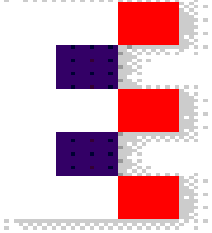

Adaptively Modelling the Context of an Intranet Query

Motivation
Research Plan
FCA
Machine Learning

Flatlands '08

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June 6, 2008

Adaptively Modelling the Context of an Intranet Query

Motivation
Starting Point
Users Like Help
Query Table
Research Focus
Intranet Search
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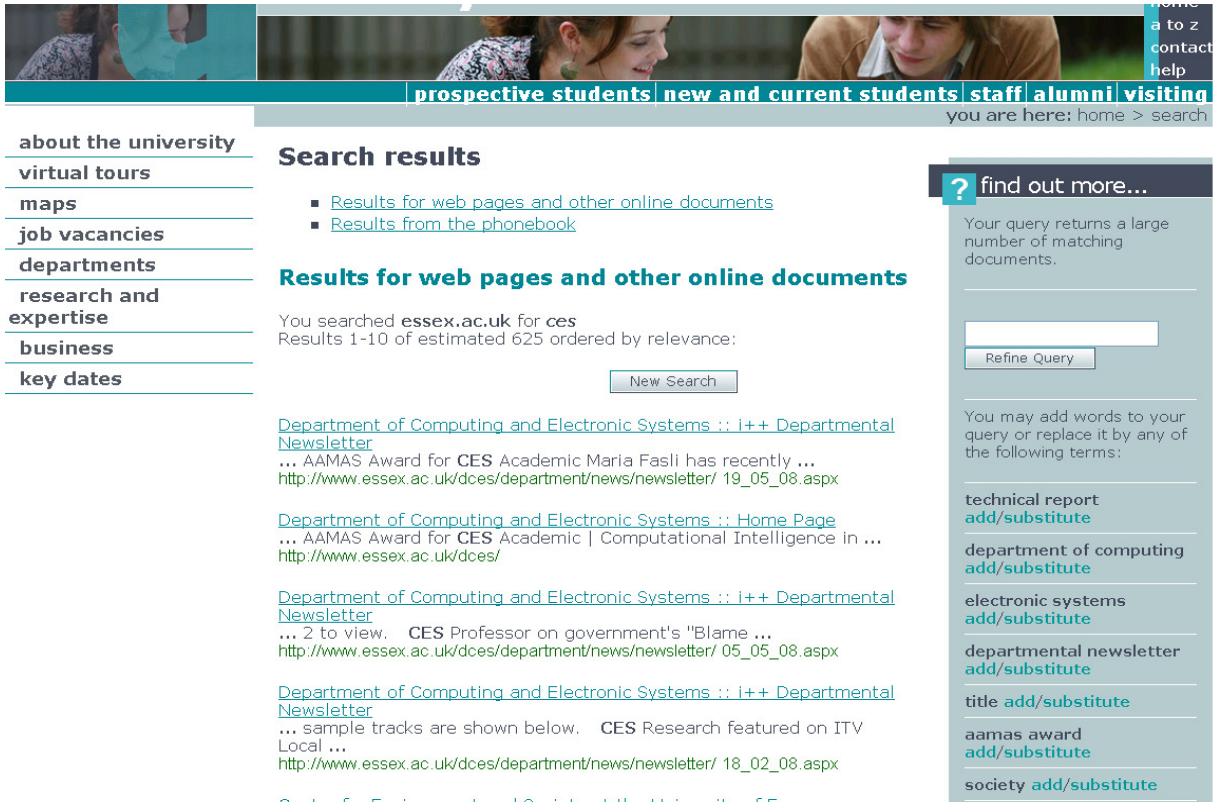
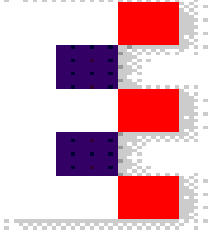


Figure: University of Essex Intranet Search



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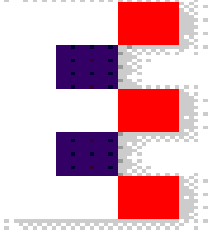
Motivation

- Users do like some help!
  - Kruschwitz and Al-Bakour, 2005
  - White and Ruthven, 2006
    - known-item search - query suggestions
    - exploratory search - query destinations
- Web examples
  - Clusty - Vivisimo Ltd.
  - CREDO - FUB, Italy
- Intranet example
  - Aquabrowser - Medialab Solutions, The Netherlands
- Analysis of UoE intranet search modifications
  - Dominated by single-term queries
  - Many of these queries met by documents in top 5 results
  - However, how about?
    - Multi-context terms - sport, parking, printing
    - Ambiguous terms - CES



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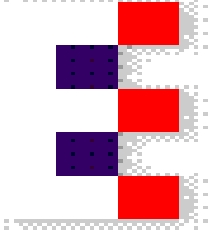
	Query Term(s)
1.	library
2.	accomodation
3.	exam timetable
4.	timetable
5.	courses
6.	accommodation
7.	fees
8.	moodle
9.	mba
10.	graduation

Table: Prominent Modified Queries



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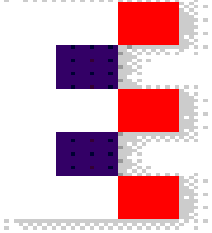
Research Focus

- All require a domain model
- Non-trivial task
  - Relying on appropriate document annotation
- Our answer!
  - Automatically adapt our domain model - let it learn from implicit user feedback (clickthrough data)
- Current uses of clickthrough data
  - Re-ranking of results
  - Query refinement



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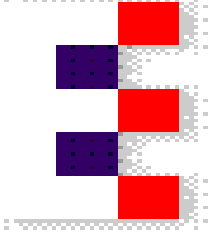
Why Intranet Search?

- Controlled environments
  - Often imposed annotation standards
  - Less spam, making inlinks and metadata more reliable
- Relatively cohesive community of users
  - Similiar search needs aid the viability of harnessing user population feedback



Motivation
Research Plan
Components
System Architecture
FCA
Machine Learning

Components

- Underlying Search Engine
  - Lucene's Nutch
- Natural Language Processing
  - QTag
  - Collocations (Justeson and Katz)
    - AN, NN, AAN, ANN, NAN, NNN, NPN
- Context Model
  - Formal Concept Analysis (FCA)
- Machine Learning
  - SVM-Light (Joachims)

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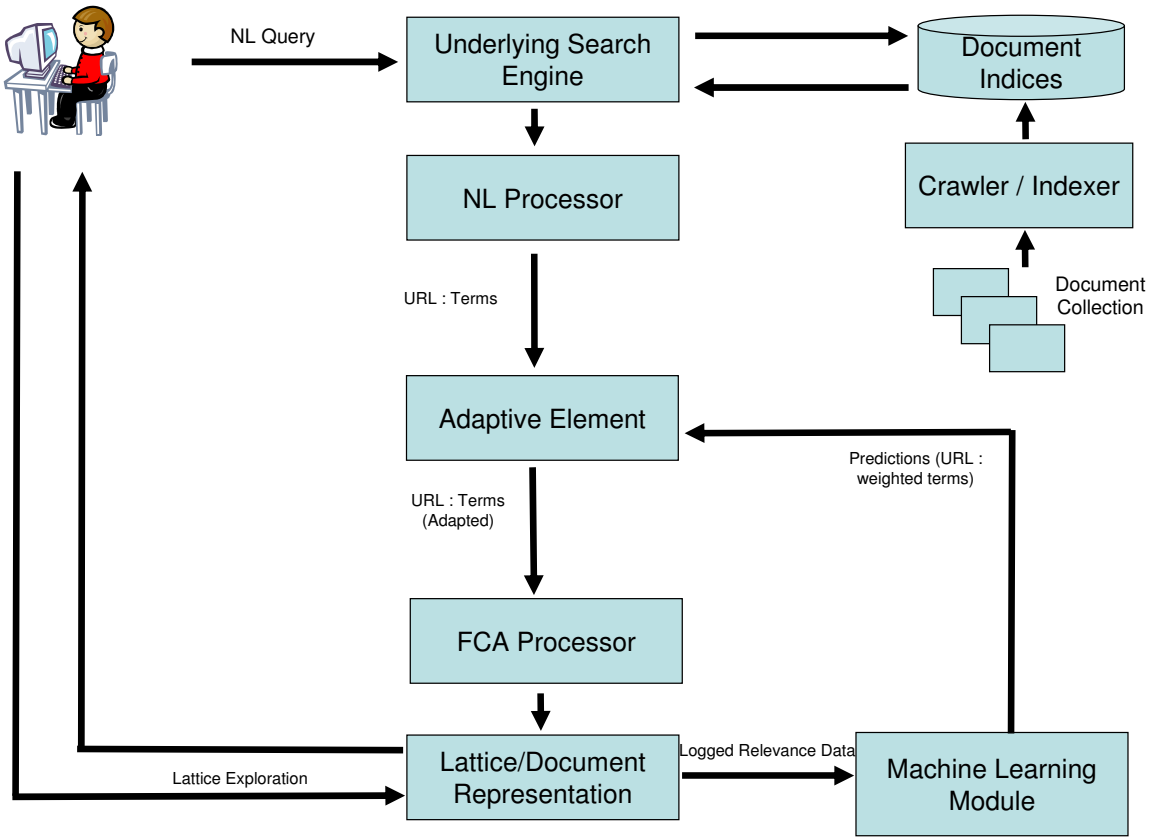
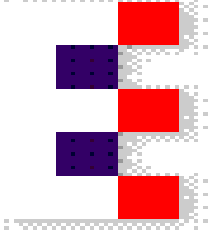


Figure: System Architecture



Adaptively Modelling the Context of an Intranet Query

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Hasse Table
Related Concept Lattice
Automade
Adapted Lattice
Machine Learning

	horse	**male**	**female**	**adult**	**young**
horse	X				
stallion	X	X		X	
mare	X		X	X	
foal	X				X
filly	X		X		X
colt	X	X			X

Figure: Classical Lattice Example - Hasse Table

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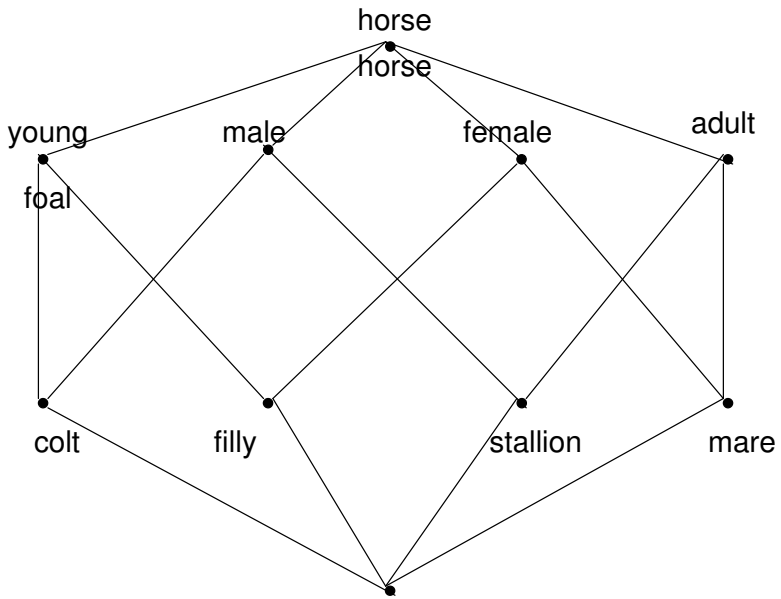

Figure: Classical Lattice Example - Concept Lattice

Adaptively Modelling the Context of an Intranet Query

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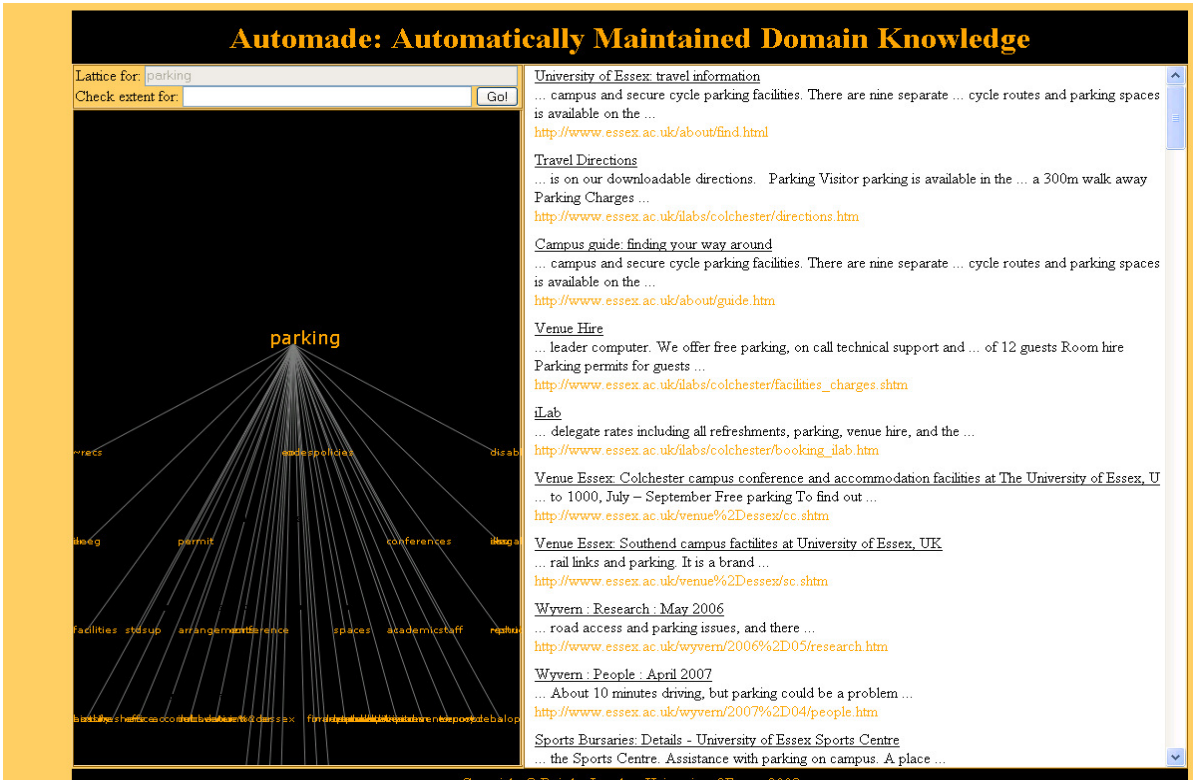

Figure: Automade Screenshot

Adaptively Modelling the Context of an Intranet Query

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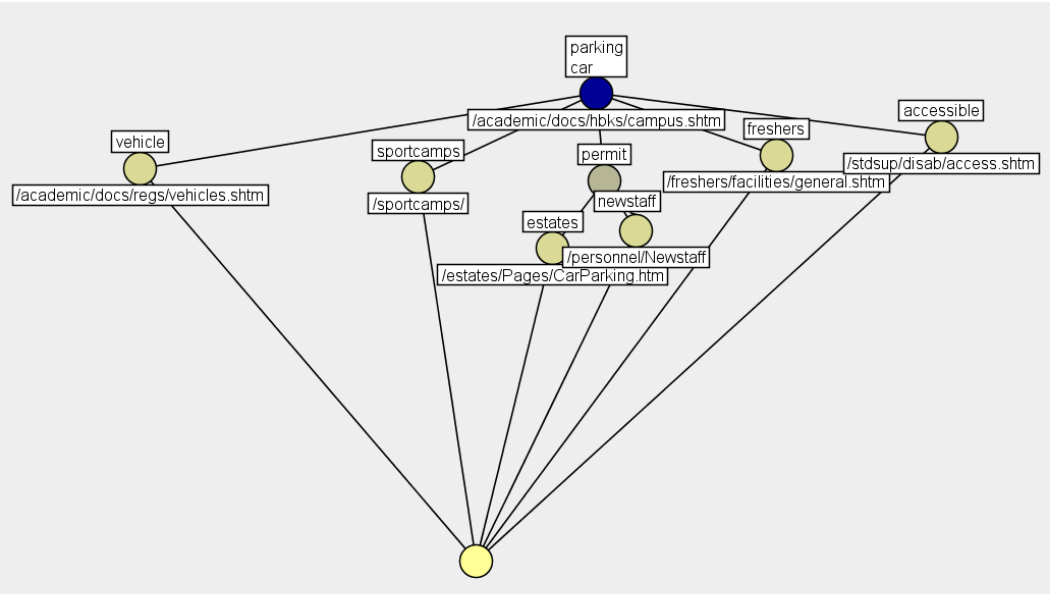
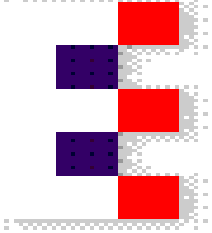


Figure: Example Adapted Lattice



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SVM-Light
Clickthrough Data
Adaptation Steps

SVM-Light

- Machine learning tool developed by Thorsten Joachims
- Particularly suitable for Information Retrieval - developed to surmount the problem of sparsity in document/term matrices
- Default linear kernel
- Lattice-based kernel to optimize the lattice structure?

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Adaptation Steps

Clickthrough Data

- Questions have been raised regarding the accuracy of using clickthrough data as an indicator of relevance
- Radlinski and Joachims promote relative relevance as against absolute relevance
  - A document clicked on for a query is deemed more relevant to that particular query than documents above and below

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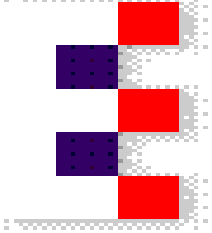
SVM-Light
Clickthrough Data
Adaptation Steps

Adaptation Steps

- Record Log Data
  - Log initial query term
  - Log subsequent query terms either entered in the textbox or chosen by clicking on the lattice node
  - Log clicked URL plus subsequent browser clicked URLs (possibly not within result list)
- Adaptive Element. Before creation of query lattice apply SVM-Light Model. This should:
  - Associate query terms positively with the clicked URLs and negatively with skipped URLs (i.e., increase/decrease document/term weight)
  - Decrease weight of document terms not in query terms
  - If query term does not exist in document terms, add with positive weight
  - Apply threshold to delete terms within documents and entire documents where all terms deleted



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Thank You!