

# Understanding and Predicting Personal Navigation

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## General v. Personal Navigation

Search engines are often used to navigate to particular information resources.

When we identify navigational behavior because everyone uses the same query to navigate to the same page, we call the behavior **general navigation**.

When we identify navigational behavior based on an individual's own search history, we call it **personal navigation**.

## Personal Navigation Prediction Algorithm

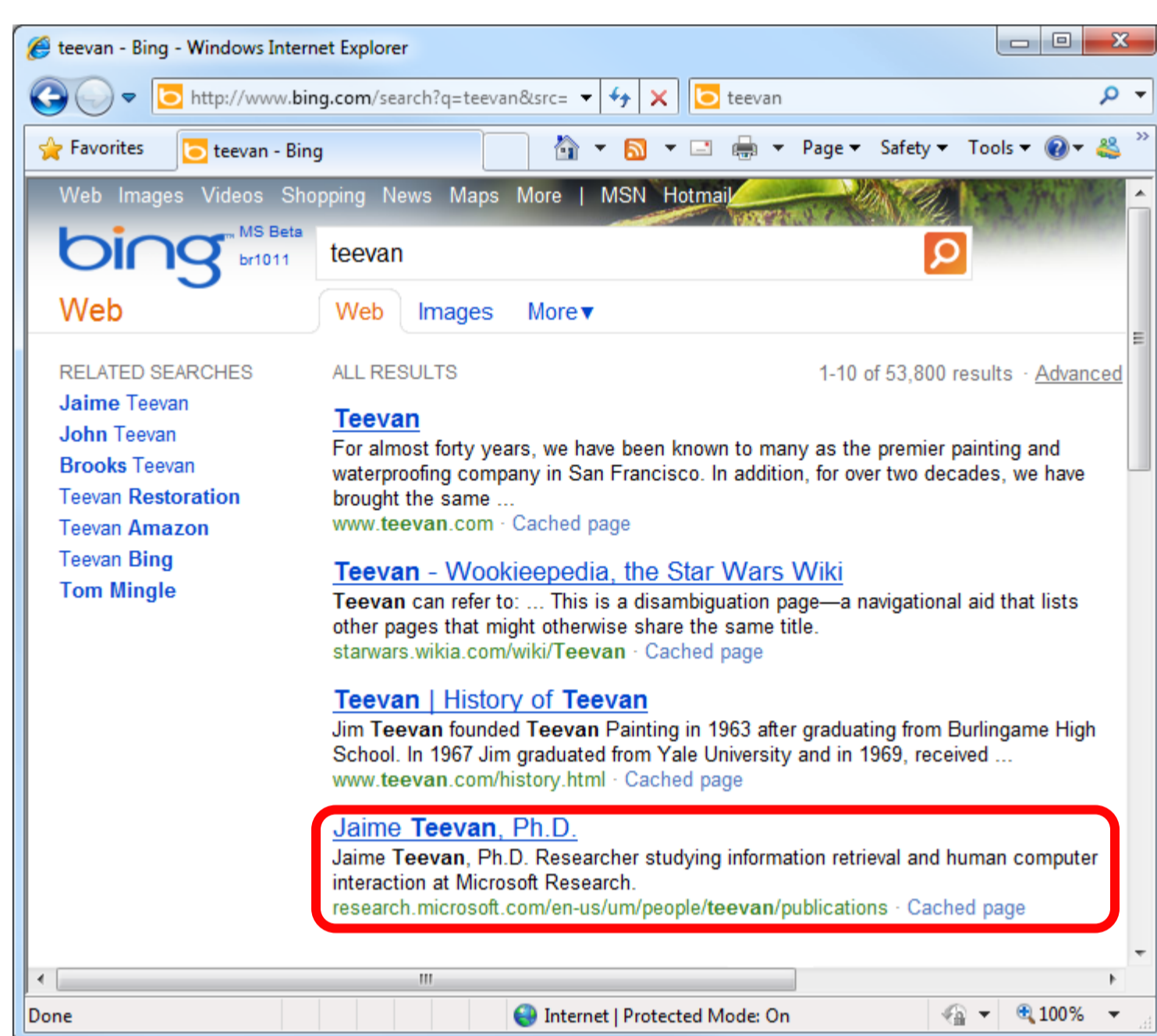
Given a query  $q_i$  issued by a user

Select the two most recent queries ( $q_{i-1}$  and  $q_{i-2}$ ) from the user's history such that:

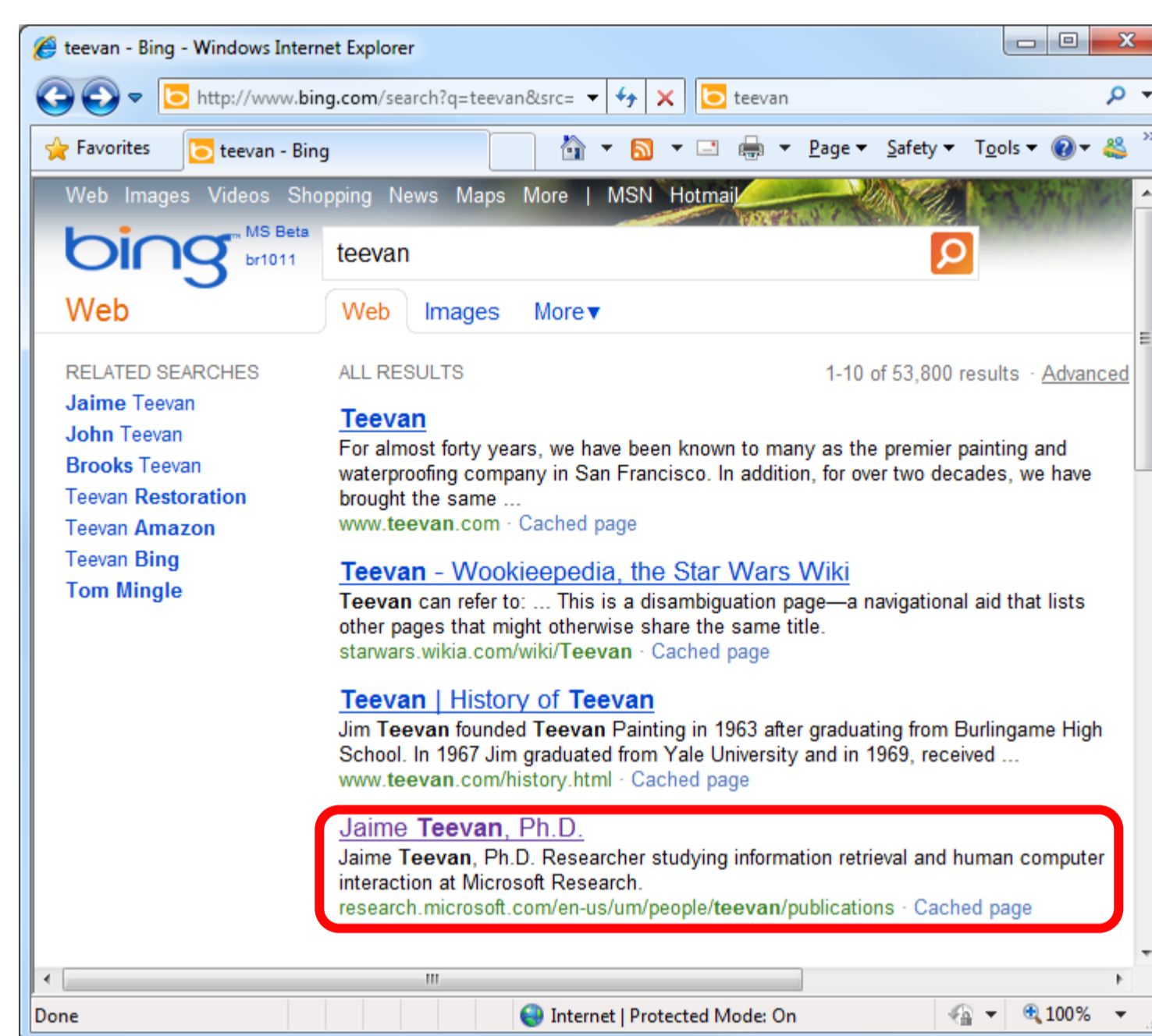
- $q_{i-1} = q_i$  and  $q_{i-2} = q_i$
- $|\text{urls clicked}(q_{i-1})| > 0$
- $|\text{urls clicked}(q_{i-2})| > 0$

Predict the user will click  $u \in \{\text{urls clicked}(q_{i-1})\}$  iff:

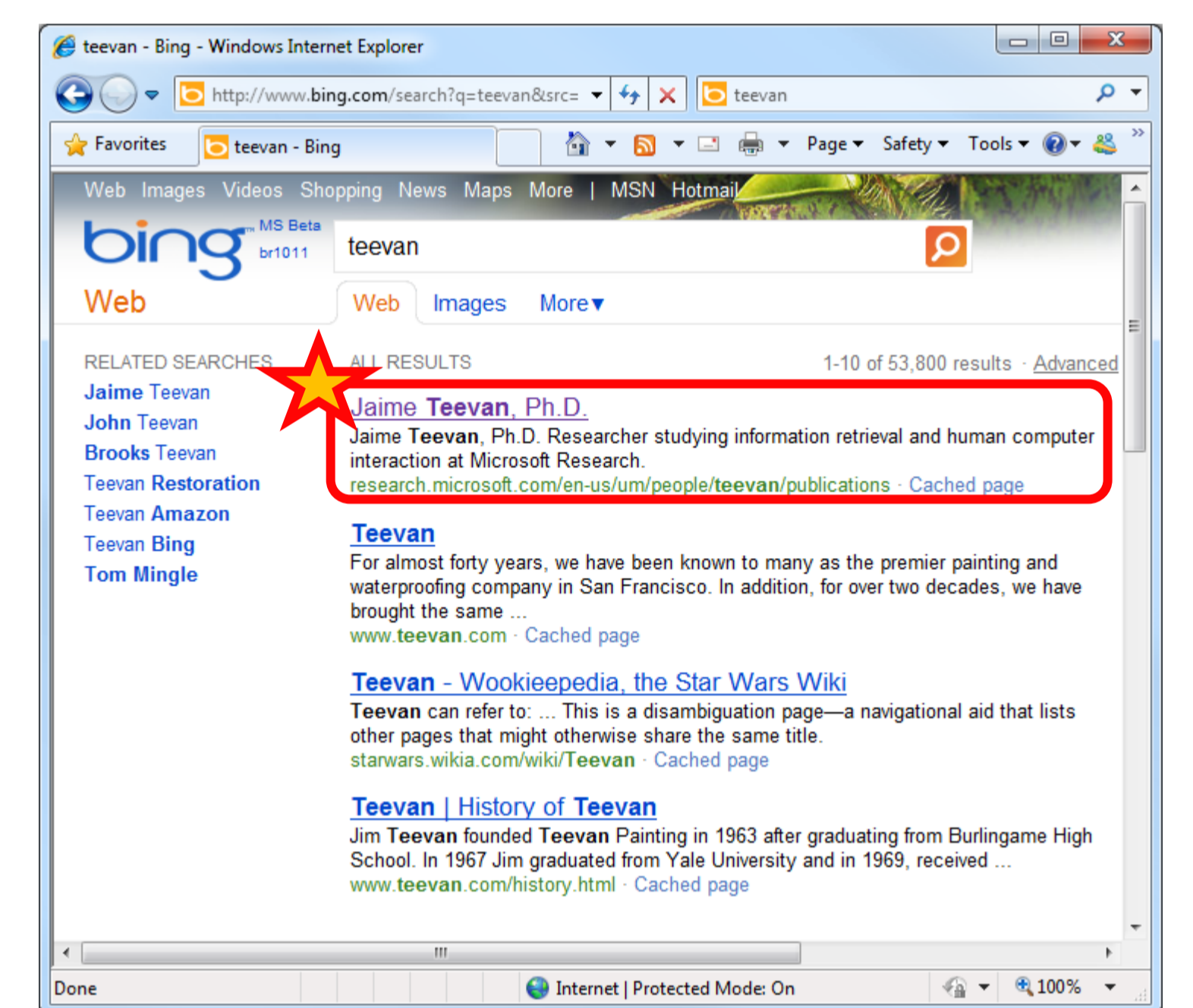
- $q_{i-1} \neq \text{null}$  and  $q_{i-2} \neq \text{null}$
- $|\text{urls clicked}(q_{i-1}) \cup \text{urls clicked}(q_{i-2})| = 1$



First search...



...second search...



...third search!

## Personal Navigation

## Understanding Personal Navigation

		Few people	Many people
<b>General Navigation</b>	<b>Different</b>	<i>biggest spider</i> <i>cooking videos</i> <i>firewood</i> <i>tiny house plans</i> <i>url shortener</i> <i>wholesale clothes</i>	<i>american idol</i> <i>flash games</i> <i>hidden object games</i> <i>horoscopes</i> <i>justin bieber</i> <i>tiger woods</i>
	<b>Same for all</b>	<i>azflyfishing</i> <i>great bay volleyball</i> <i>media gossip</i> <i>new moon bar</i> <i>stanford lane library</i> <i>www chili org</i>	<i>drudge report</i> <i>eharmony login</i> <i>msn games</i> <i>myyearbook</i> <i>pandora</i> <i>photobucket</i>

Properties of general navigation searches:

- There are very few general navigation queries
- But each individual query is very popular
- Queries are short and contain URL fragments
- Target result usually ranked first
- Everyone uses the query the same way

Properties of personal navigation searches:

- There are a lot of personal navigation queries
- But individual queries tend to be unusual
- Queries are longer and do not contain URLs
- Target result often ranked lower
- Other people use the query differently

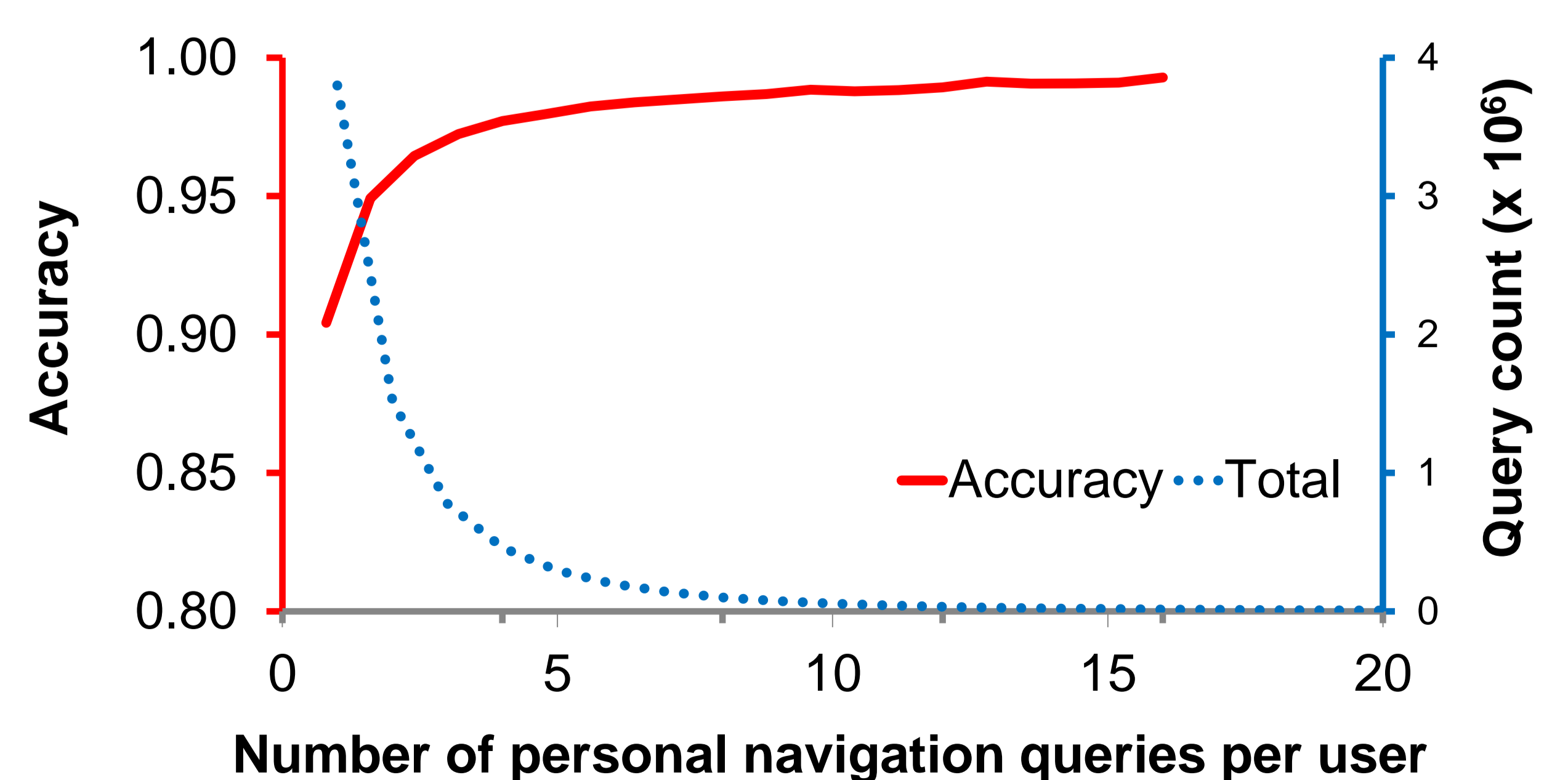
## Predicting Personal Navigational

It is possible to predict personal navigation:

- High accuracy (right 95% of the time)
- High coverage (predict for 15% of all queries)

Properties of the personal navigation predictions:

- Coverage still high when general navigation is excluded (predict for 10% of all queries)
- Longer aggregation periods improve coverage
- Group behavior can increase coverage further
- Predictions are stable over time, making offline prediction possible



Using additional user history can improve the accuracy of the personal navigation prediction, but it also reduces the coverage.