Location-based mobile search

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Today's topic

Location-based mobile search:

- What is location-based search?
- Types of location-based searches
- When, where and why people conduct location-based search?
- How to improve location-based search using these facts?

Trajectory-Aware Mobile Search:

- Does trajectory-awareness improve mobile search results?
- Destination-prediction algorithm from trajectory?

Research questions of the paper:

Fancy a drink in Canary Wharf?: A user study on location-based mobile search

Claim of the paper:

In order to improve and optimize location-based services, it is necessary to understand people's location-based information needs and the context in which they occur.

Research questions arose:

- What types of location-based search can be identified?
- In what context (spatial, temporal, and social) are these searches initiated?

What is location-based search?

Location-based : "Search for a business or place of interest that is tied to a specific geographical location."

Not restricted only to searcher's location

Study conducted

3 sources of data:

- Users' search event logs (347 location-based mobile search queries)
- Location tracking data from participant's device
- Diary entry data

Types of Location-based queries

- Syntactic view: how people express location-based information needs ?
- Domain view: what are peoples' interests and the types of places people look for the most?
- Task view: what are information seeking tasks?

Types of Location-based queries: Syntactic view

Observation:

Location-based information need is expressed by:

- Specifying a business name (22.9%)
- Specifying a business name and location (13.0%)
- Specifying web address containing local information (12.1%)

Recommendations based on these findings

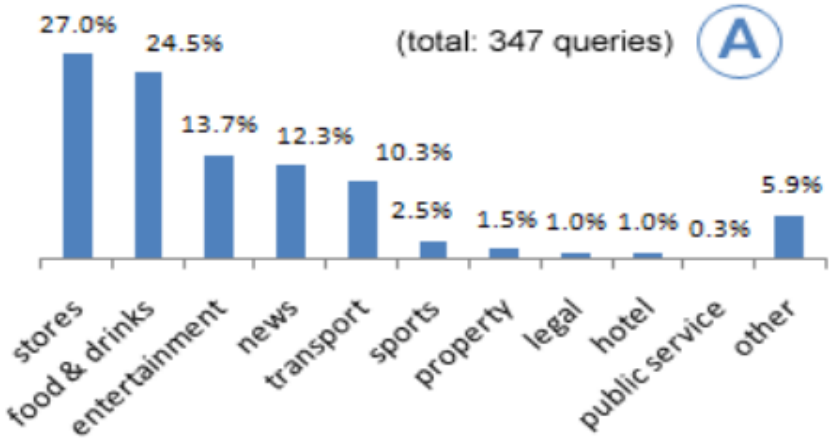
Detecting and predicting location-based information needs.

If a search engine receives a query that contains business name, business category, event name or product name, the search engine should prioritize using location-based information.

Types of Location-based queries: Domain view

Four main domains of interest that our participants looked for:

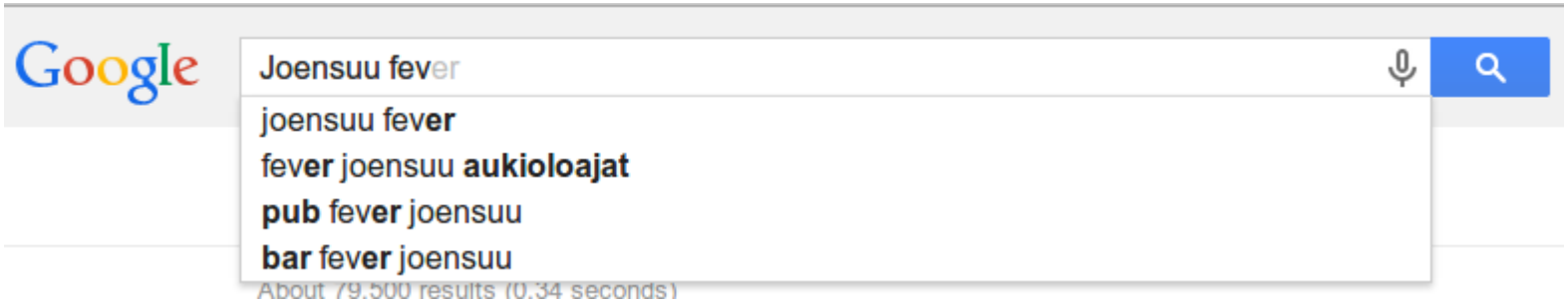
- stores (27.0%): businesses that offers products/services
- food & drink (24.5%): businesses such as restaurants
- entertainment (13.7%): such as cinemas
- transportation (10.3%): such as train, bus, taxi



Recommendations based on these findings

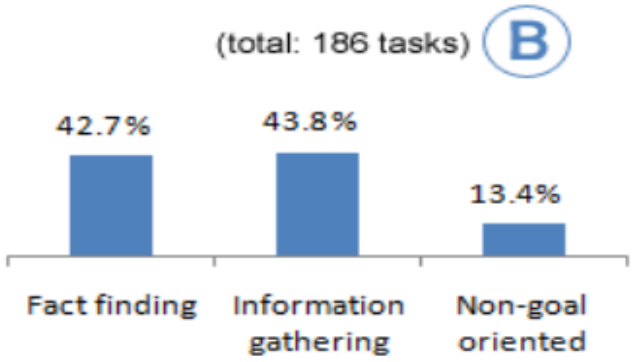
Location-based search query refinement.

- Search engines can help users by providing query suggestions based on main domains of interest. It will help avoid making mistakes when typing unfamiliar business/place names and addresses.



Types of Location-based queries: Task view

- Fact Finding tasks
- Information Gathering tasks
- Non-goal oriented information seeking tasks



Recommendations based on these findings

Support iterative, exploratory and comparative search activity.

- Support users to collect, filter, organize, compare, save and share location-based search results
- Support exploration by allowing users to filter points of interest by distance, business category, service price, in order to find the optimum search results

The context of location-based search

- Spatial
- Temporal
- Social context

The context of location-based search: Spatial

The most common places to search were:

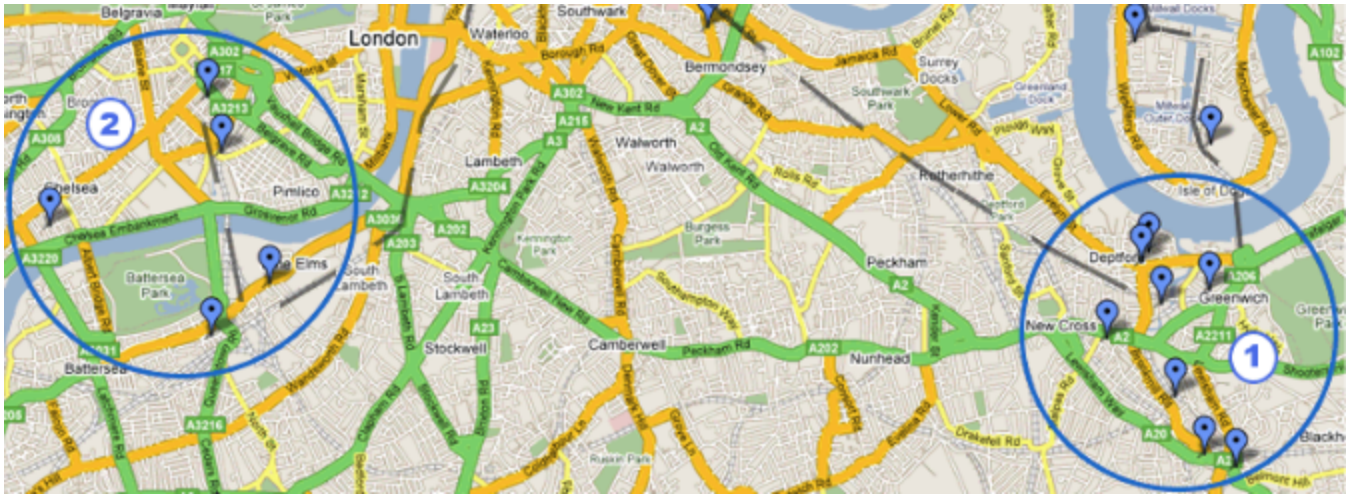
- at home (53%)
- on the move (20%)
- at work (12%)
- at family/friends' home (6.5%)
- public places (8.5%)

Observation: Target location is more often related to their regularly visited places (e.g. work, home)rather than to the proximity of their current location.

Recommendations based on these findings

Recommendation based on hotspots.

Users' interests in location-based information are usually within the proximity of their hotspots. Thus, search result tailored to users' hotspots areas would be potentially valuable.



The context of location-based search: Temporal

- 66.1% of the queries were a spontaneous need
- 21.5% of the queries were needs that were planned for the same day but had less sense of urgency
- 12.4% of search tasks were needs for another day

Conclusion:

Current context is very impotant!

The context of location-based search: Social

- 76.1% of the location-based search tasks were conducted in the presence of others
- 23.9% of location-based search tasks were conducted alone , mostly driven by necessity

Observation:

Most location-based searches are not a solitary activity but one that is strongly influenced and triggered by social interactions.

Recommendations based on these findings

Recommendation based on social network.

- Enable people to search, recommend and share experiences on businesses and make this information easily accessible to people from their social networks
- To provide location-based recommendations based on the interests of the whole group

Trajectory-Aware Mobile Search

Shahriyar Amini , A.J. Bernheim Brush , John Krumm , Jaime Teevan , Amy Karlson

Real Time Destination Prediction Based On Efficient Routes

John Krumm

Trajectory-Aware Mobile Search

Claim:

The searcher's location trajectory could help find more relevant results than using current location alone.

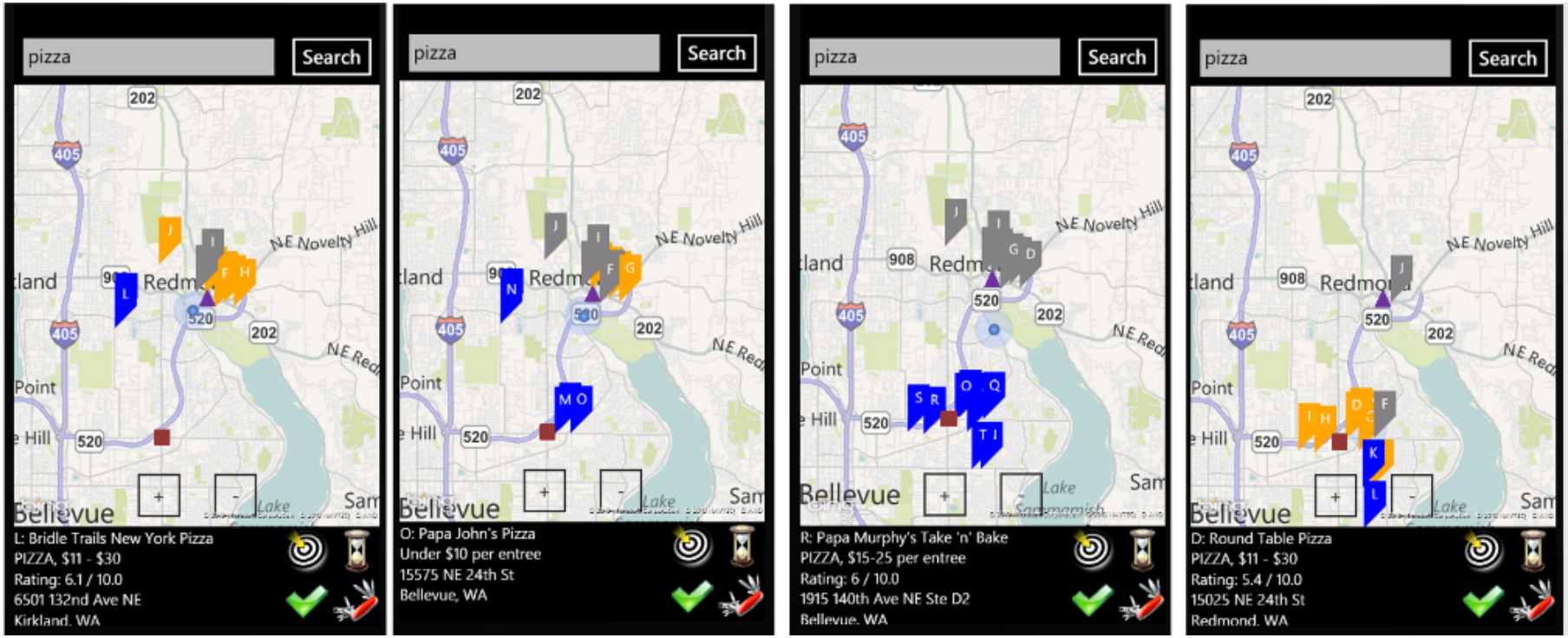
Trajectory Aware Search prototype

- Uses trajectory to predict destination that is used to identify appropriately located search results
- Mitigates privacy concerns by only using location data from the current trip

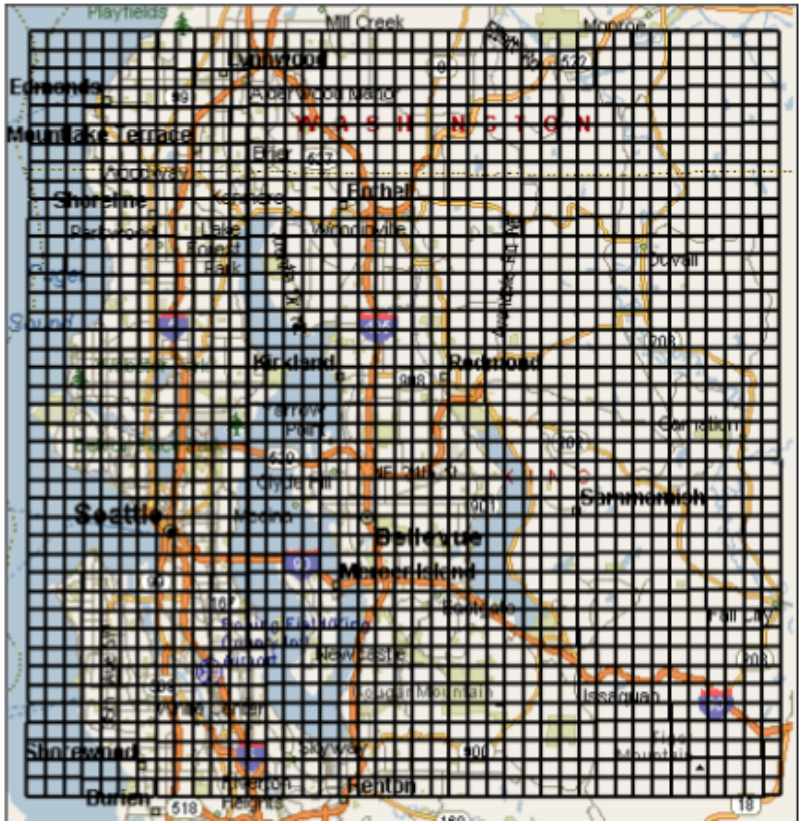
Trajectory Aware Search prototype

Two sets of search results:

- Based on the user's current location
- Trajectory results, based on the user's predicted destination

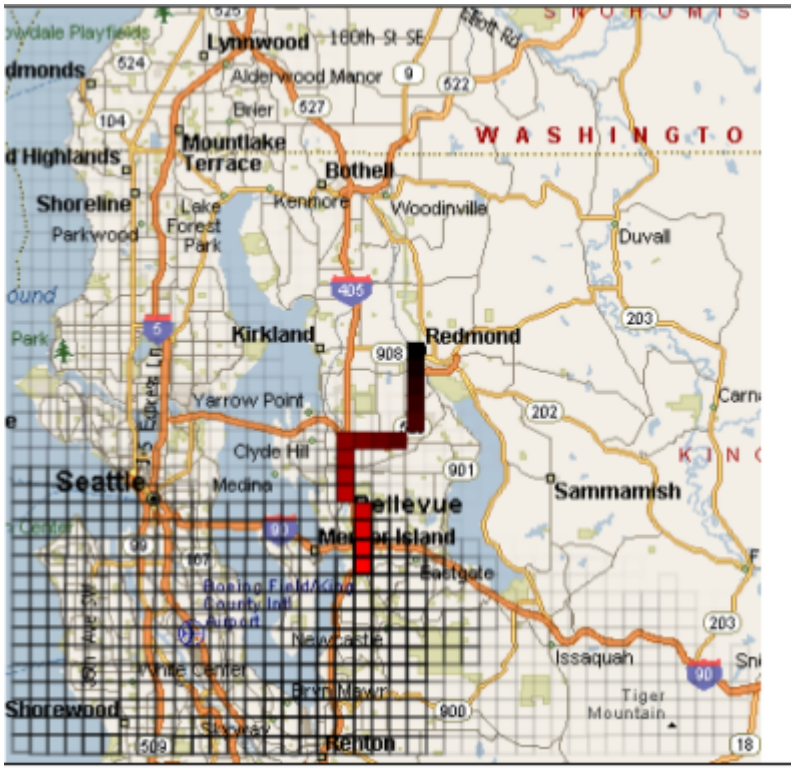


Destination Prediction



Destination Prediction

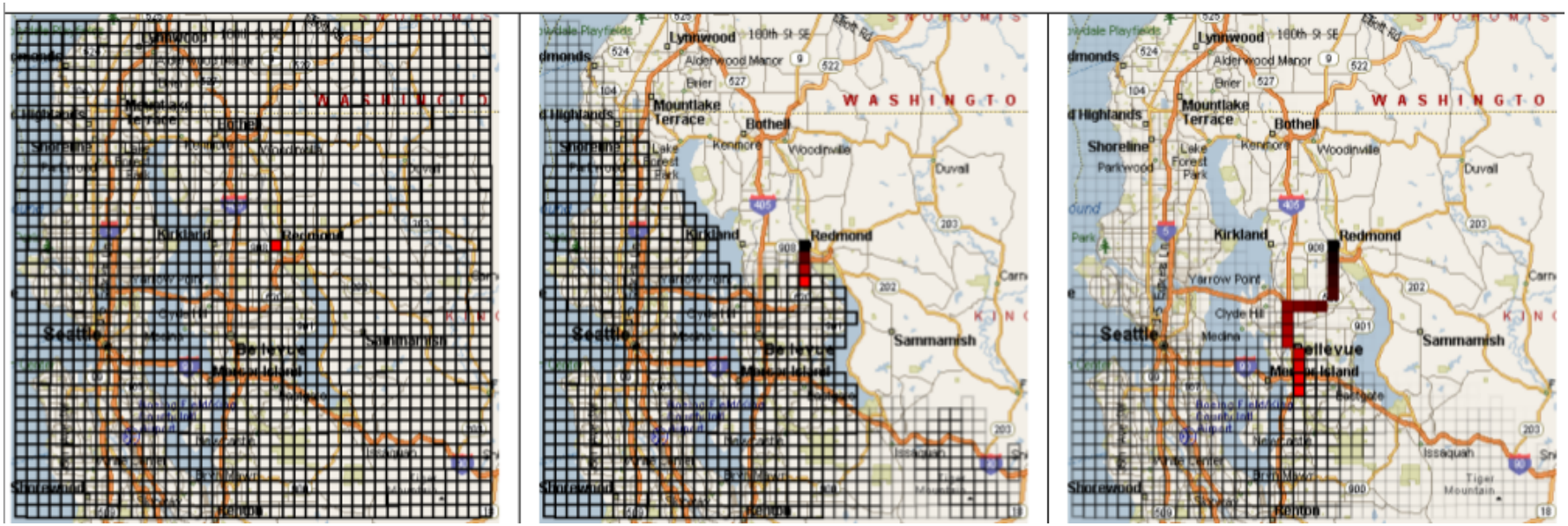
- Destination prediction is based on the assumptionthat drivers chose efficient routes
- The probability that the driver will reduce the minimum time to the destination with transition to the next cell is p = 0.625



Destination Prediction

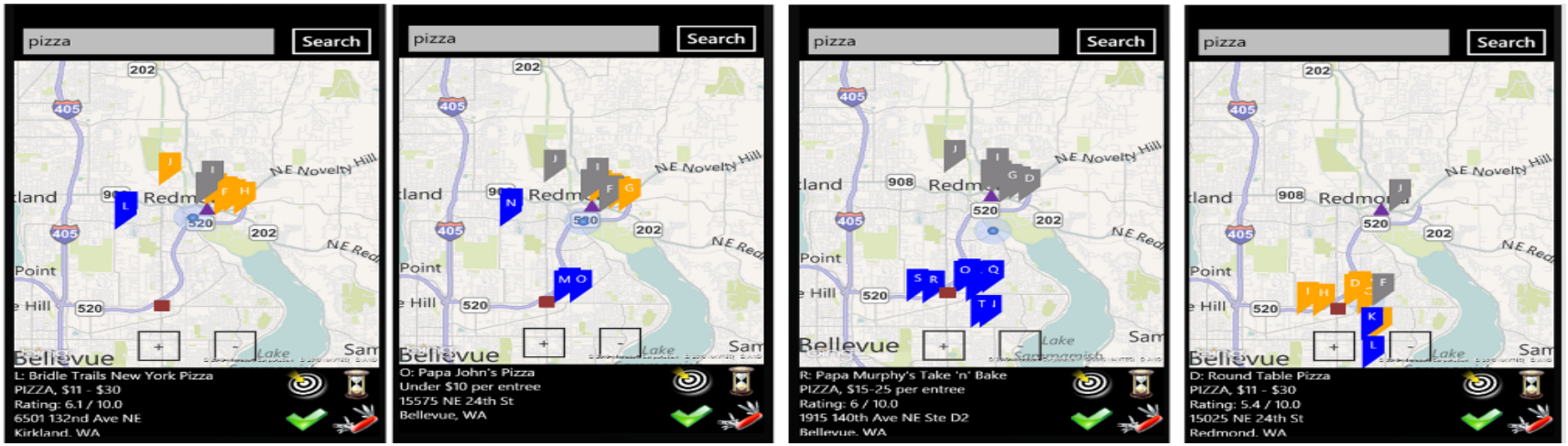
$$p(c_i|S) = \frac{p(S|c_i)p(c_i)}{\sum_{j=1}^{N_c} p(S|c_j)p(c_j)}$$

$$p(S|c_i) = \prod_{j=2}^{N_s} \begin{cases} p & \text{if } s_j \text{ is closer to } c_i \text{ than any previous cell in } S \\ 1-p & \text{otherwise} \end{cases}$$



Conclusion

- Useful early in the search process, when the destination was some distance away
- Destination predication could be used to inform auto-complete query suggestions



Thank you for your attention!

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