

DOCTORAL SCHOOL OF INFORMATICS
COMPLEX EXAM SUBJECT

Mathematics of Networks and the WWW
(recommended subject)

Recommended books:

Jure Leskovec, Anand Rajaraman, Jeff Ullman

Mining of Massive Datasets

<http://www.mmds.org/>

(2nd edition)

John Hopcroft, Avrim Blum, Ravi Kannan, Foundations of Data Science

<https://www.cs.cornell.edu/jeh/book.pdf>

- Search engines
 - Web crawler architecture
 - Principles of relevance ranking
 - PageRank
 - Definition, usage
 - Connection to random walks
 - Efficient approximation techniques
 - HITS (Kleinberg's algorithm)
 - Connection to graph spectra
 - Network models
 - The Barabasi-Albert model
 - Small world models, navigation in small worlds (Kleinberg's method)
 - Recommender systems
 - Matrix factorization
 - Consistent hashing, caching the Web content
 - The data stream computational model
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