Information Retrieval: Course Introduction

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Course Info

Course Website:

`http://cse.iitkgp.ac.in/~saptarshi/courses/ir2021a`

Books and Materials

Text book:

- Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schütze. *Introduction to Information Retrieval*, Cambridge university press.
- Available online: `https://nlp.stanford.edu/IR-book/information-retrieval-book.html`

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Other materials:

- Lecture Slides
- Additional Readings to be given as necessary

What is Information Retrieval?

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What is a document?

web pages, emails, books, news stories, scholarly papers, text messages, Powerpoint, PDF, forum postings, patents, tweets, question answer postings, etc.

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  - e.g., bank records with account numbers, balances, names, addresses, social security numbers, dates of birth, etc.
- Easy to compare fields with well-defined semantics to queries in order to find matches

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Example search engine query

- *bank scandals in 2019 in India*
- This text must be compared to the text of entire news stories

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What is the "killer" app?

Searching for the pages on WWW

IR over text and other modes of data

- IR does not necessarily deal with text data
- Both the documents and the query can be in other modes as well, e.g., similar image search
- In this course, we will consider only textual IR

Typical IR tasks

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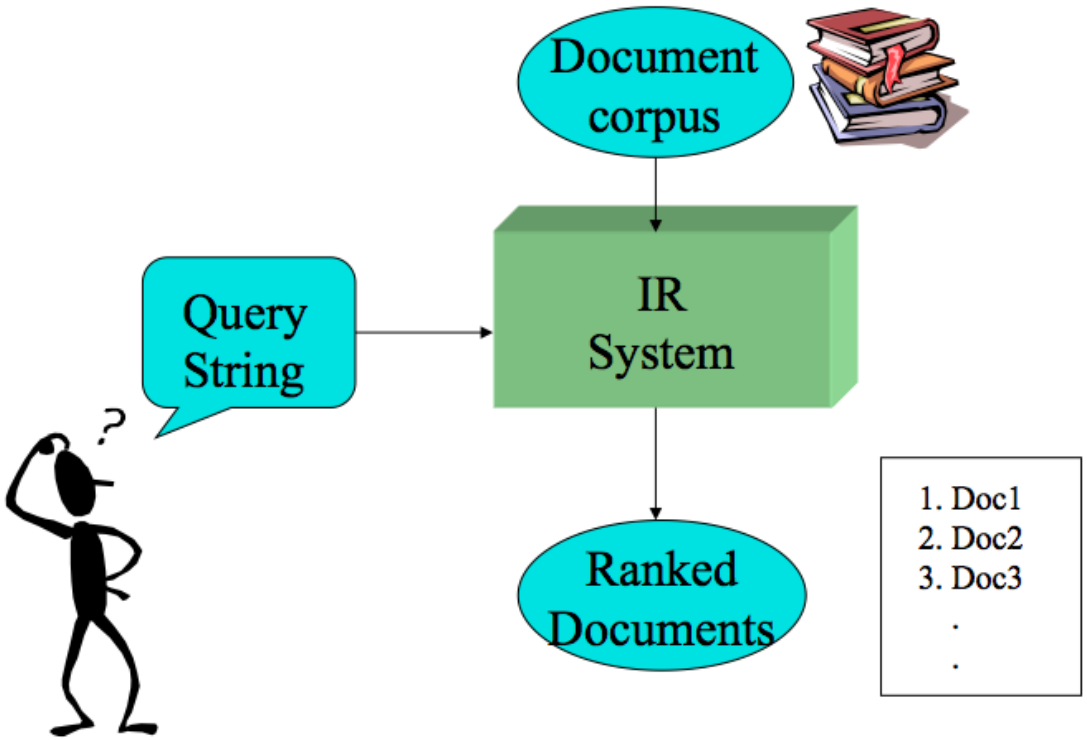
Find:

- A ranked set of documents that are relevant to the query.

IR System



The system should be able to retrieve the relevant docs efficiently

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- Being on the proper subject.
- Being timely (recent information).
- Being authoritative (from a trusted source).
- Satisfying the goals of the user and his/her intended use of the information (information need).

Simplest notion of Relevance from Retrieval Models' Perspective

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Keyword Search

- Simplest notion of relevance is that the query string appears verbatim in the document.
- Slightly less strict notion is that (most of) the words in the query appear frequently in the document, in any order (*bag of words*).

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- 'Apple' (company vs. fruit)
- 'Java' (programming language vs. Island)

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Where do we find the latest happenings in the field?

Top Conferences in the field

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- WSDM

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Other Venues

- ECIR
- ACM Transactions on Information Systems
- Springer IR Journal, JASIST, etc.

Active Areas of Research

Compiled based on some recent papers at SIGIR and related conferences, just indicative, not exhaustive

What to retrieve

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- *Leveraging User Reviews to Improve Accuracy for Mobile App Retrieval*. SIGIR 2015.

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- *Cross-Modal Interaction Networks for Query-Based Moment Retrieval in Videos.* SIGIR 2019.

Search Experience

- *Engaged or Frustrated? Disambiguating Emotional State in Search.* SIGIR 2017.
- *Understanding and Modeling Success in Email Search.* SIGIR 2017.
- *Using Information Scent to Understand Mobile and Desktop Web Search Behavior.* SIGIR 2017.
- *Between Clicks and Satisfaction: Study on Multi-Phase User Preferences and Satisfaction for Online News Reading.* SIGIR 2018.

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- *When Fair Ranking Meets Uncertain Inference*. SIGIR 2021.

What do we cover in this course

IR Basics

- Boolean retrieval
- The term vocabulary & postings lists
- Dictionaries and tolerant retrieval
- Index construction and compression
- Scoring, term weighting & the vector space model
- Computing scores in a complete search system
- Evaluation in information retrieval
- Relevance feedback & query expansion
- Probabilistic information retrieval
- Language models for information retrieval

Course Contents

Web Search, Applications, Recent Advances

- Web Search and Applications such as Query Auto-completion
- Link analysis
- Summarization
- Neural IR
- Learning to Rank
- Domain-specific IR