

# Comparative Study of Search Engine Result Visualization: Ranked Lists Versus Graphs

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## 1. Motivation

Search Engine Results (SER) ranked lists show only a limited view of the information space, do not show how similar the retrieved documents are and/or how the retrieved documents relate to each other [1,2].

## 2. Objective

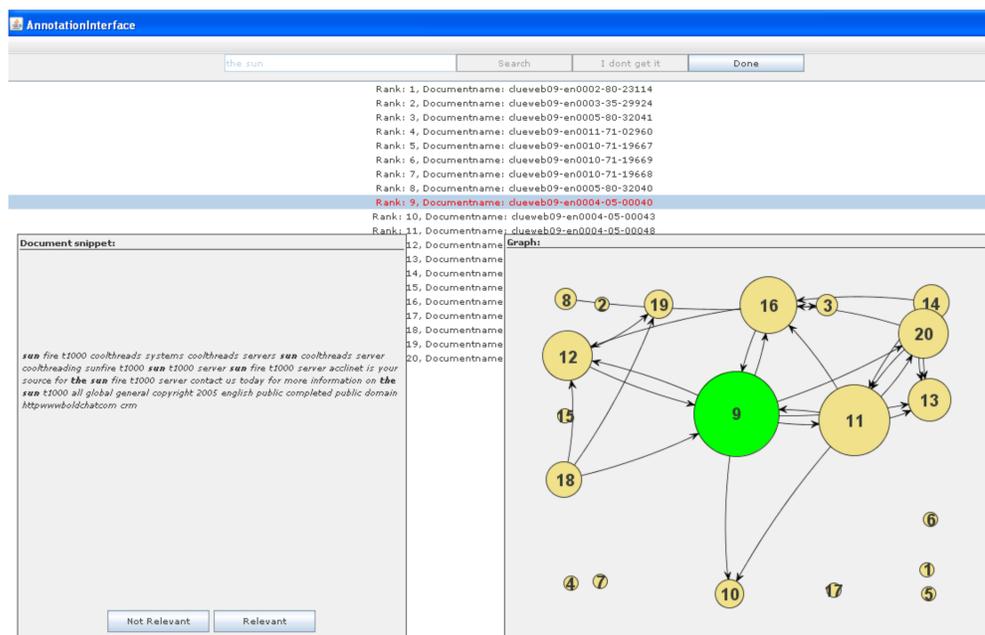
SER graphs could present at a glance an overview of any clusters or isolated documents among the SERs.

### Aim

Compare SER ranked lists to SER graphs: Which of the two improves retrieval effectiveness and decreases time spent?

## 3. Search Settings

- **Data:** Clueweb09 Subset B. No spam filtering.
- **Queries:** 200 TREC queries (Web Track 2009-2012) and relevance assessments.
- **Snippet:** TF-IDF weighted document extract of query terms.
- **Visualisation:** Top 20 ranked documents with their hyperlinks.



**Figure 1:** SER ranked list (centre-back), SER graph (right-front) and clicked SER snippet (left-front). In the graph, nodes (webpages) are scaled by degree and edges are hyperlinks between webpages.

## 4. User Study

- “Assess how many of the documents shown in these interfaces are, in your opinion, relevant to the query”.
- 10 users (Avg. age = 33.05, 9 males, 1 female).
- 30 minute session pr. user.

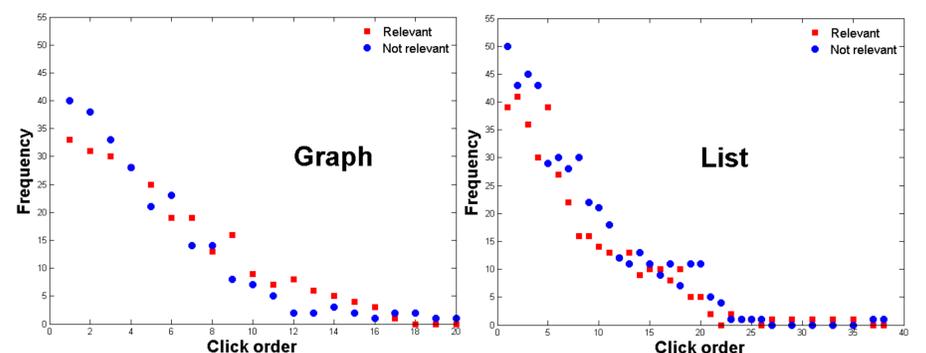
## 5. Results

Retrieval effectiveness per interface					
Ranked List			Graph		
MAP@20	MRR	RECALL@20	MAP@20	MRR	RECALL@20
0.4195	0.4698	0.0067	0.3211	0.3948	0.0069

**Table 1:** Mean Average Precision (MAP), Mean Reciprocal Rank (MRR) and RECALL of the top-20 retrieved results.

Time spent on interface (sec)							
Ranked List				Graph			
MIN	MAX	MEAN	$\sigma$	MIN	MAX	MEAN	$\sigma$
1.39	25.78	8.23	4.37	3.32	20.96	9.70	3.70

**Table 2:** Time (seconds) spent on each interface.



**Figure 2:** Click-order and participant relevance assessments for (left) the graph interface and (right) the ranked list.

Mean rater agreement (Krippendorff's $\alpha$ )			
Inter-participant (our users)		Inter-rater (our users vs. TREC)	
Ranked List	Graph	Ranked List	Graph
0.198	0.044	-0.075	-0.072

**Table 3:** Mean rater agreement for queries assessed by more than one participant.

## 6. Finding

Ranked lists result in faster and more precise search sessions than graph-based SER visualisations.

## 7. Future work

- Address limitations (population size, HTML extraction, connectivity sparsity, relevance to pre-typed queries).
- Scale up to large displays.

### References:

- [1] M. Hearst. *Search user interfaces*. Cambridge University Press, 2009.  
[2] K. Treharne and D. M. W. Powers. Search engine result visualisation: Challenges and opportunities. In *Information Visualisation, 2009 13th International Conference*, pages 633(638), 2009.