

Smarter Cities, Safer Travels: Integrating Contextual Suggestion

Adriel Dean-Hall
University of Waterloo

Jack Thomas
University of Waterloo

Goal

- Safety information included in many tourist guides
- Provide more up-to date and more finely grained safety information

Strategy

- Combine output from suggestion systems and crime databases to provide safety information
- TREC Contextual Suggestion Track
- Public city crime data

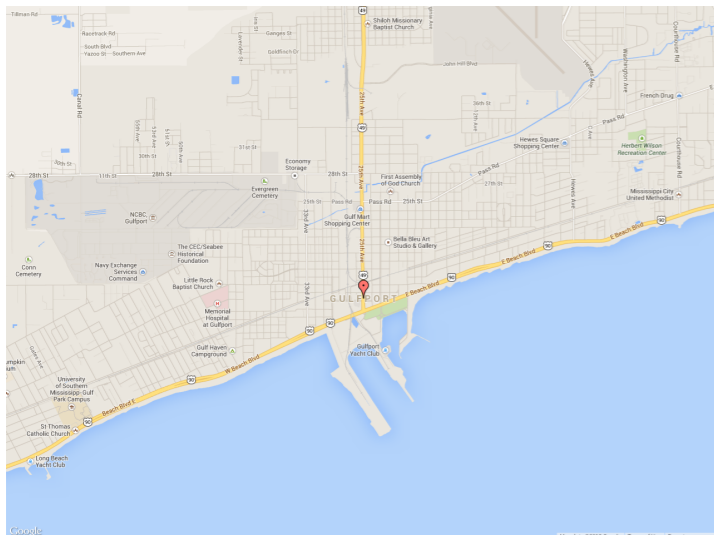
Contextual Suggestion Track

Profile (554)

Title	Desc	Website
Elfreths Alley Museum	Neutral	Interested
Red Mango	Interested	Strongly Interested
Fergie's Pub	Strongly Interested	Interested
Club 27	Uninterested	Uninterested

...

Context (81)



Contextual Suggestion System

Suggestion

Darwell's

Salute Italian Restaurant

Bonefish Grill

Harbor View Cafe

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Washington, D.C. Crimes

- Based on 2013 crime data
- Live feed is provided for more recent crimes (delayed by less than 2 days)
- Based on crimes in Washington, D.C.
- Other cities provide similar data

Data Catalog

Report Date/ Time	Offense	Method	Latitude, Longitude	...
4/16/2013 12:00:00 AM	HOMICIDE	KNIFE	38.871386, -77.012180	
6/5/2013 12:00:00 AM	SEX ABUSE	KNIFE	38.969278, -77.025744	
7/8/2013 12:00:00 AM	SEX ABUSE	OTHERS	38.922484, -77.042956	
4/8/2013 12:00:00 AM	SEX ABUSE	OTHERS	38.921881, -77.040153	

Safety Score

- Count number of crimes within a certain distance from the attraction
- Weight each crime by how long ago it occurred
- For these calculations we mocked a user search date

Safety Score

TREC Rank	Title	Score
1	Zaytinya	1104.86
2	Bistrot Du Coin	610.58
3	Old Ebbitt Grill	406.15
4	Blue Duck Tavern	353.16
5	Founding Farmers	484.29

Safety Score

- Can compare attractions to each other based on score
- Need to normalize score

Normalize Score

- Calculate the safety score at the location of each crime (worst locations)
- Use percentiles of all these scores to normalize

Normalize Score

Percentile	Score
0%	2.08
20%	180.55
40%	278.32
60%	428.66
80%	667.03
100%	1388.53

Normalized Safety Score

TREC Rank	Title	Score
1	Zaytinya	5
2	Bistrot Du Coin	4
3	Old Ebbitt Grill	3
4	Blue Duck Tavern	3
5	Founding Farmers	4

Crime Types

Type	Number of Occurrences	Percent of Occurrences
Theft/Other	12453	35.42%
Theft From Auto	9917	28.21%
Robbery	4080	11.60%
Burglary	3346	9.51%
Motor Vehicle Theft	2634	7.49%
Assault With Dangerous Weapon	2289	6.51%
Sex Abuse	295	0.83%
Homicide	103	0.29%
Arson	35	0.09%

Crimes Types

- Safety score is based on all crimes
- Split safety score based upon crime type
- Personal safety vs. vehicle safety

Safety Score

TREC Rank	Title	Personal	Vehicle
1	Zaytinya	4	5
2	Bistrot Du Coin	4	5
3	Old Ebbitt Grill	1	4
4	Blue Duck Tavern	3	3
5	Founding Farmers	1	5

$$\tau = 0.5224$$

Improvements

- Crimes are treated the same regardless of the time of day they occurred
- Take user search time into account
- Better normalization: Based on population density
- Weight based on type of crimes

Conclusion

- Added safety scores to attraction suggestions
- Provide more information to users
- User interest vs. safety has $\tau = -0.0044$

Implications

- “Fraught with peril”
- Getting these scores wrong may compromise a person’s safety
- Businesses may not appreciate users being scared off
- Residents may not appreciate their neighbourhood being labelled as unsafe

Conclusion

- Despite these concerns this information is valuable to users