

An Exploration of Ranking-based Strategy for Contextual Suggestion

TREC 2012 Contextual Suggestion Track

Peilin Yang and Hui Fang
University of Delaware

The task is to provide suggestions based on both user profiles and contexts

Profiles



Contexts

Geographical Information



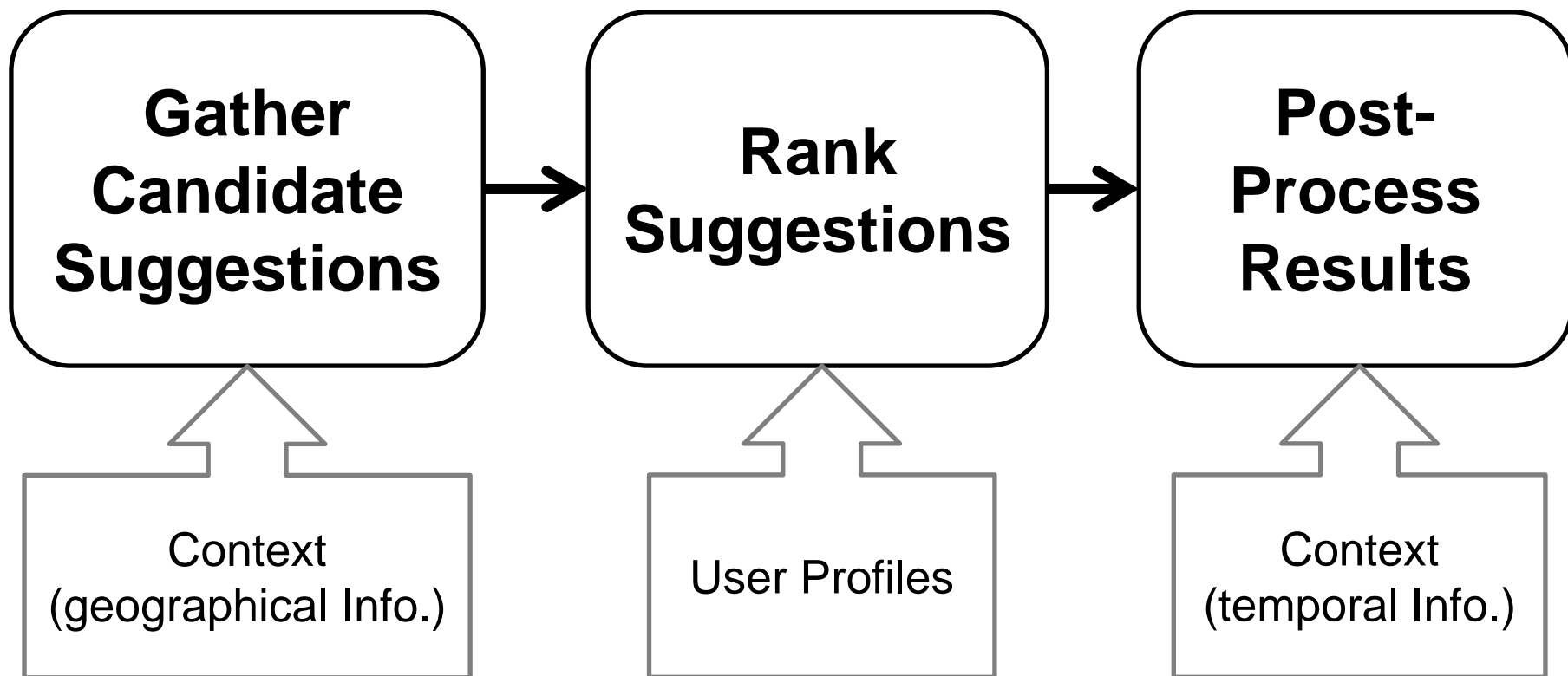
e.g. New York City

Temporal Information



e.g. Weekday/Morning/Summer

Overview of Our methods



Overview of Our methods



Step 1. Gather candidate suggestions based on *geographical information* in the contexts and *categories* that occur in examples suggestions

Attr	FourSquare	Yelp
Name	✓	✓
Address	✓	✓
Phone_num	✓	✓
Category	✓	✓
Web_site	✓	✓
User_rating	✗	✓
User_rating(checkin)_count	✓	✓
User_reviews	✓	✓
Business_hours	✗	?

What we used

Information about “Color Me Mine Tribeca”

	Yelp	FourSquare
Category	Event Planning → Party; Shopping → Arts & Crafts Event Planning → Venues	Arts & Entertainment → Art
Web_site	http://tribeca.colormemine.com	
Business_hours	Mon-Sat 11 am - 9 pm, Sun 11 am - 8 pm	

Our Studio Hours:

11am-8pm	Sunday
11am-9pm	Monday
11am-9pm	Tuesday
11am-9pm	Wednesday
11am-9pm	Thursday
11am-9pm	Friday
11am-9pm	Saturday



How Does It Work?

COLOR ME MINE is the leader in the Paint 'It-Yourself ceramic s industry. Our New York City location has over 400 pieces to choose from, once you made your choice. We have an exclusive design center with 60 colors, brushes, stencils, stamps and a lot more.

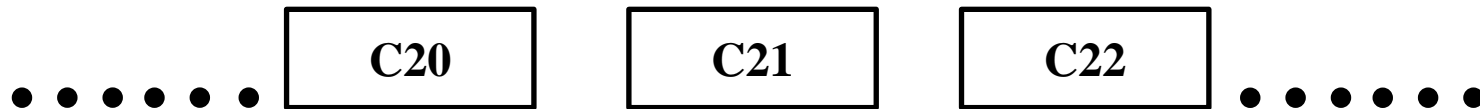
All our paints are non-toxic, lead free, and are food-safe. They are dishwasher safe. At a flat rate, you can stay AS LONG AS YOU LIKE...

Overview of Our methods



Step 2: Rank suggestions Based on User Profiles

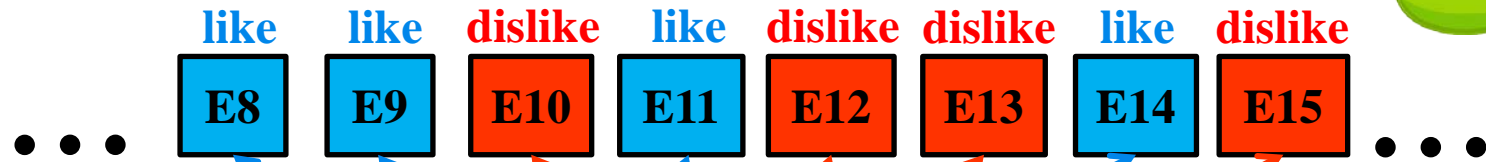
Example Suggestions



Candidate Suggestions

Step 2: Rank suggestions Based on User Profiles

Example Suggestions



Positive
Similarity

Negative
Similarity



Candidate Suggestions

Step 2: Rank suggestions Based on User Profiles

Example Suggestions



Candidate Suggestions



Given a user profile, rank candidate suggestions based on their similarity scores with respect to both positive and negative examples in the profile

$$S(U, C) = \underbrace{\varphi}_{\text{Coefficients}} \times \frac{\sum_{p \in P(U)} \text{SIM}(p, C)}{|P(U)|} - (1 - \varphi) \times \frac{\sum_{n \in N(U)} \text{SIM}(n, C)}{|N(U)|}$$

Similarity Function

Similarity Functions (1): Description-based

- $SIM_D(e, C) = F2EXP(DES(e), WEB(C))$

Example 49

Playdium is the ultimate interactive, virtual and physical Family Entertainment Center. Thematic, retrieval function [Farrag & Zhai, 2005], an 200 of today's newest attractions, rides, simulators. Our (t, D) feature Go Karts, Mini-Golf, Water Wars, Bungee Trampolines. Playdium Is The Ultimate Place To Play!



Color Me Mine Tribeca

How Does It Work?

COLOR ME MINE is the leader in the Paint 'it-Yourself ceramics industry.

Our New York City location has over 400 pieces to choose from, once you made your selection you can paint it anyway you like, we take care of the glazing and firing and it's ready within a week. We have an exclusive design center with 60 colors, brushes, stencils, stamps and a computer with over 25,000 images to download and trace on to the pieces.

All our paints are non-toxic, lead free, and are food-safe. They are dishwasher safe as well. Pieces range from \$16 to \$100, and there's also a studio fee of \$12 for adults and \$8 for kids, that's a flat rate, you can stay AS LONG AS YOU LIKE...

Similarity Functions (2): Category-based

$$SIM_C(e, C) = \frac{\sum_{c_i \in \mathcal{C}(e)} \sum_{c_j \in \mathcal{C}(C)} \frac{|Intersection(c_i, c_j)|}{\max\{|c_i|, |c_j|\}}}{|\mathcal{C}(e)| \times |\mathcal{C}(C)|}$$

Example 49

- $\mathcal{C}(s)$ is the set of categories of s ,
 Event Planning → Party
 Active Life → Amusement Parks
- $Intersection(c_i, c_j)$ denotes the number of common categories between c_i and c_j .
 Event Planning → Party
 Shopping → Arts & Crafts
 Event Planning → Venues

Color Me Mine Tribeca

Similarity Functions (3): Combined

- $SIM_{combine}(e, C) =$
 $\alpha \times SIM_{\mathcal{C}}(e, C) + (1 - \alpha) \times SIM_{\mathcal{D}}(e, C)$

Overview of Our methods



Step 3: Post-Process Candidates

- How to filter out the suggestions that do not meet the temporal requirement?
 - Not every suggestion has listed business hours.
 - To solve the data sparsity problem, we propose to learn business hours for each category through majority voting, and apply the learned business hours for all the suggestions under the same category.

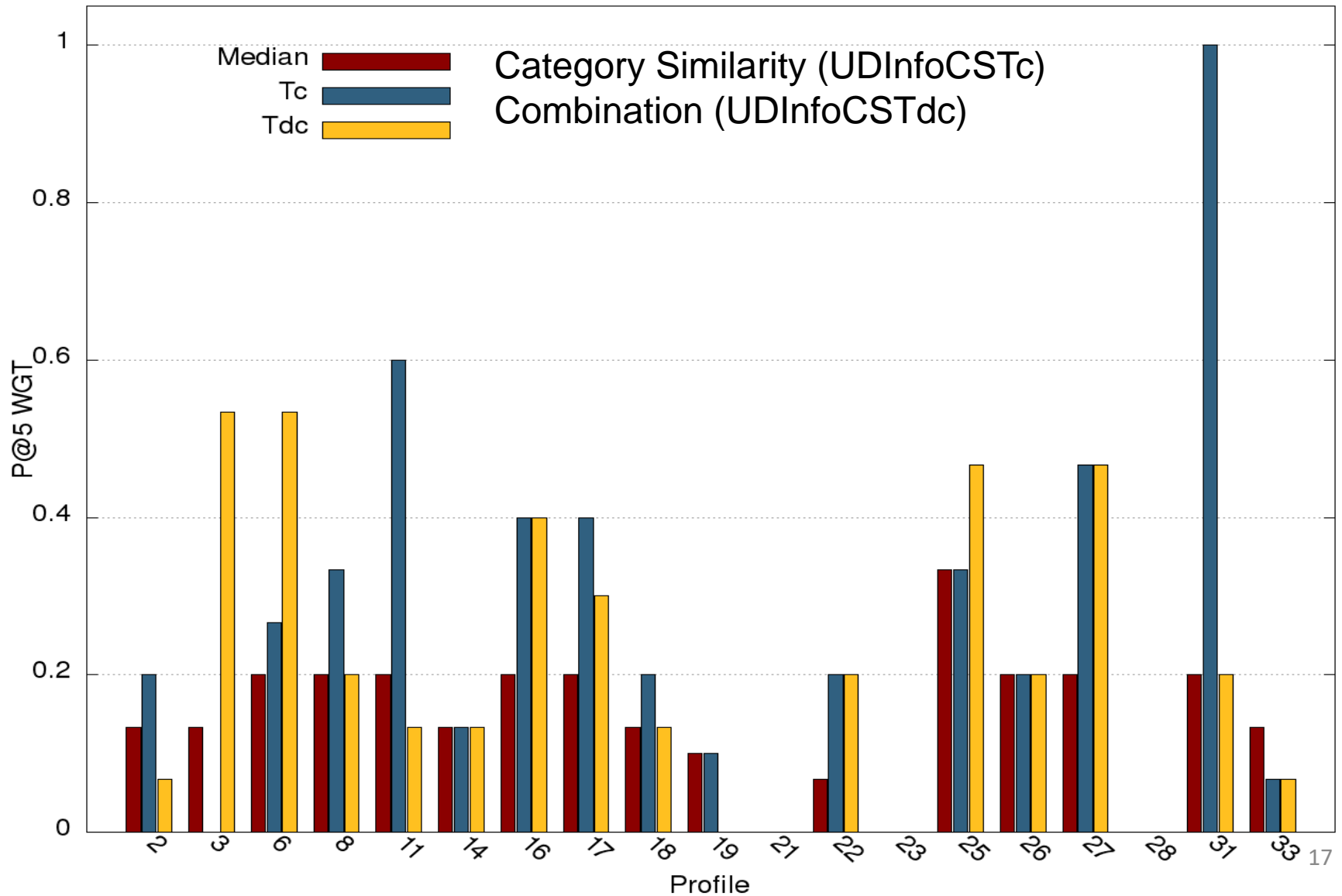
Performance of Our Runs

RunID	Use SIM_c	Use SIM_D	P@5 WGT	P@5 W	P@5 GT
UDInfoCSTc	Yes	No	0.2481	0.35	0.4950
UDInfoCSTdc	Yes	Yes	0.2210	0.35	0.5442

- Use Category only has better performance on WGT
- Use Combination has better performance on GT

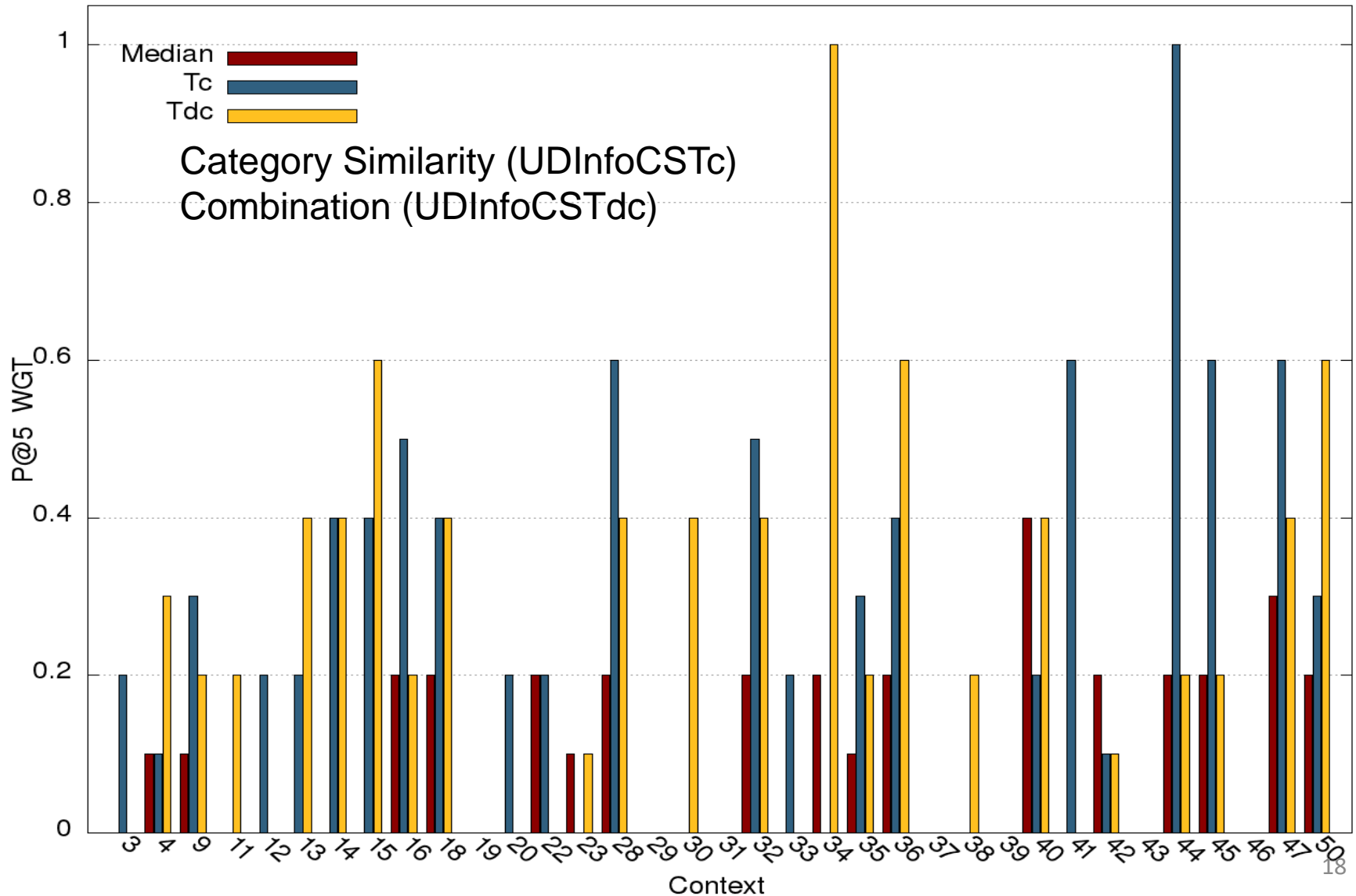
Results

Overall Performance of Profile P@5 WGT

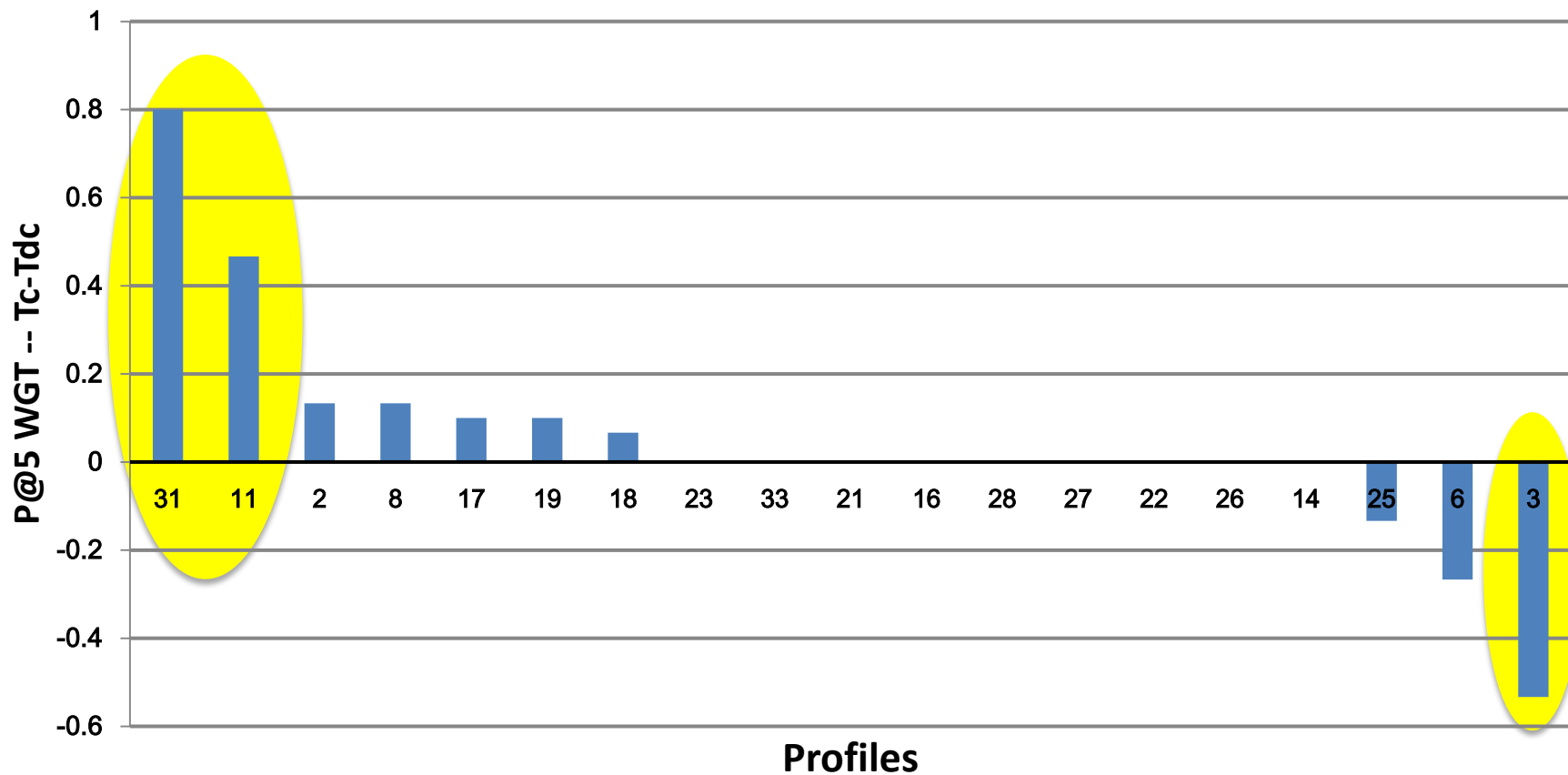


Results

Overall Performance of Context P@5 WGT



Difference of P@5 WGT Performance of Two Runs (Subtract combination from category)



	Like	Dislike	Relevant Suggestions Category	Relevant Suggestions Combination
31	Restaurants (6) Tours(3) Food(3) Landmarks (2) Museum (2) ...	Museum (2) Shopping (2) Bowling (1) Planning (1) ...	Restaurants (5)	Bowling (1)
11	Restaurants (3) Food (3) Bars (2) Spa (1) Amusement Parks (1) ...	Shopping (5) Museum (4) Restaurants (3) ... Food (1) Amusement Parks (1) ...	Spa (2) Food (1)	Amusement Parks (1)
3	Food (4) Museum (3) Shopping (2) Landmarks (1) Theater (1) ...	Restaurants (6) Theater (3) Food (3) Tours (3) Museum (1) Shopping (1) ...	None	Theater (1) Restaurants (1) Museum (4)

Summary

- We propose a ranking-based strategy for the contextual suggestion task.
- It would be great if the track organizers could release a standard evaluation set so that new methods can be more reliably evaluated.

Thank You!

Questions?