

Understanding Temporal Query Dynamics

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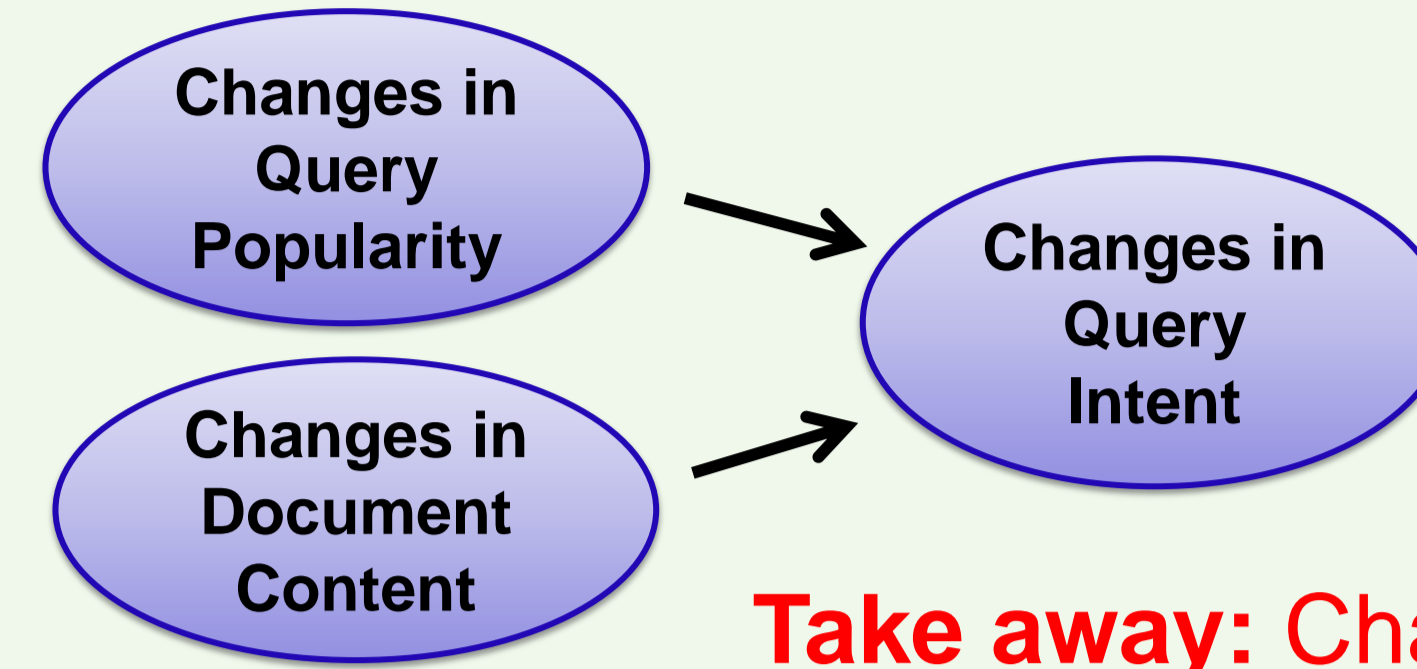
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Motivation and Research Goal

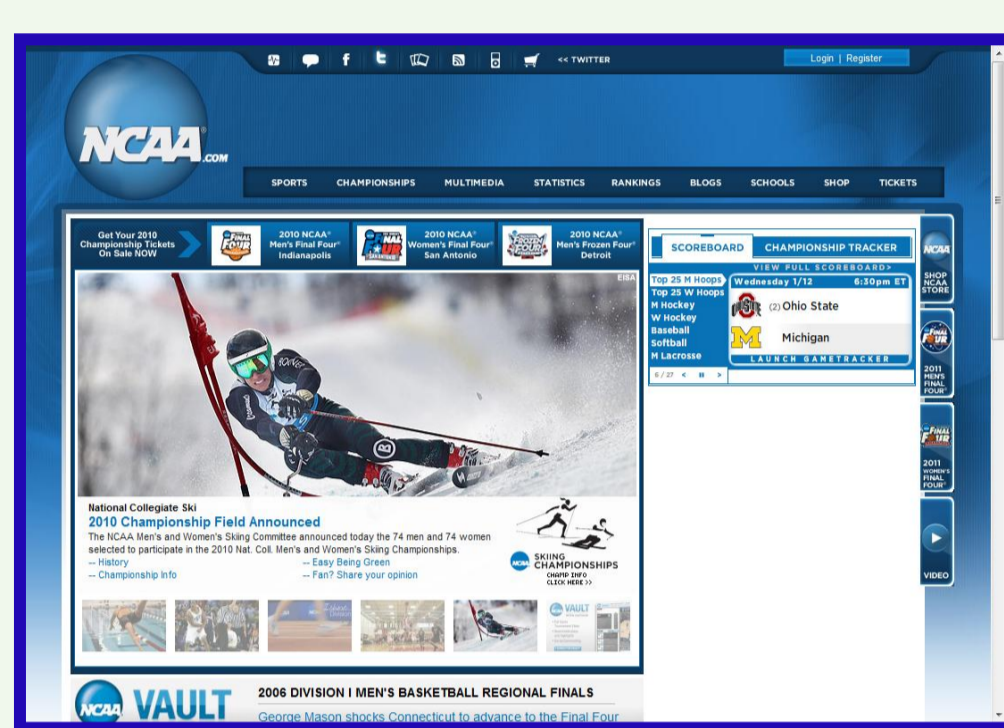
- Web search is strongly influenced by time
 - o Queries popularity change over time
 - o Document content changes over time
 - o What's relevant (intent) changes over time
- Goal: Infer changes in query intent using changes in popularity, content and interaction



Take away: Changes in popularity and content can signal changes in user intent.

Example: *march madness*

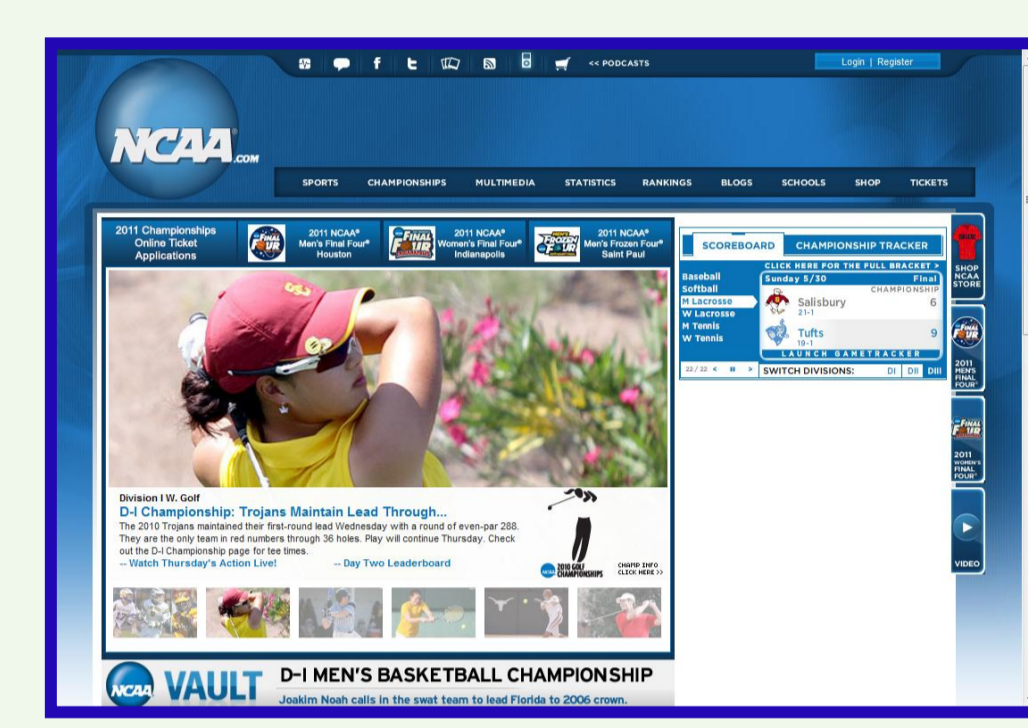
<http://ncaa.com> becomes relevant *during* the basketball tournament but is not *before* or *after*



Before



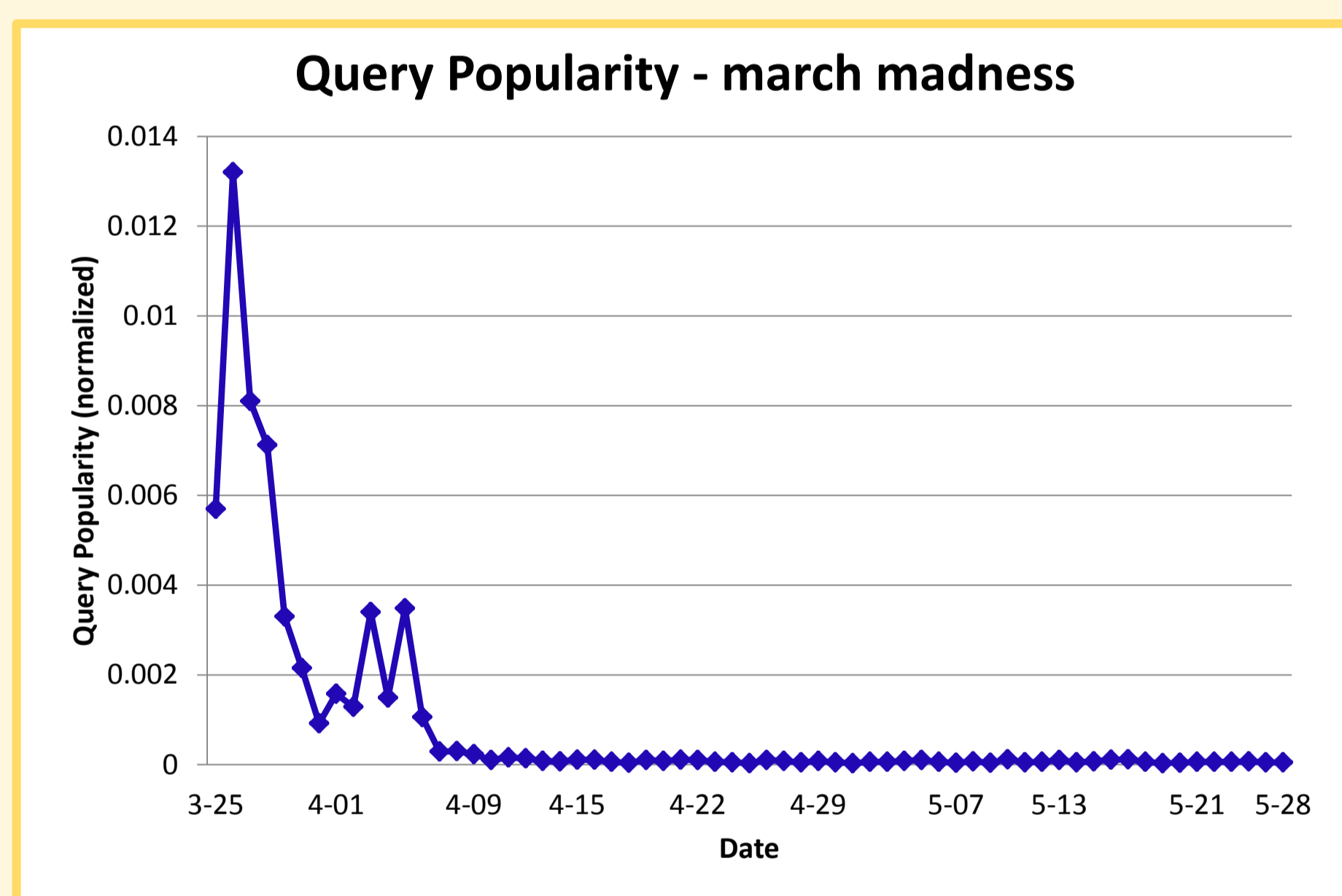
During



After

<http://mahalo.com/march-madness> is always about March Madness and is relevant *before* and *after*

Changes in Query Popularity



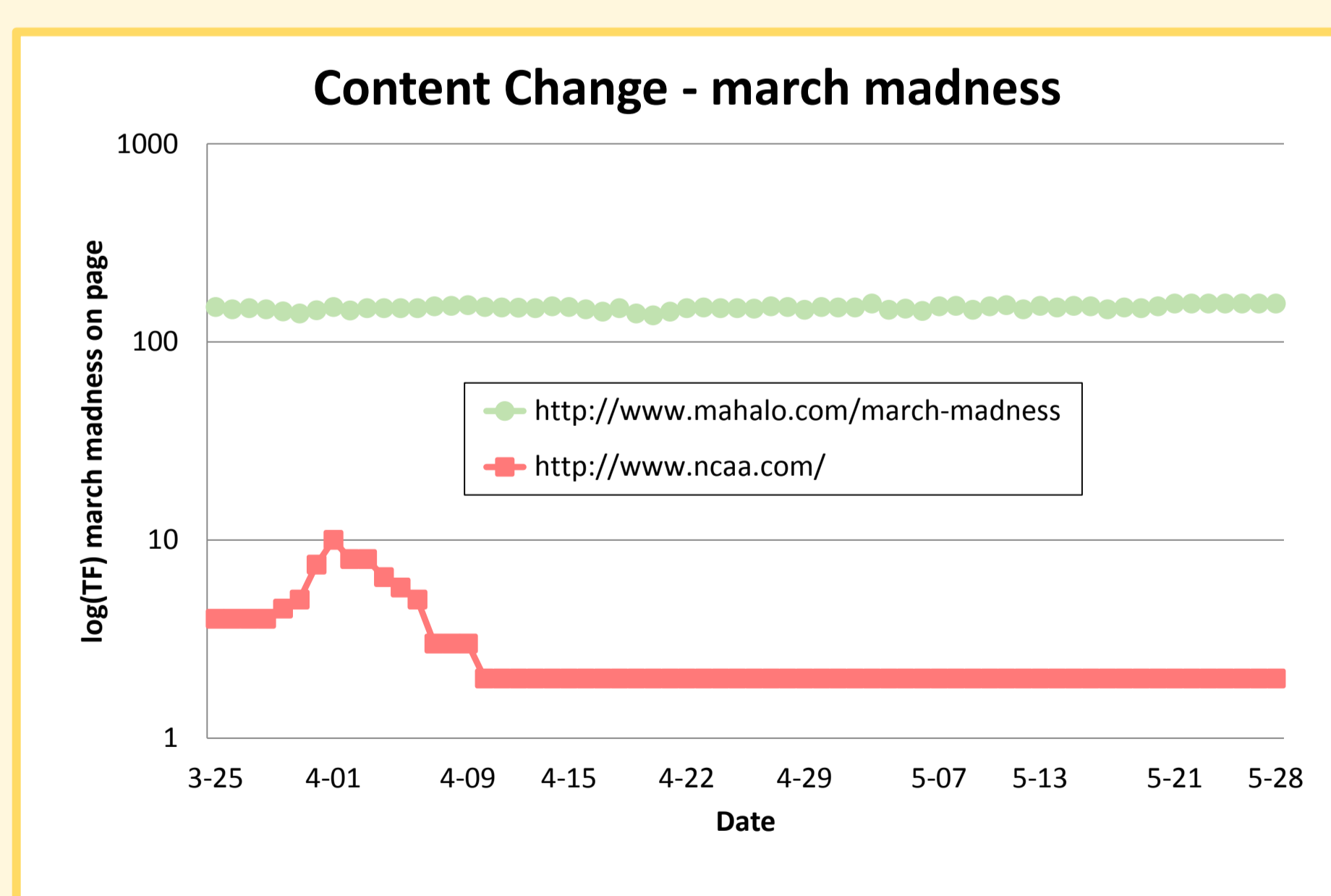
Methods:

- Measure query popularity over time

Findings:

- Characterize query popularity curves with shape features
 - o Number of spikes / Periodicity / Shape / Trend
- Most queries
 - o One or more spikes / not periodic / wedge / show temporal trend
- *march madness*
 - o Multiple spikes / not periodic / castle shape / downward trend

Changes in Document Content



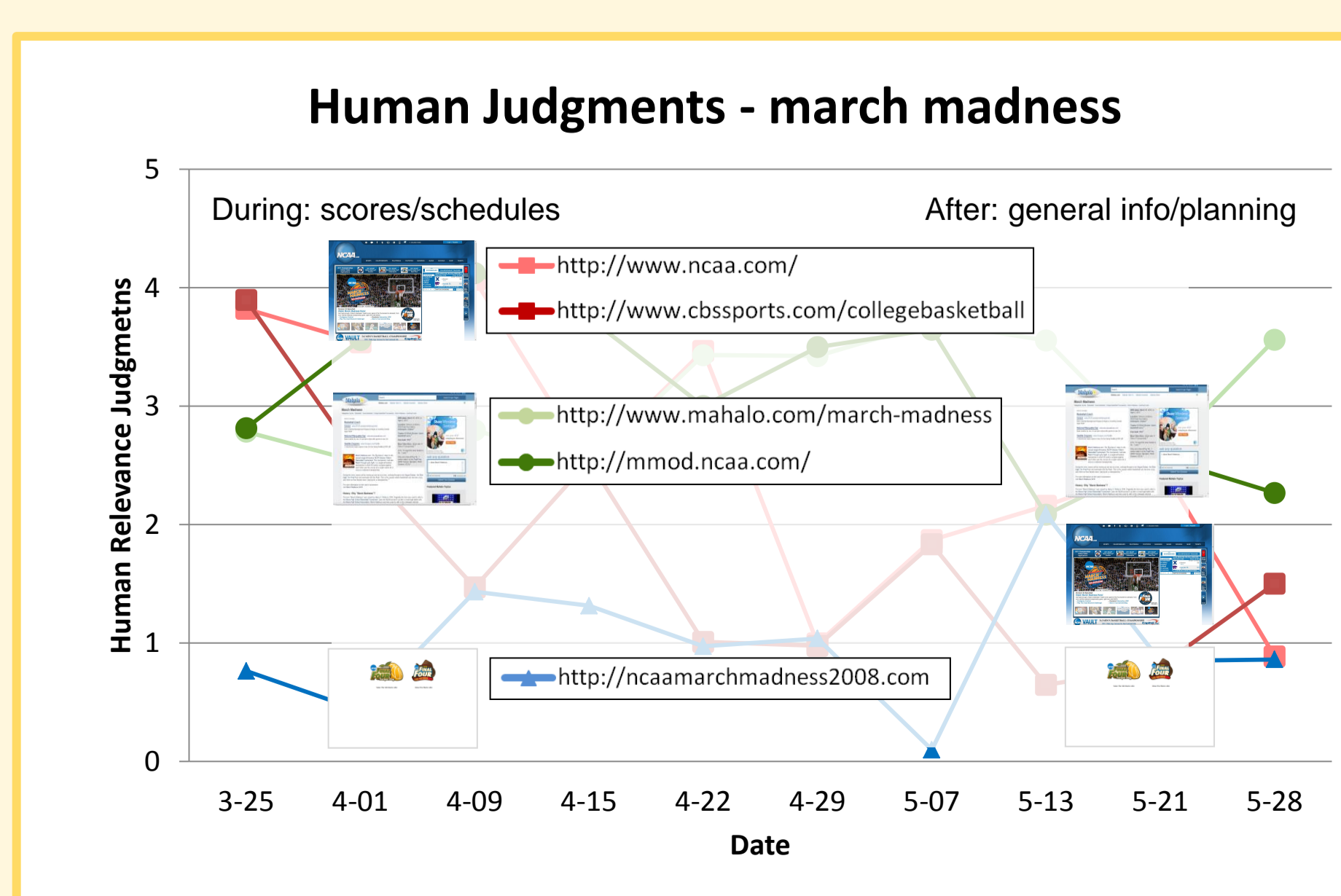
Methods:

- Crawl pages every day
- Measure page content change
 - o Query-dependent: Term frequency (TF)
 - o Query-independent: Dice coefficient over words

Findings:

- 61% pages show query-related (TF) change
- 95% pages changed by less than 15% (Dice)
- Periodic and multiple-spike queries are more likely to have changed documents

Changes in Query Intent



Methods:

- Estimate query intent change
 - o Explicit human relevance judgments (top HR Count)
 - o Entropy of clicked results

Findings:

- Top HR count and CE are negatively correlated
- Click entropy correlated with multiple-spike queries and downward-trend queries