Information Retrieval — Example Exam Questions

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SS 2015

Remark: These are only examples for queries that might be asked during the oral exam - this is not a complete list of exam questions!

• Introductory questions: please talk 3 minutes about one of the following topics. Mention the issues and how these problems can be solved:
  – IR and databases
  – Ontologies and OWL
  – Document classification
  – Hierarchic clustering
  – Learning to Rank
  – Inverted lists
  – Interactive retrieval
  – Web Search
  – Social Media Retrieval

• Models based on predicate logic
  – What is the difference to models based on propositional logic, and what are the advantages?
  – What is the difference between extensional and intentional semantics? How can the latter be implemented using event keys and event expressions?
  – Which aspects of database query languages have not been fully supported in IR-based approaches so far?
  – What are the advantages and possibilities of XML Retrieval?
  – What are the major elements of an ontology? How can it be used in IR?

• Learning and classification
  – Explain the difference between classification and clustering!
  – Explain the core ideas underlying naive Bayes (NB)
  – What are the theoretical weaknesses of NB? ’Why does NB work in spite of these problems?’
  – What is ’learning to rank’ (LTR)? Explain the basic method!
  – What is the advantage of LTR in comparison to classic retrieval models?

• Clustering
  – What are possible applications of clustering? Which types of clustering methods can be distinguished?
  – Describe the k-means algorithm!
  – ’What is the computational complexity of k-mean in comparison to agglomerative hierarchic clustering?’
What are the two main problems with k-means and how can they be addressed?
Which types of hierarchic methods (agglomerative/divisive) do you know?
What are the best agglomerative methods?
How is optimum clustering defined? How can it be achieved?
What does the optimum clustering framework say about exiting clustering methods?

• Indexing and Searching
  Describe the structure of inverted lists, and how they can be used for efficient retrieval!
  How can inverted files be efficiently constructed?

• User Interfaces
  What are the assumptions underlying the interactive PRP, and what does it say about interactive IR? How can it be used for improving interactive IR?
  Describe Ellis’ seeking model and its possible consequences for the design of interactive IR systems!
  Describe the Select/Organize/Project model
  What is the benefit of having a taxonomy for Web search queries?
  What are the different levels of search activities? Give examples from Web search engines!
  Describe the different degrees of system support! Give examples from Web search engines!
  Which functions of search interfaces are essential for supporting search sessions?

• Web Search
  Describe the major components of a Web search engine! How can it be made more efficient via cluster-based architecture and caching?
  What are the specific requirements for ranking in Web search engines?
  Describe the basic concepts underlying PageRank and HITS!

• Social Media Retrieval (SMR)
  What is the major difference between SMR and classic document or Web retrieval?
  Explain the richer representation with the example of a popular social media web site!
  How can the richer representation be used for retrieval?
  What is the role of User Context, how can it be captured and used for IR?

• Multimedia IR
  What are the major differences between text and multimedia retrieval? Explain the ‘semantic gap’!
  Which image properties should not have an effect on the retrieval method?
  Explain the basic methods for colour- and texture-based retrieval!
  What are ‘salient points’ in image retrieval?
  How does ’fingerprinting’ for music retrieval work?
  Explain the basic methods for generating video abstracts!