
 Category: Food  
 Situation: Name + Category + Name + their Category of POIs within the walkable buffer

Aaron Brothers Shopping

Pearls on A Whim Appearance



Whole Foods Shopping

REI Fort Worth Shopping

Social Events

Social Media Reviews

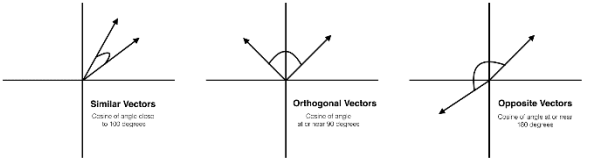
POI Type

Surrounding POIs

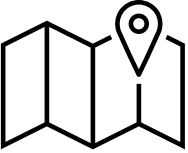
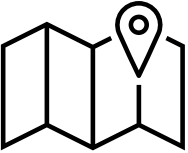


$$w_{x,y} = tf_{x,y} \times \log\left(\frac{N}{df_x}\right)$$

**TF-IDF**  
 Term x within document y  
 $tf_{x,y}$  = frequency of x in y  
 $df_x$  = number of documents containing x  
 N = total number of documents



Cosine Similarity



Similarity among Places



# Use hyper-parameter $\alpha$ to combine human experience and geographical context

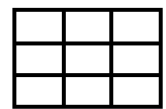


Human Experience



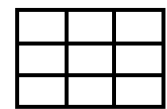
Geographical Context

Processing



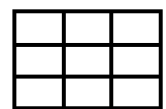
Similarity Matrix

Multiply  $\alpha$



Final matrix

Processing



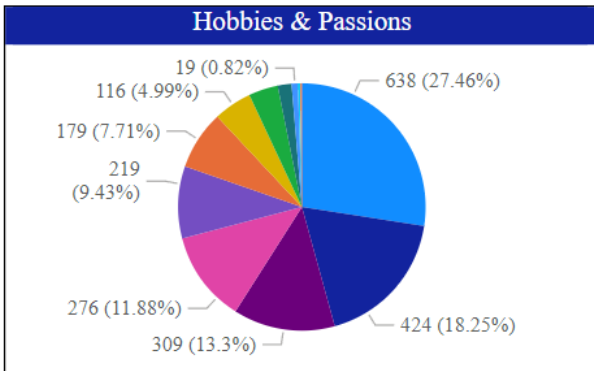
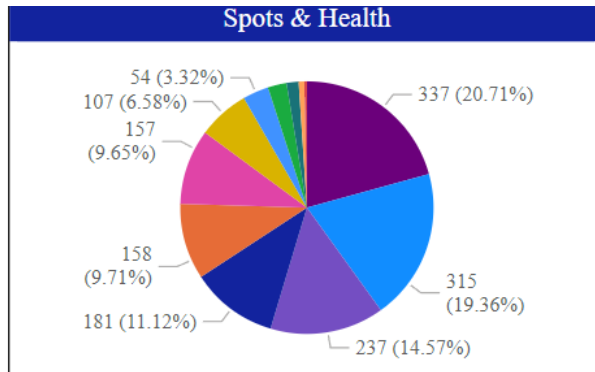
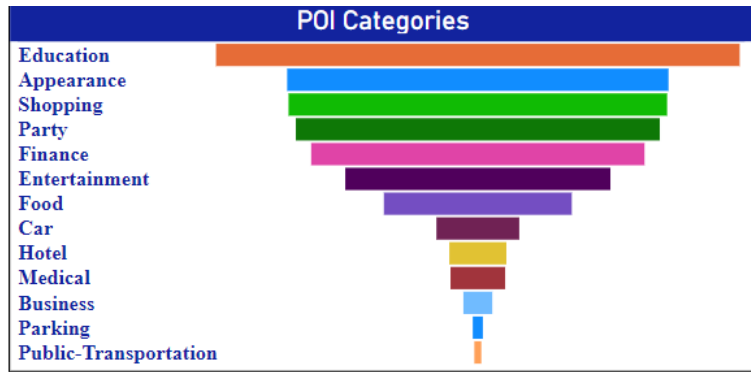
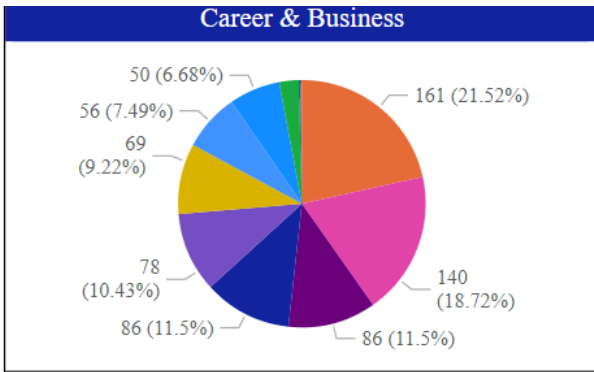
Similarity Matrix

Multiply  $1-\alpha$

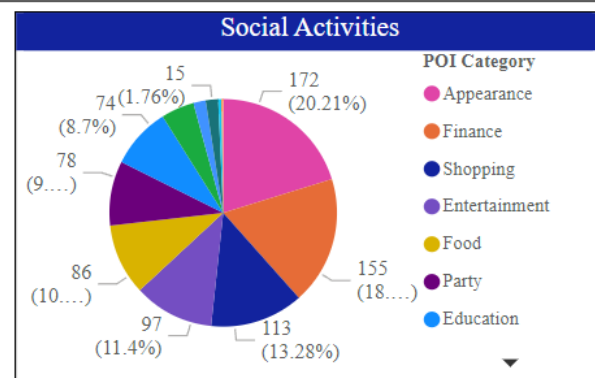
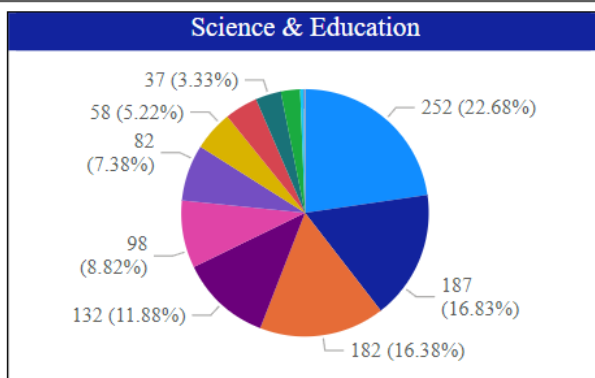
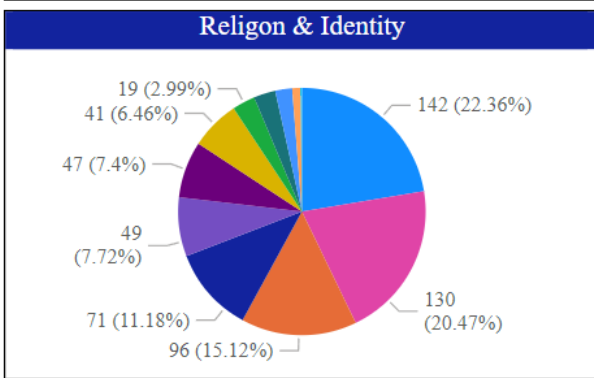
$\alpha(0 - 1)$   
0: only account for geographical context  
1: only account for human experience

Content-based filtering





Events	Appearance	Business	Car	Education	Entertainment	Finance	Food	Hotel	Medical	Parking	Party	Public-Transportation	Shopping
Spots & Health	157	5	39	315	237	158	107	54	25	12	337		181
Social Activities	172		40	74	97	155	86	15	15	2	78		4
Science & Education	98	48	28	252	82	182	58	1	37	1	132		5
Religion & Identity	130		19	142	49	96	41	14	18	7	47		1
Movements	123	27	4	34		27	63	5	18	4	57		3
Hobbies & Passions	276	2	89	638	219	179	116	19	42	3	309		7
Career & Business	140	1	19	50	78	161	69	56	2		86		86
<b>Total</b>	<b>1096</b>	<b>83</b>	<b>238</b>	<b>1505</b>	<b>762</b>	<b>958</b>	<b>540</b>	<b>164</b>	<b>157</b>	<b>29</b>	<b>1046</b>		<b>20</b>

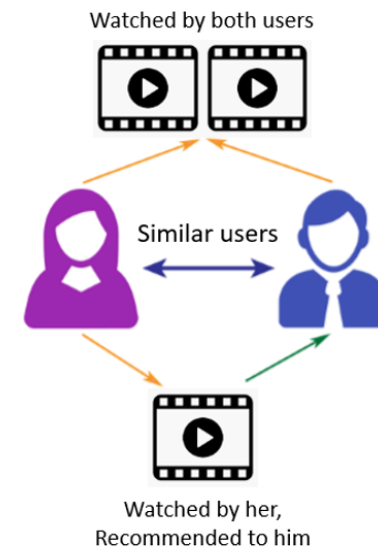


% of POIs for different types of social events hosting

Collaborative filtering

Simulate  
"Preference"

Collaborative Filtering

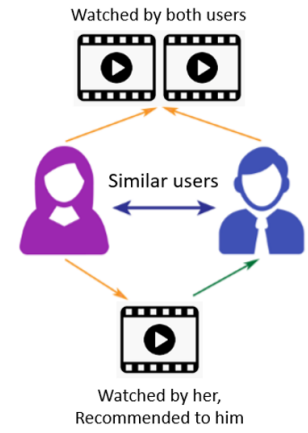


# Future Work: Collaborative filtering and Hybrid recommender systems

Table 1  
Spatial association rules for POIs and Social events

Reclassified Category	Original Category	Reclassified Category	Original Category
Movements	Movements	Religion & Identity	Beliefs
Science & Education	Tech		LGBTQ
	Learning	Career & Business	Career & Business
	Writing	Sports & Health	Health & Wellness
	Book Clubs		Sports & Fitness
Hobbies & Passions	Sci-Fi & Games		Outdoors & Adventure
	Dance	Social Activities	Social
	Music		Language & Culture
	Food & Drink		Pets
	Hobbies & Crafts		Family
	Arts		
	Photography		
	Film		
	Fashion & Beauty		

## Collaborative Filtering



## Drawing things at Half Price Books




### Details


A very informal meetup of people who like to draw. Bring your own materials. Members draw from life, from books or computer images or from their imaginations. There is no fee for attending.

### Attendees (5)


[See all](#)




**Joe W.**  
Member




**Jennifer E.**  
Member



**Hannah**  
Member



**John K.**  
Organizer



**Dallas Sketchers**  
Public group

🕒 Wednesday, March 4, 2020 at 7:30 PM to Wednesday, March 4, 2020 at 9:30 PM CST  
[Add to calendar](#)

📍 Flagship Half Price Books  
5803 East Northwest Hwy · Dallas, TX

[Report this event](#)

# Thank you! Questions?



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