

# Social-Network based Search and Ranking



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## Introduction

- Emergence of social networks and Web 2.0 applications makes it interesting to see how social data can be used in improving the traditional textual search on the web.
- We can improve the effectiveness of web search by utilizing social data available from users, users' actions and their underlying social network on the web.
- A **socio-textual** query is defined as  $Q = \langle K_q; S_q \rangle$ , where  $K_q$  is the textual part of query specified as a set of keywords in the query and  $S_q$  is the social part of query specified as the user  $u_q$  issuing the query and the social network  $G$ .

## Application/Project

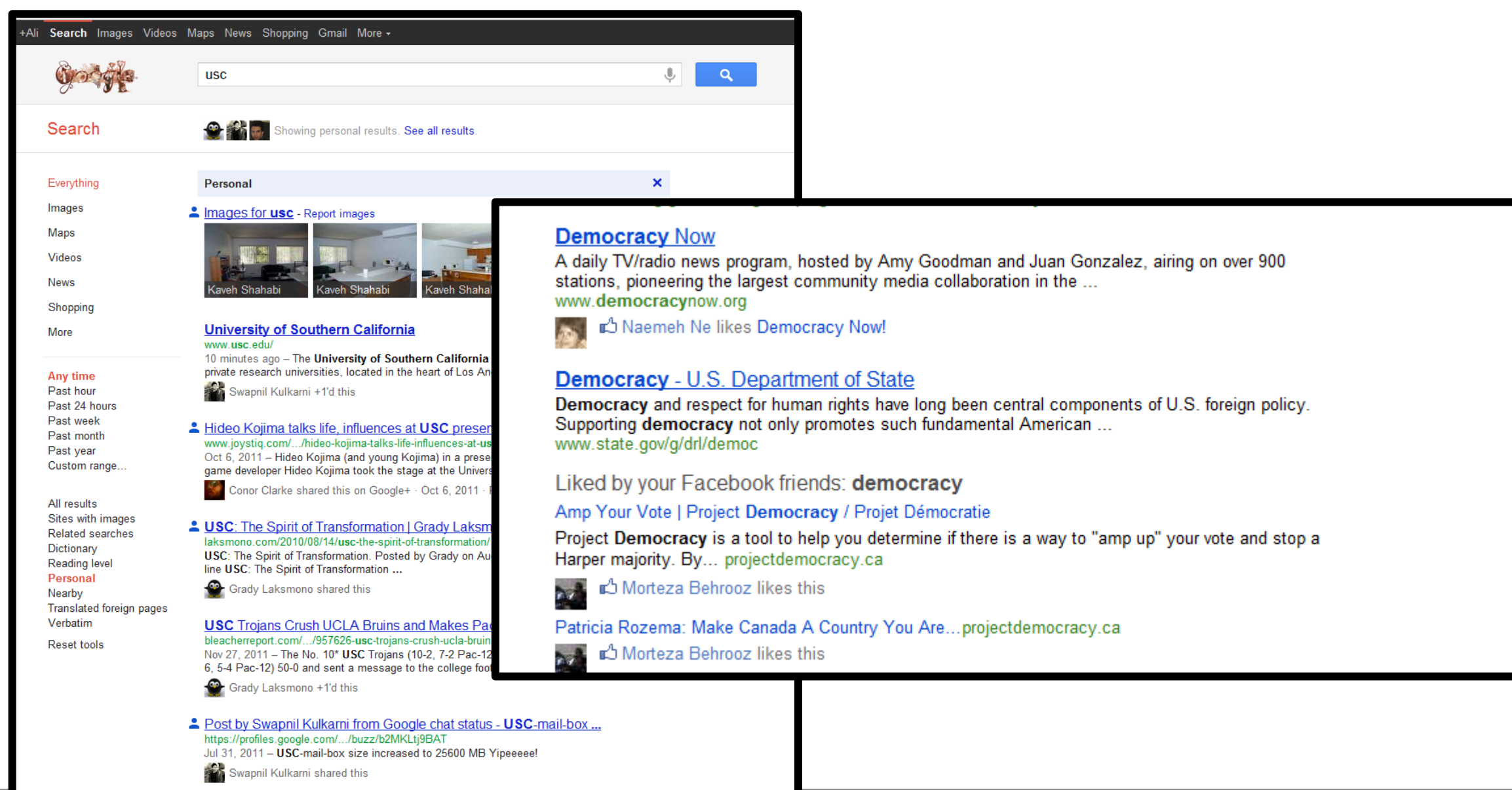
- Web 2.0 applications



- Recommendation based on user's friends
- Re-ranking the search results

- Web search

- Re-ranking of search results based on actions by user's friends



## Related Work

- Search Services
  - People through their social networks are found and contacted directly to answer web queries
  - People and their networks are indexed and search engine has to find the most relevant people to send the queries/questions to
- Search using Social Networks (SSN)
  - The basic intuition behind SSN is the findings that state that a person's interest are very similar to her friends
- Commercial Search Engines
  - Google and Bing integrate users 'like's or '+1's into the search results
  - Only show the likes and +1s and the actual ranking is not affected

## Approach

- User Relatedness

- $urf(u_i, u_j)$
- Measures the relevance/relatedness between to users (nodes) in a social network (graph)

- User Weight

- $uwf(u_i)$
- Captures the overall (global) importance of each user in the network

- User Action

- $uaf(u_i, o_k)$
- Quantifies the importance of each object to each user not affected
- Context/application dependent
- YouTube videos:
  - {own(publish) : 1; favorite : 0:9; like : 0:7; comment : 0:4}.

- Social Relevance

$$socRel(o, q) = \sum_{v_i \in U_o} urf(u_q, v_i) \times uaf(v_i, o) \times uwf(v_i)$$

- Social-Textual Relevance

$$stRel(o, q) = \alpha \times socRel(o, q) + (1 - \alpha) \times texRel(o, q)$$

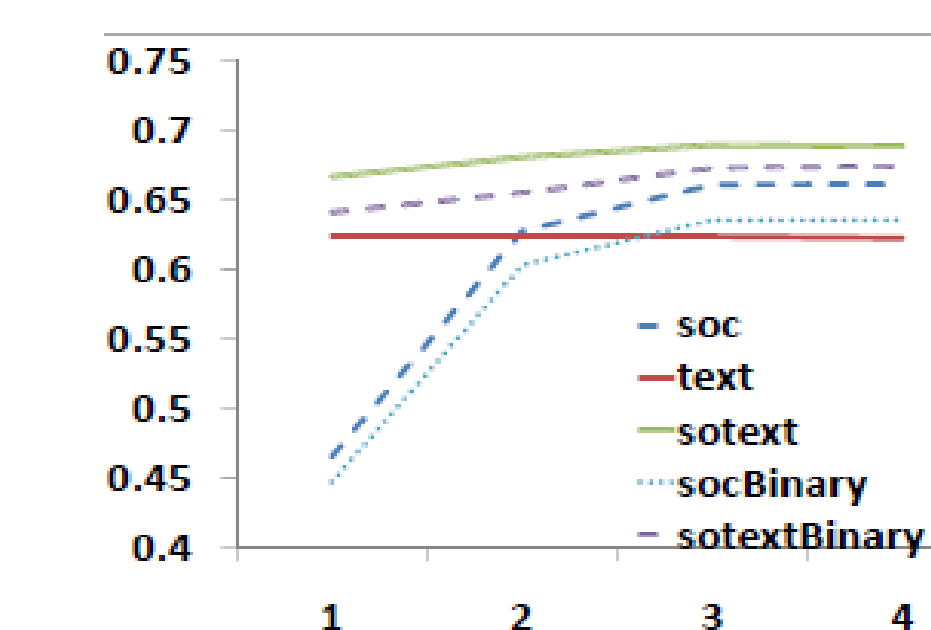
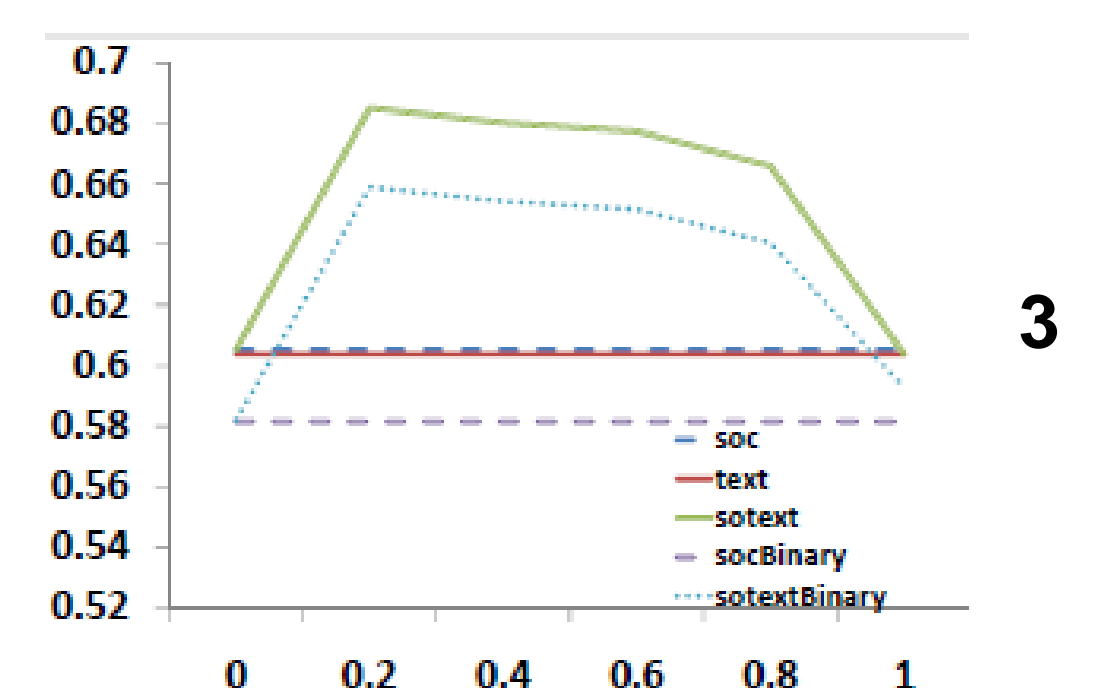
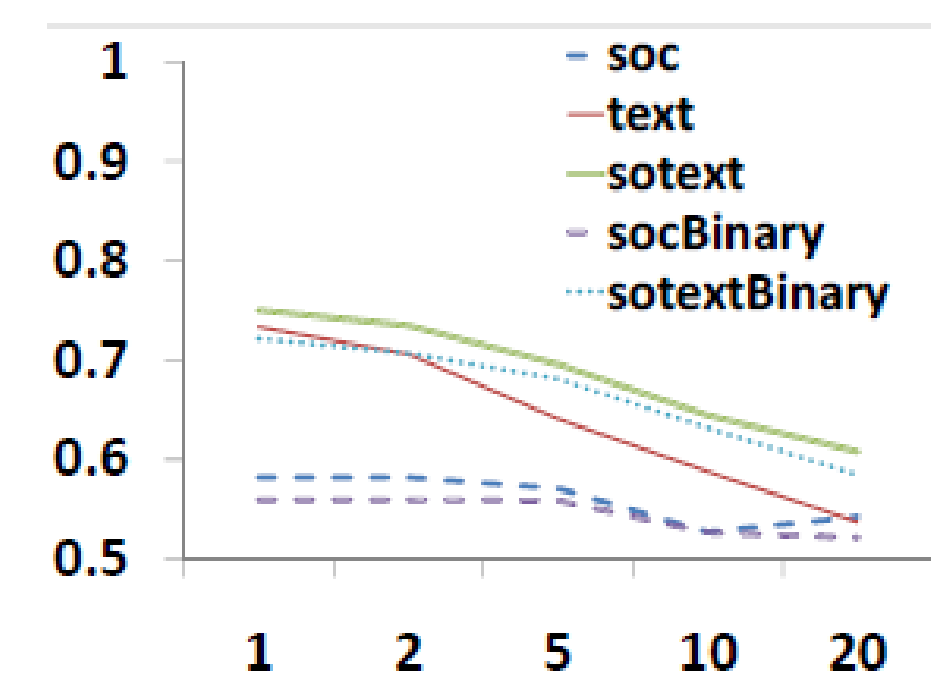
$$= \alpha \times \sum_{v_i \in U_o} urf(u_q, v_i) \times uaf(v_i, o) \times uwf(v_i)$$

$$+ (1 - \alpha) \times \sum_{t_j \in K_q} tf(o, t_j) \times idf(t_j)$$

## Challenges

- How to measure the relevance of document to the query
  - Social Relevance?
- How to combine social relevance with textual relevance accurately and seamlessly?
- How to quantify the importance of users in the network?
- How to measure the relevance/relatedness of users to each other?
- How to model and quantify actions users perform on (web) objects/documents?
- How to evaluate the new model/results?
- How to test the proposed model on a real dataset with real users
  - With documents/objects with textual tags/keywords
  - With Social network/friendship

## Experiments



- 1- Impact of  $k$  on nDCG
- 2- Impact of 'threshold' on nDCG
- 3- Impact of  $\alpha$  on nDCG