

Ranking Models (2018/2)

Credits: 4 (60h)

Lectures: Tuesday and Thursday, 14h55 – 16h35

Instructor: [Rodrygo Santos](#)

Course description

The focus of this course is on the design, implementation, and evaluation of advanced ranking models for information retrieval.

Course prerequisites

Students are expected to have a good knowledge of basic probability and statistics in addition to programming skills at the level of AEDS3 or a similar programming course. Some background in one or more of the following areas would be helpful but is not required: information retrieval, machine learning, natural language processing, data mining. If you are not sure whether you have the right background, please contact the instructor.

Course program

1. **Introduction:** course overview; ranking overview
2. **Basic concepts:** fundamentals of indexing and retrieval
3. **Query-independent ranking:** on-document evidence (retrievability, readability, maliciousness); off-document evidence (centrality, popularity, credibility)
4. **Query understanding:** query normalization (encoding, tokenization, spelling); query rewriting (expansion, relaxation, segmentation, scoping)
5. **Query-dependent ranking:** basic models (algebraic models, probabilistic models, information-theoretic models); proximity models (Markov random fields models); structural models (field-based models); semantic models (latent semantics, explicit semantics)
6. **Contextual ranking:** personalization; diversification; interactivity
7. **Machine-learned ranking:** query-document representation; loss functions (pointwise, pairwise, listwise loss); optimization strategies; adaptation strategies (intent-awareness, exploration-exploitation)
8. **Ranking evaluation:** behavioral models; evaluation design; evaluation metrics; offline evaluation; online evaluation
9. **Seminars**

Course grading (tentative)

Activity	Grade
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Exams	40
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Project	40
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Assignments	20
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Course schedule (tentative)

#	Date	Class	
1	14/08	Introduction	[slides]
2	16/08	Search architecture	[slides]
3	21/08	Document understanding	[slides]
4	23/08	Query understanding	[slides]
5	28/08	Ranking fundamentals	[slides]
6	30/08	Project feedback sessions	[slides]
7	04/09	Probabilistic relevance models	[slides]
-	06/09	No class	
8	11/09	Language models	[slides]
9	13/09	Experimental methods	[slides]
10	18/09	Offline evaluation	[slides]
11	20/09	Information-theoretic models	[slides]
12	25/09	Feedback models	[slides]

#	Date	Class	
-	27/09	No class	
13	02/10	Structural models	[slides]
14	04/10	Quality models	[slides]
15	09/10	Exam	
16	11/10	Seminars	
17	16/10	Seminars	
-	18/10	No class	
18	23/10	Diversification models	[slides]
19	25/10	Latent semantic models	[slides]
20	30/10	Neural ranking models	[slides]
21	01/11	Learning to rank: fundamentals	[slides]
22	06/11	Learning to rank: pointwise	[slides]
23	08/11	Learning to rank: pairwise and listwise	[slides]
24	13/11	Ranking adaptation	[slides]
-	15/11	Holiday	
25	20/11	Online evaluation	[slides]
26	22/11	Online learning to rank	[slides]
27	27/11	Counterfactual evaluation	[slides]
28	29/11	Seminars	
29	04/12	Seminars	

#	Date	Class
30	06/12	Seminars

Course bibliography

1. *Introduction to Information Retrieval*, by C. Manning, P. Raghavan, and H. Schütze
2. *Search Engines: Information Retrieval in Practice*, by B. Croft, D. Metzler, and T. Strohman
3. *Modern Information Retrieval*, by R. Baeza-Yates and B. Ribeiro-Neto
4. *Information Retrieval: Implementing and Evaluating Search Engines*, by S. Büttcher, C. Clarke, and G. Cormack
5. [*Text Data Management: A Practical Introduction to Information Retrieval and Text Mining*](#), by C. Zhai and S. Massung
6. *Foundations and Trends in Information Retrieval*, by several authors
7. *Synthesis Lectures on Information Concepts, Retrieval, and Services*, by several authors