Opinion-based User Profile Modeling for Contextual Suggestions

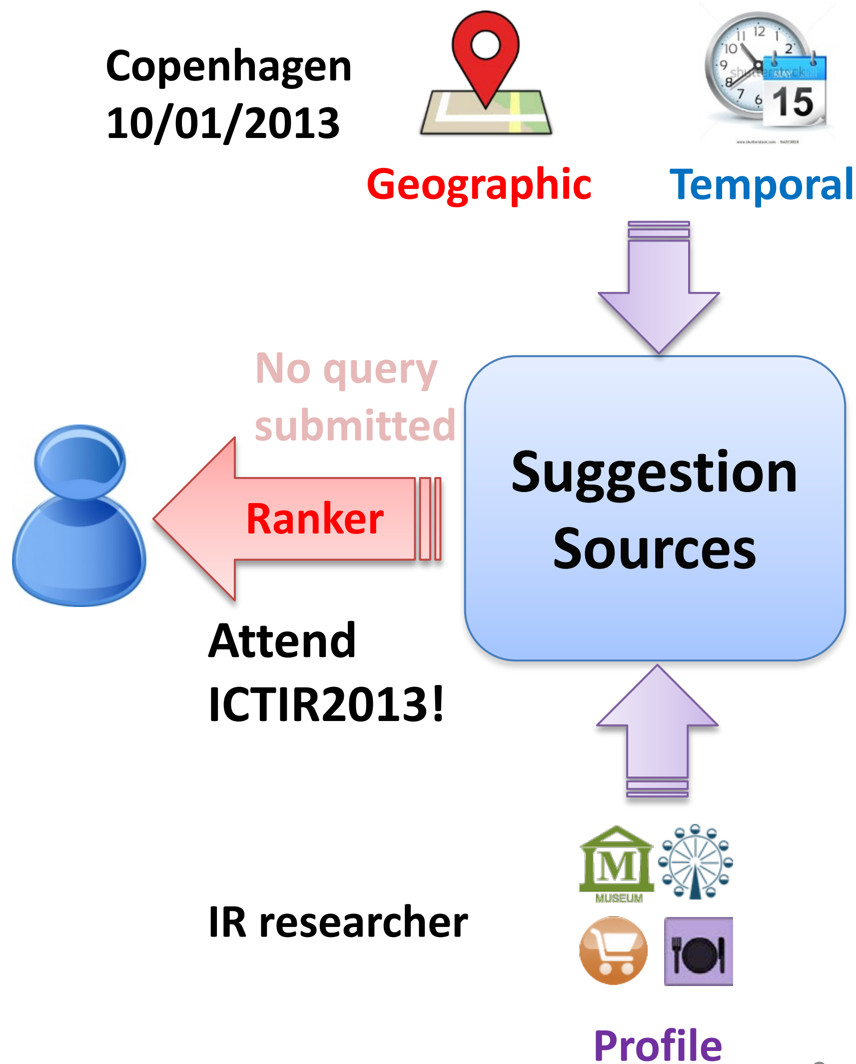
Peilin Yang and Hui Fang

University of Delaware

U.S.A

Traditional Information Retrieval

Contextual Suggestion



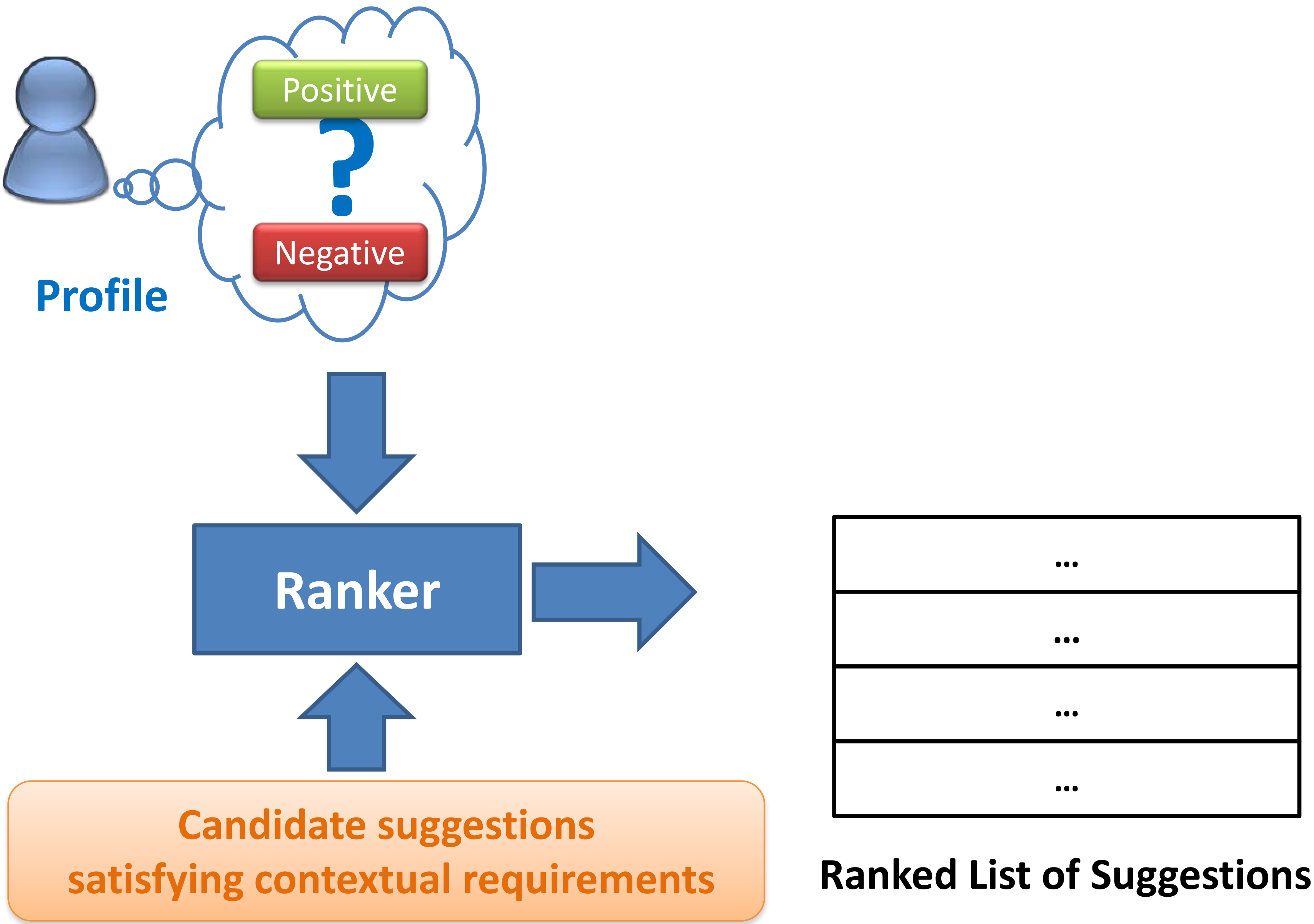
Commonly used two-step approach

- Generate candidate suggestions based on contextual requirements.

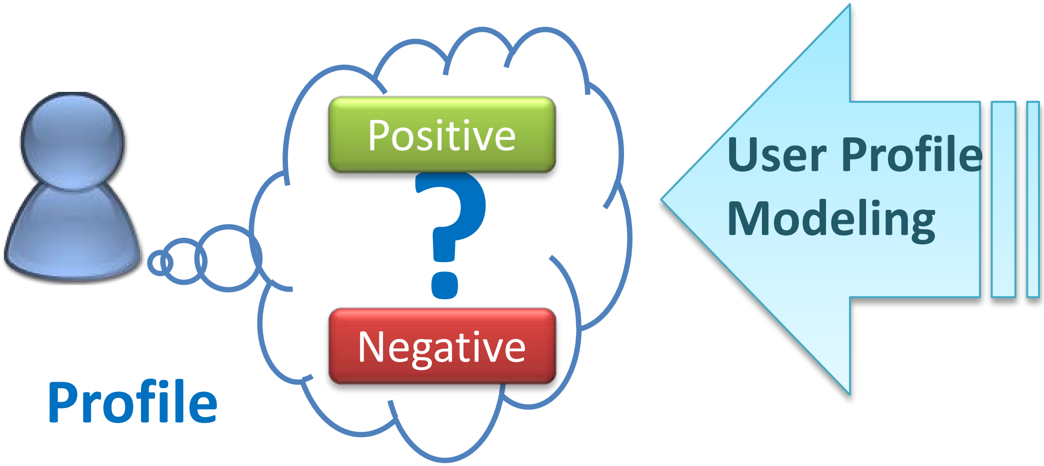
- Rank candidates based on the user profile.
  - Description-based
  - Category-based

Can we do better?

Problem Setup



A Motivating Example



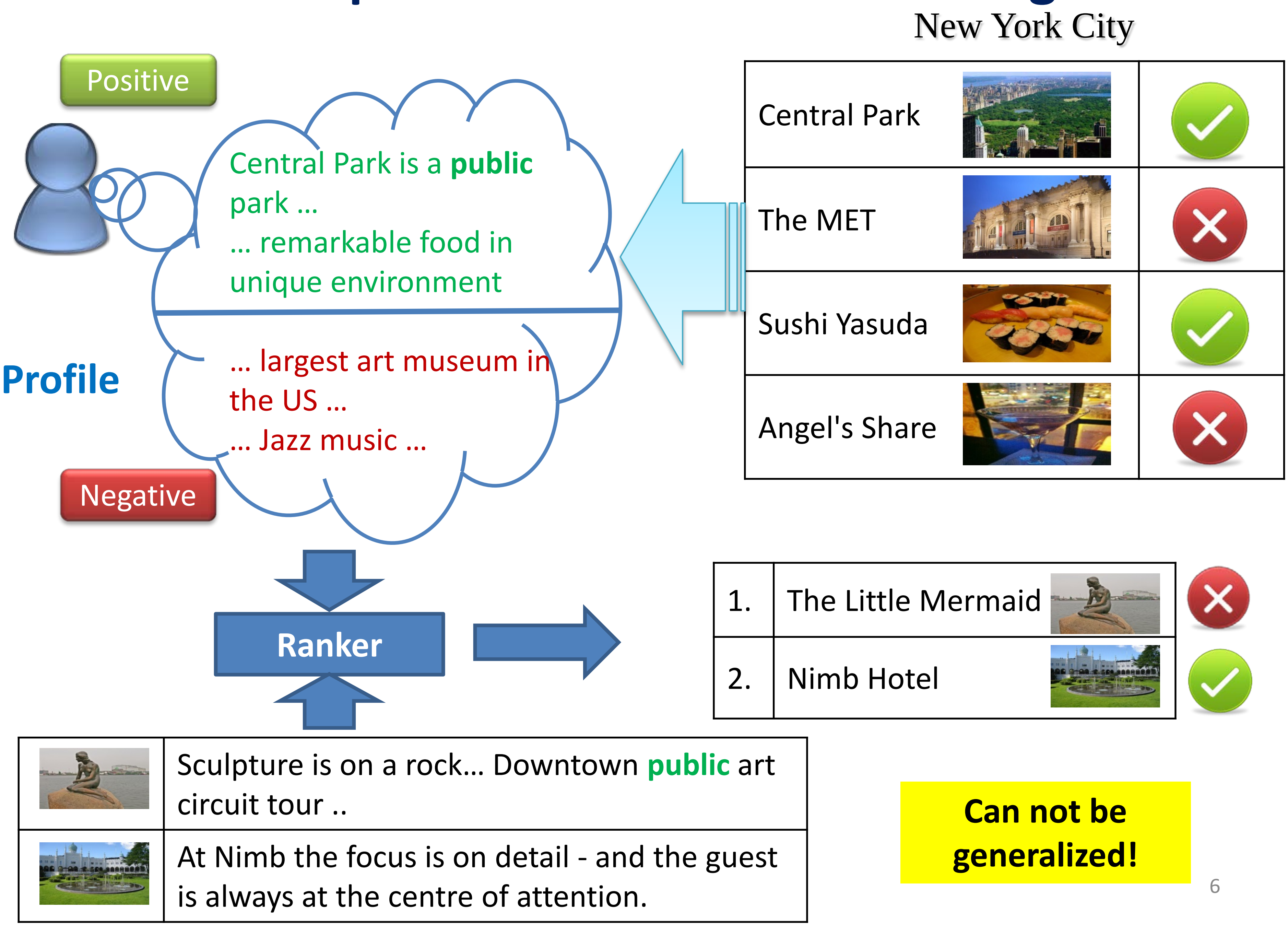
New York City

Central Park		✓
The MET		✗
Sushi Yasuda		✓
Angel's Share		✗

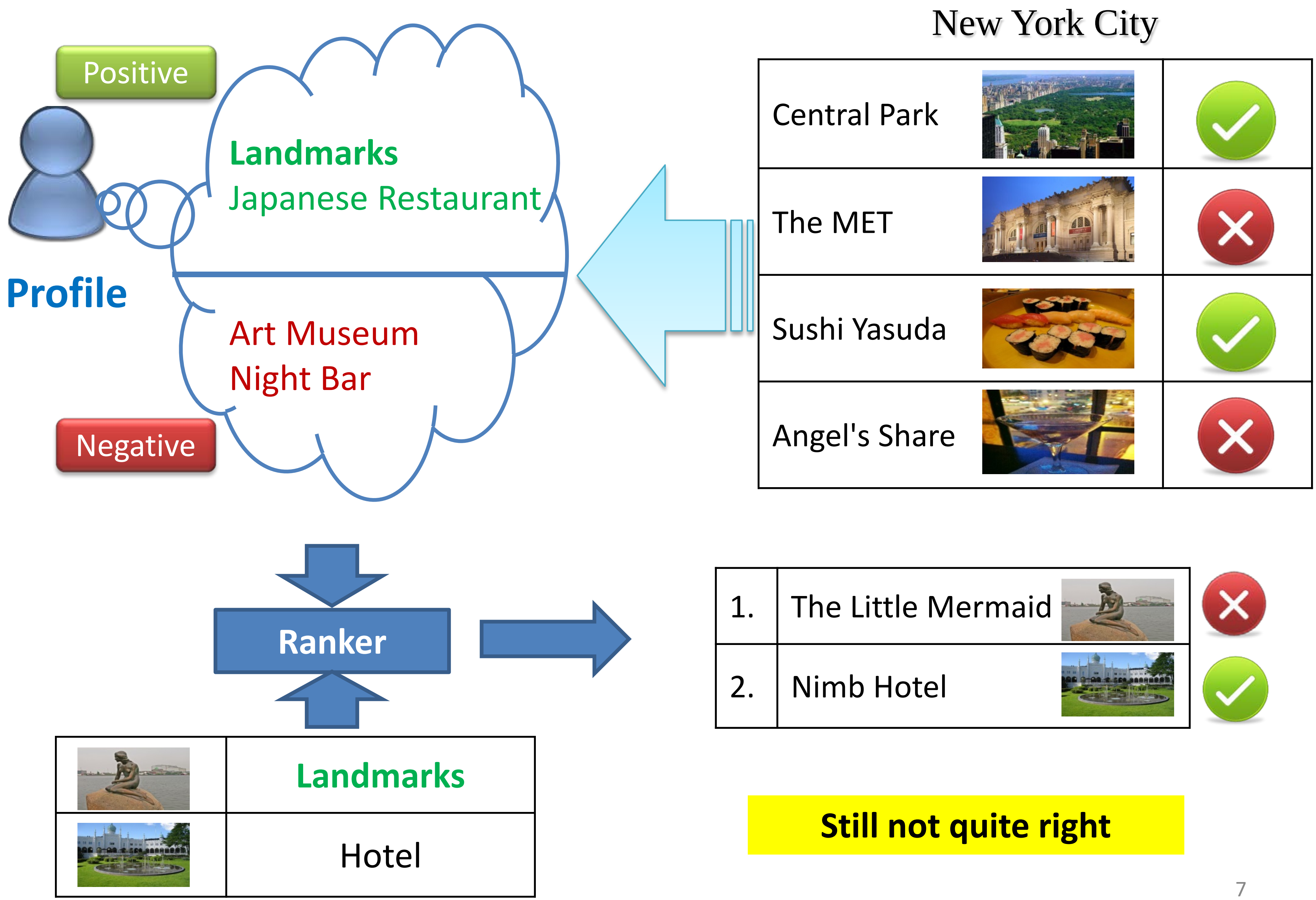
Places from Copenhagen

Nimb Hotel		✓
The Little Mermaid		✗

Description-based Profile Modeling



Category-based Profile Modeling



From “What” to “Why”

New York City

Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗

From "What" to "Why"

New York City

Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗

From “What” to “Why”

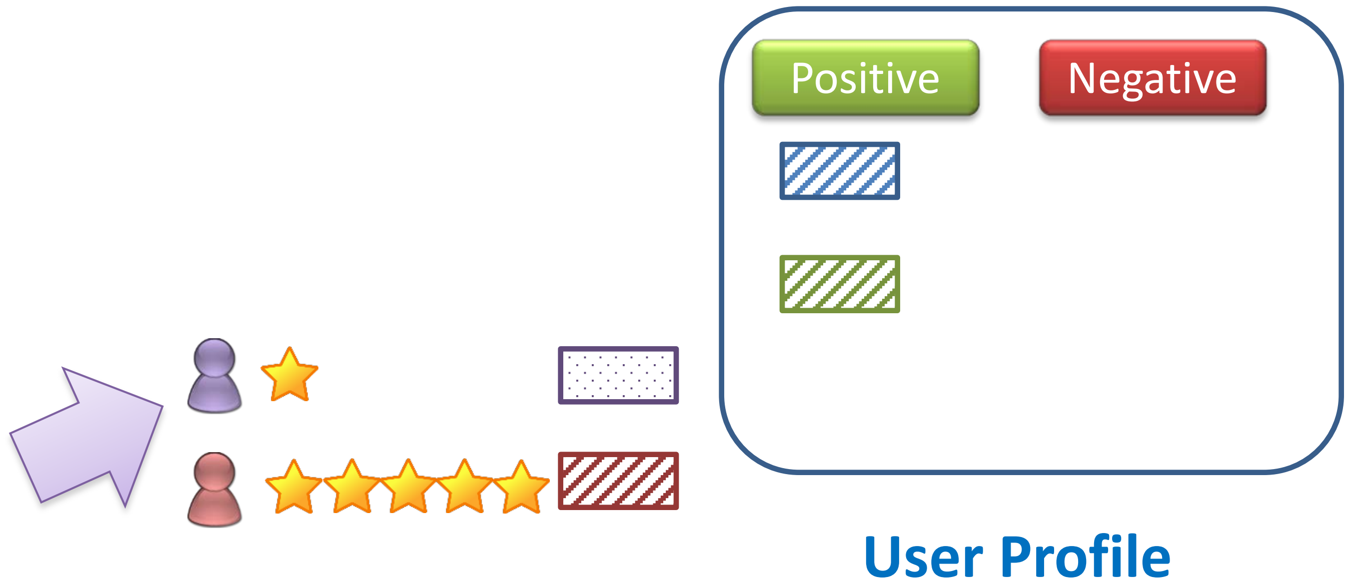
New York City

Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗

From “What” to “Why”

New York City

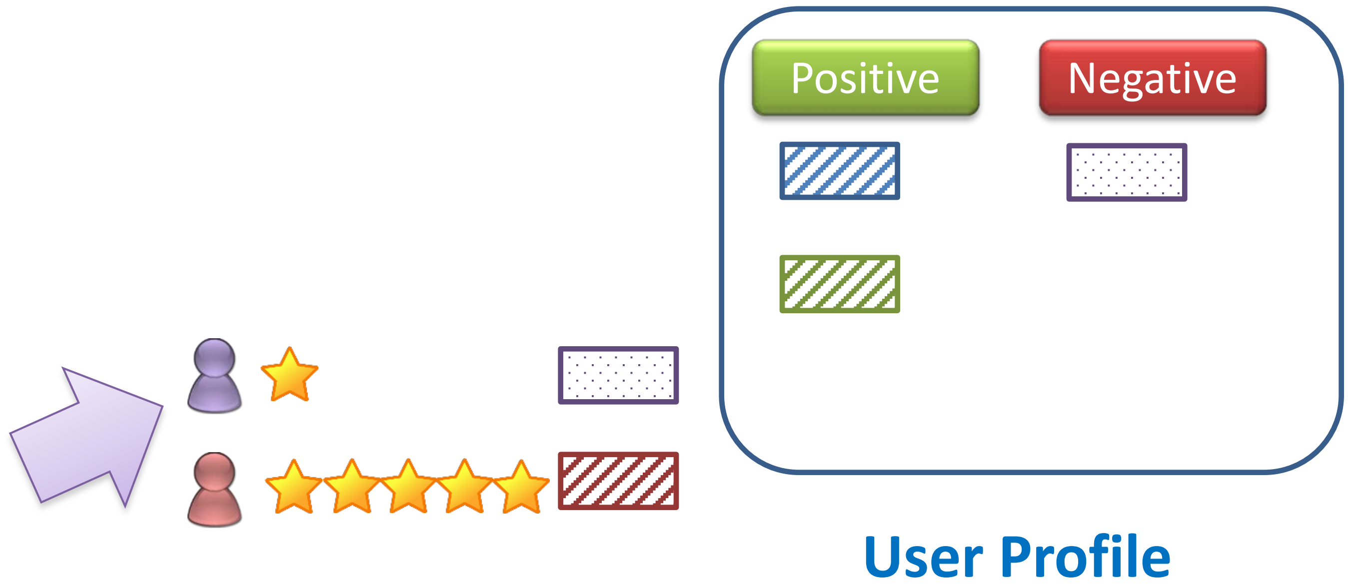
Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗



From “What” to “Why”

New York City

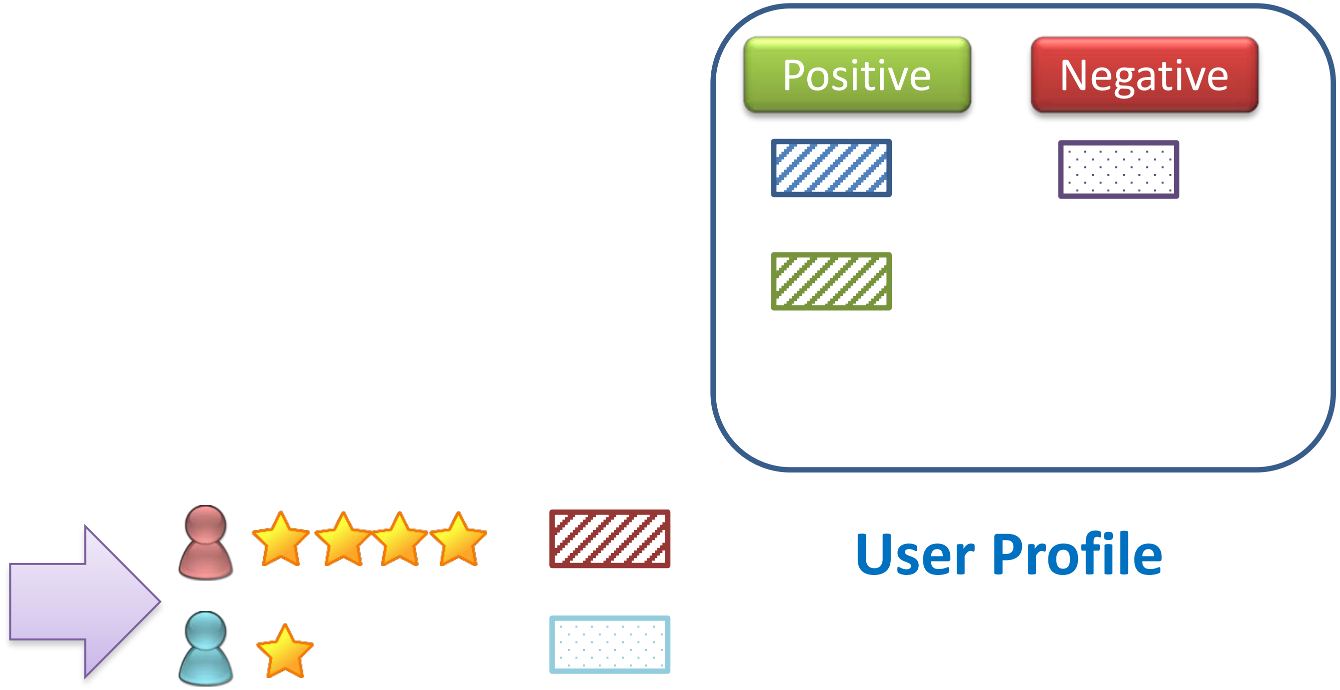
Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗



From “What” to “Why”

New York City

Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗

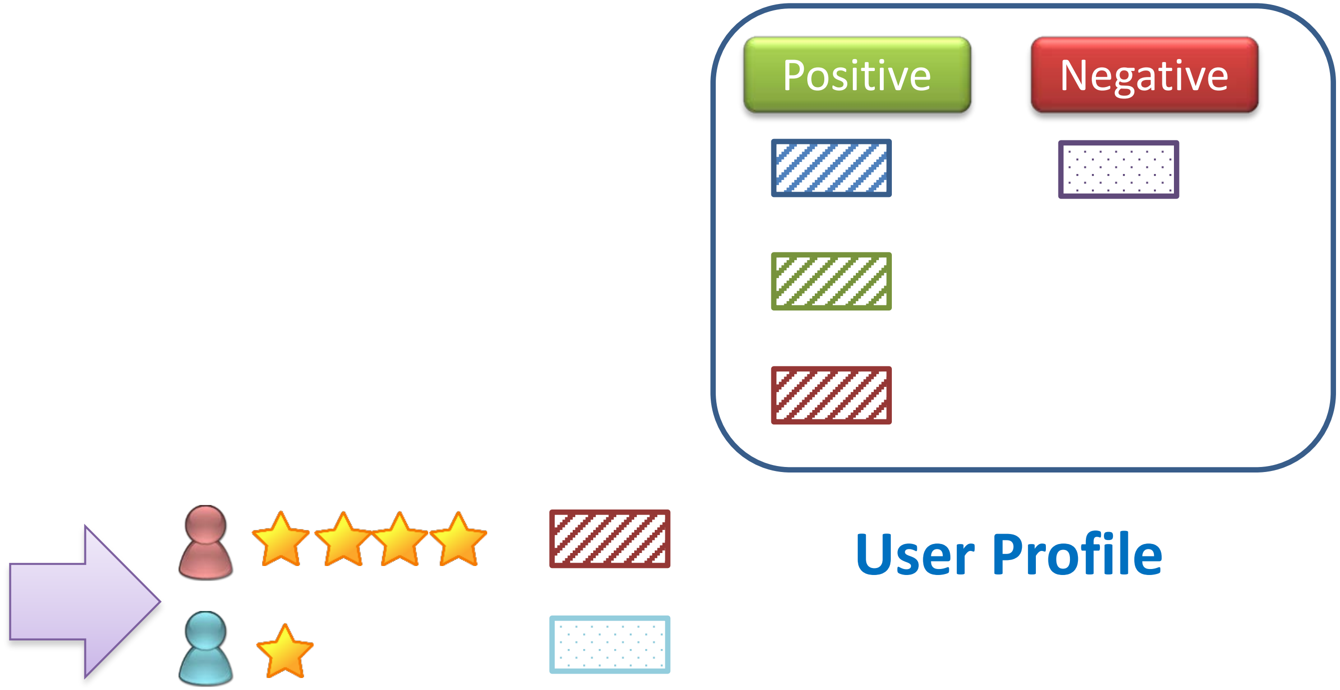


User Profile

From “What” to “Why”

New York City

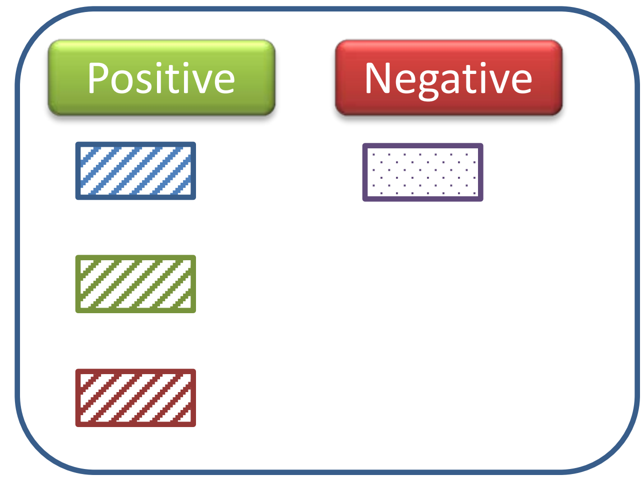
Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗



From "What" to "Why"

New York City

Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗

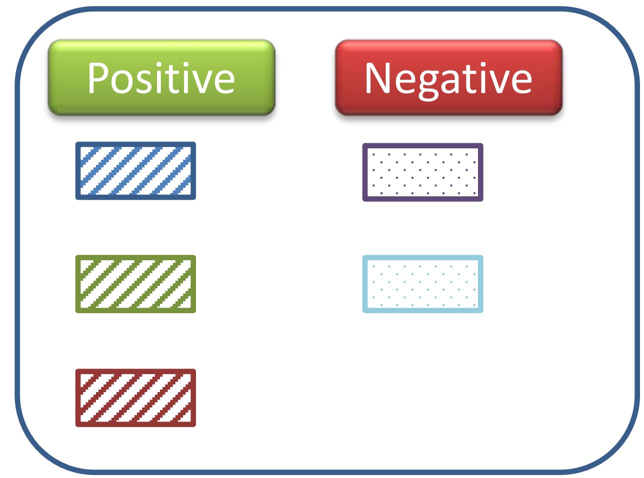


User Profile

From “What” to “Why”

New York City

Central Park	✓
The MET	✗
Sushi Yasuda	✓
Angel's Share	✗

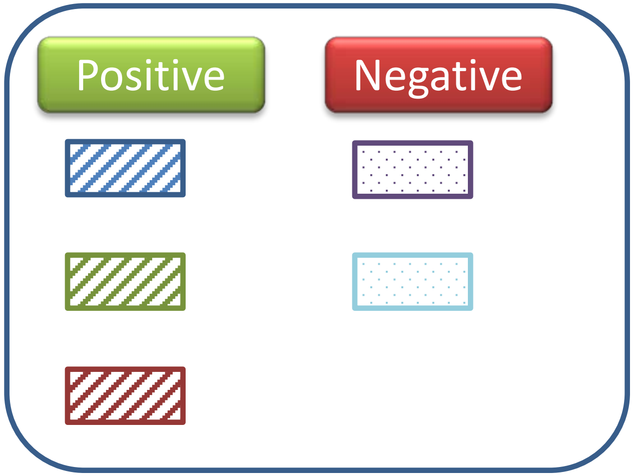


User Profile

From “What” to “Why”

New York City

Central Park	
The MET	
Sushi Yasuda	
Angel's Share	

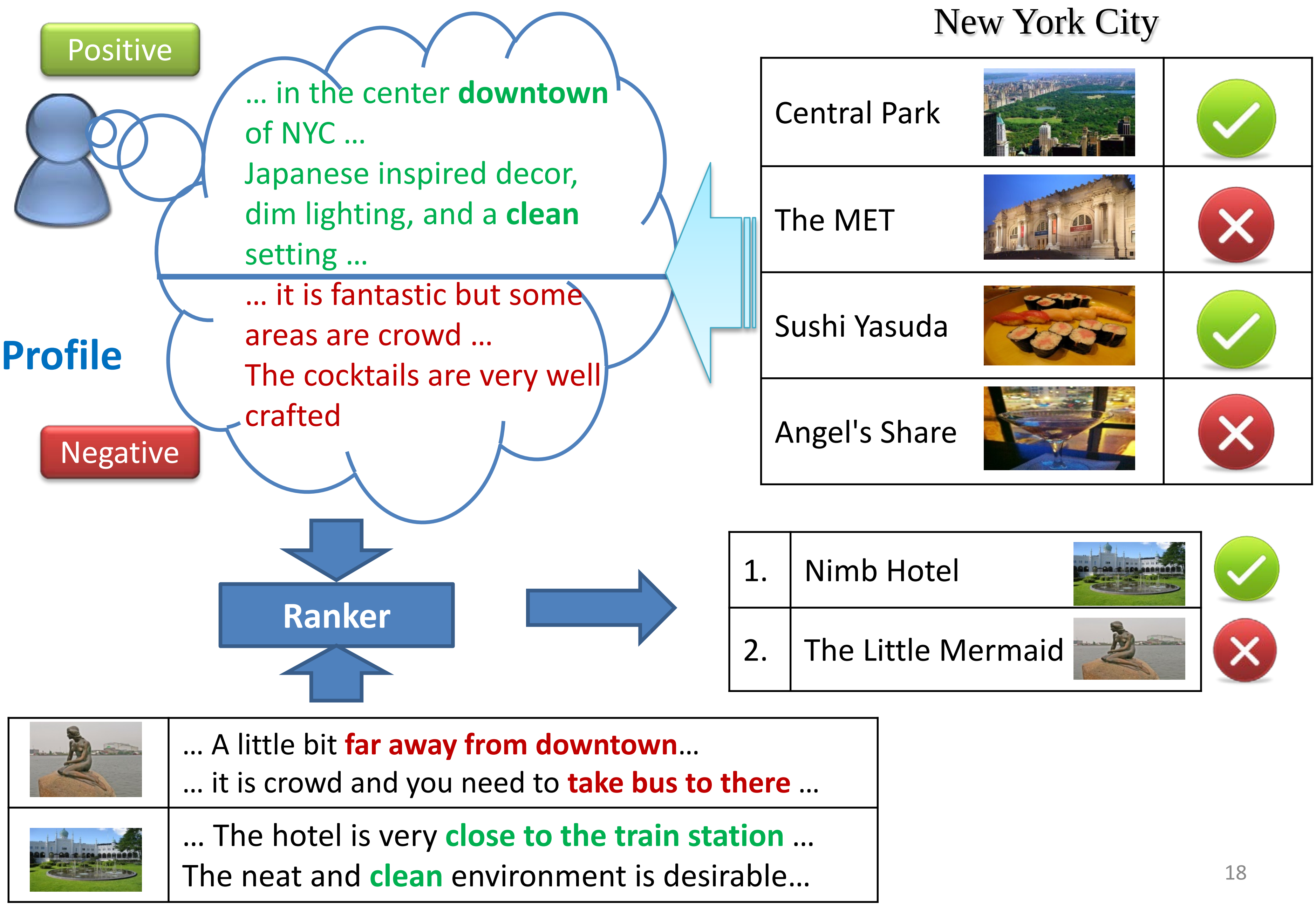


User Profile

Assumption:

A user’s profile is constructed based on reviews of other users who share the similar opinions on the example suggestions.

Opinion-based Profile Modeling



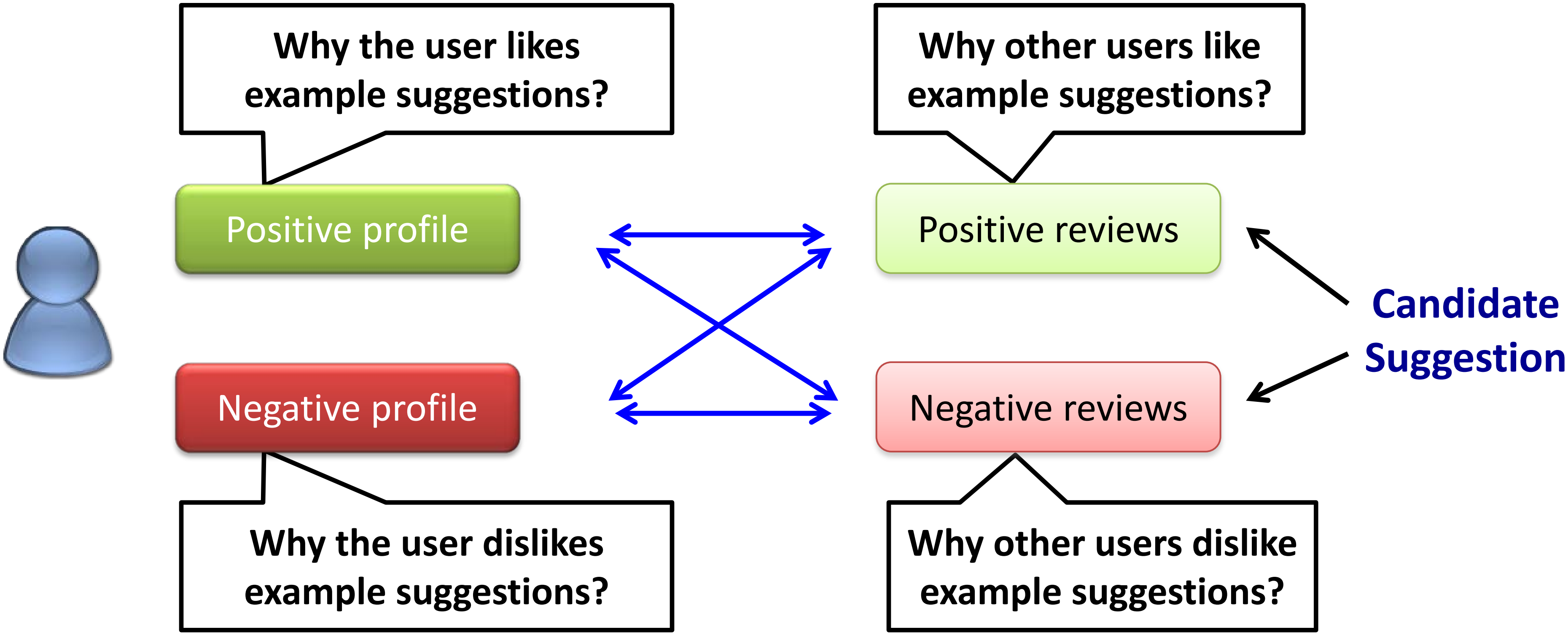
Representation of User Profiles

Original review

… From the stunning architecture to the croissant and latte served up in the food court downstairs. Go to this place and ask why all train stations can't be like this!
Wow, over 100 tracks. Unbelievable architecture. Shopping, food. Etc. it is amazing. We ate at the oyster bar last time and that was a treat. The oyster pots are quite something.

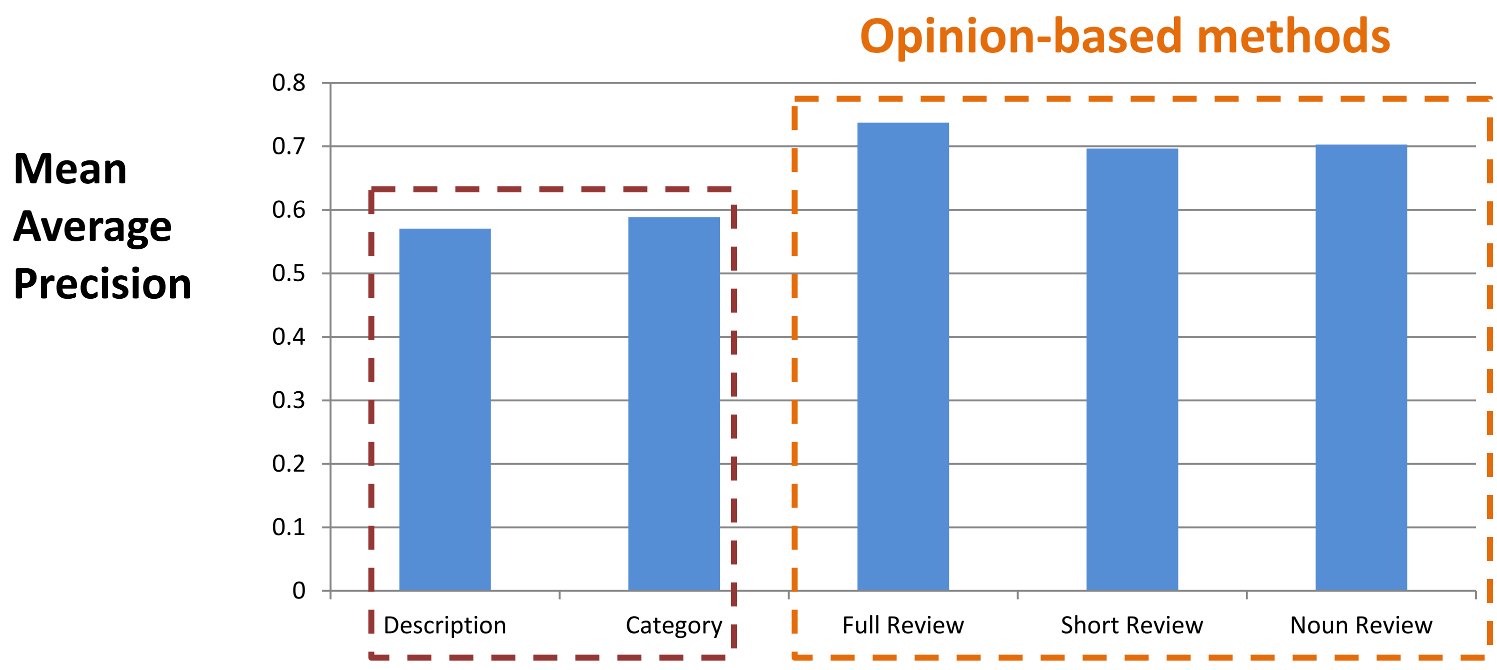
Full Reviews (all terms)	(As the same as above, excluding stop words)
Short Reviews (high frequency terms)	architecture architecture food food oyster oyster 100 amazing ask ate …
Noun-based Reviews	architecture food court downstairs place train stations tracks bar pots …

Ranking candidate suggestions



$$
\begin{aligned}
S(U,CS) = {} & \alpha \times SIM(U_{pos}, CS_{pos}) \\
& - \beta \times SIM(U_{pos}, CS_{neg}) \\
& - \gamma \times SIM(U_{neg}, CS_{pos}) \\
& + \eta \times SIM(U_{neg}, CS_{neg})
\end{aligned}
$$

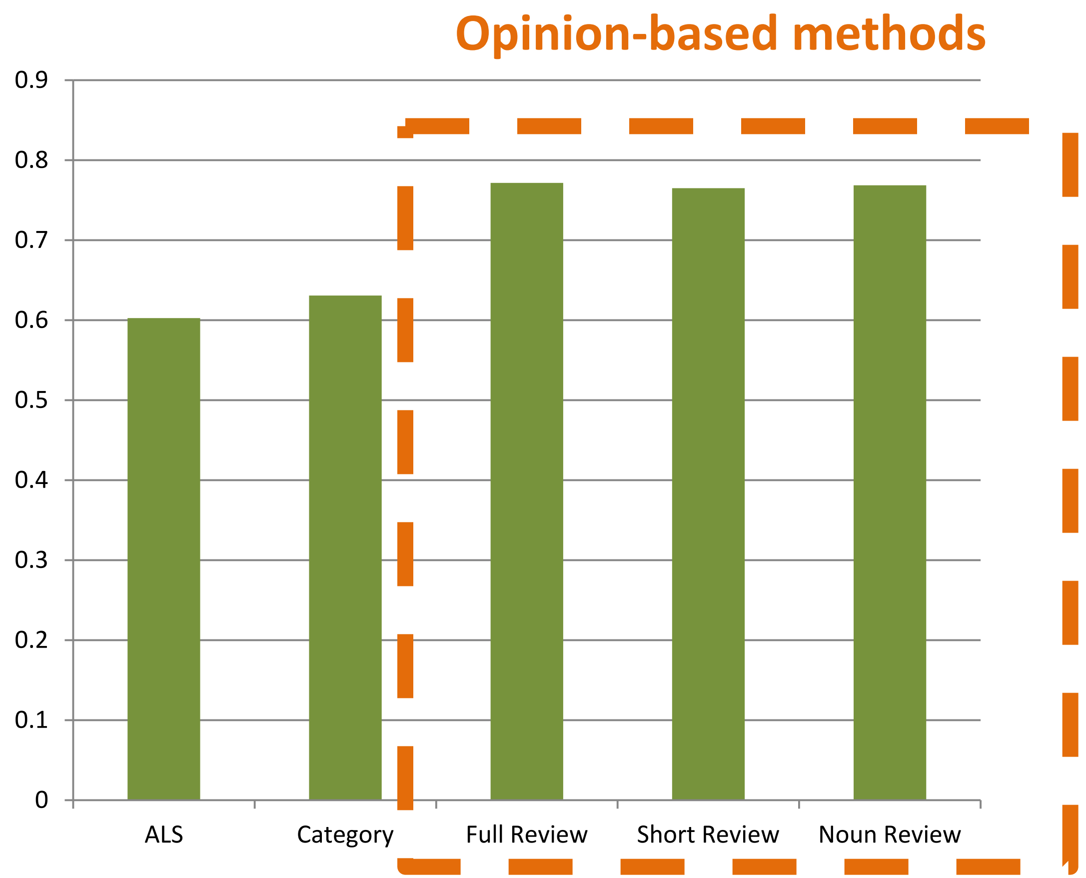
The proposed opinion-based profile modeling is more effective on the TREC2012 contextual suggestion collection.



Baselines were top runs in TREC2012 CS Track.

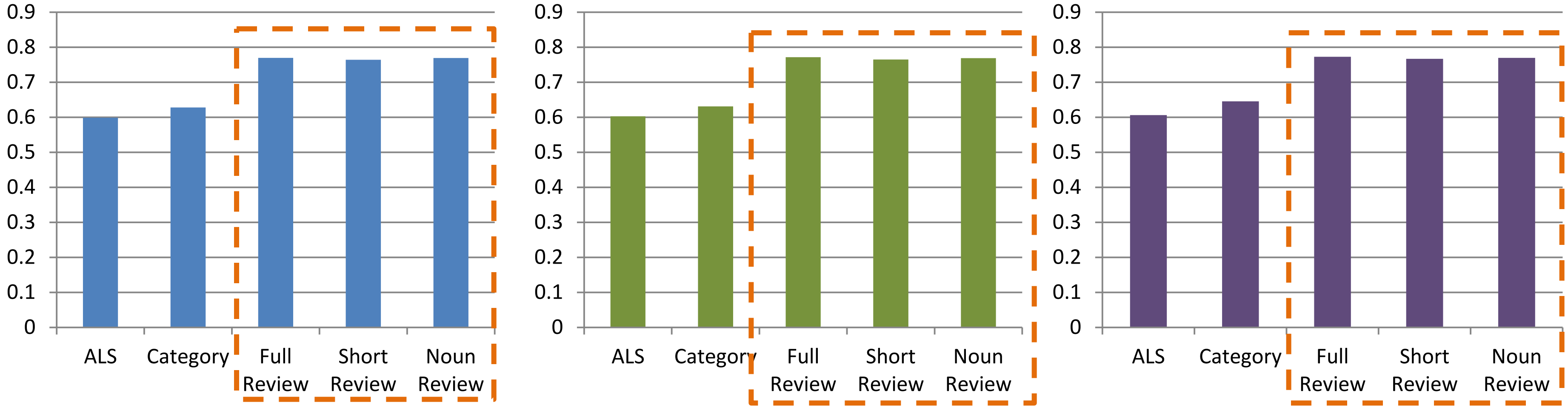
5-fold cross validation;
34 users and 49 suggestions

The proposed opinion-based methods are still more effective on a larger Yelp data set.



10-fold cross validation;
100 users and 13,880 suggestions

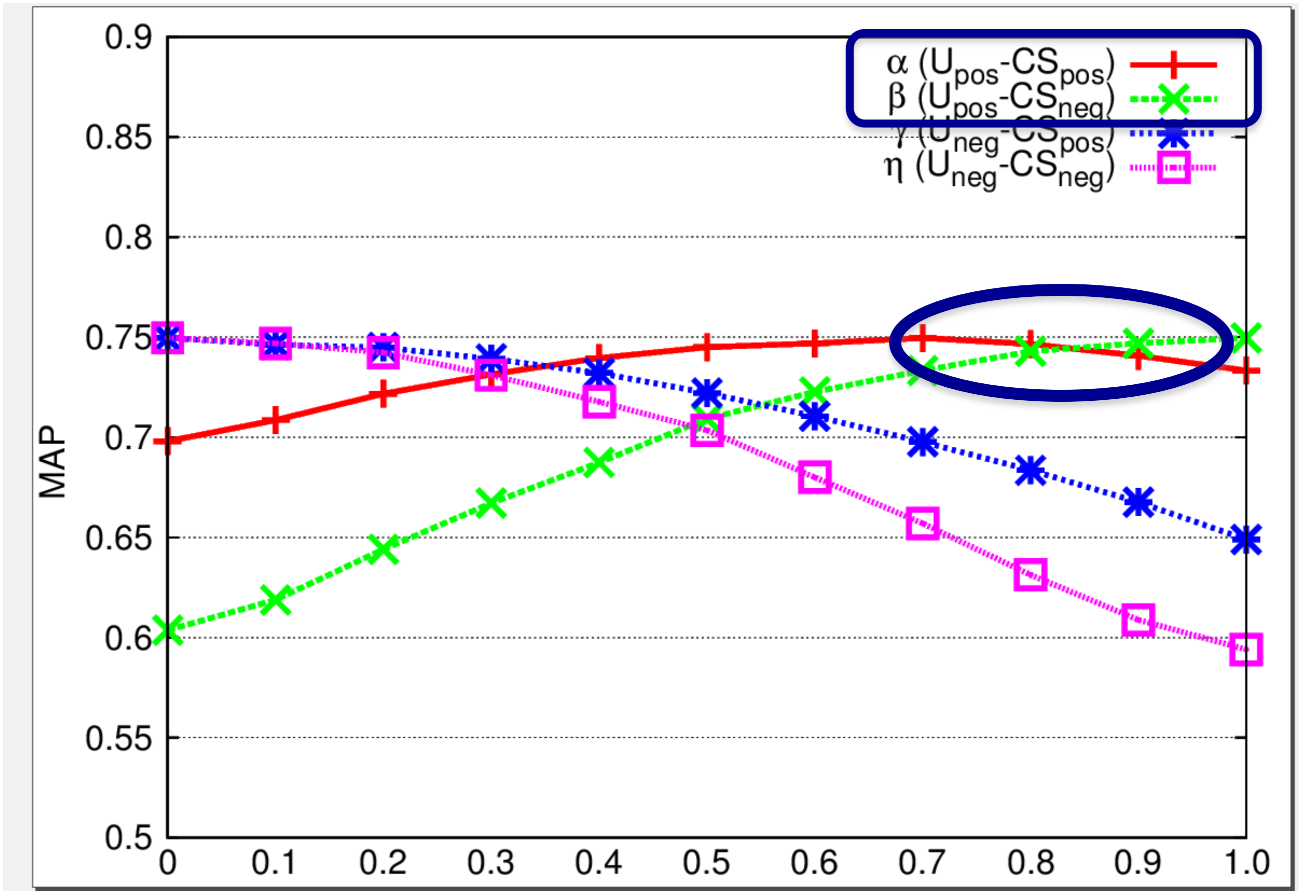
The observations are consistent when using less or more training data.



50%, 25%, 25% 60%, 20%, 20% 70%, 15%, 15%

* Baseline ALS comes from: Y. Zhou, D. Wilkinson, R. Schreiber, and R. Pan. Large-scale parallel collaborative filtering for the netflix prize. In Proceedings of the 4th international conference on Algorithmic Aspects in Information and Management, AAIM ’08, pages 337–348, Berlin, Heidelberg, 2008. Springer-Verlag.

Parameter sensitivity curves indicate that the positive profile is more effective than the negative one.



Conclusions and Future Work

- We proposed an opinion-based approach to user profile modeling for the contextual suggestion problem.
- Experimental results show that the proposed methods are more effective than the state of the art methods.
- Future work
  - Develop an intergrated ranking aproach to consider both profile and contextual requirements.
  - Apply the approach to other application such as the personalized local search problem

Thank you!

Questions?