Information Retrieval

Exercise – Winter term 2025/2026

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Agenda

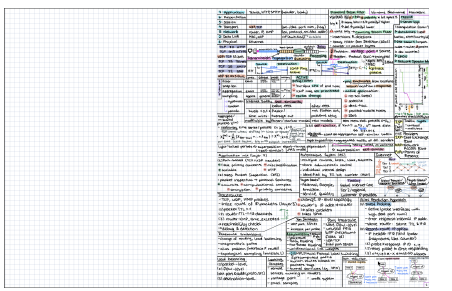
1. Exam Formalities
2. IR Ranking Paradigms
3. Metrics in high-dimensional spaces
4. WOWS 2026

Formalities

Exam

Friday, **20 Feb. 2026 11:00 - 12:30**, Hörsaal 1114

- Exam tasks will be in German
- Your answers must be in either English or German
- Bring your student ID card, a valid ID, and writing utensils
- You may use the following materials during the exam:
  - a non-programmable calculator
  - a one-sided, handwritten (pen and paper; not digitally handwritten) DIN A4 sheet of paper with notes (with name and matriculation number, has to be handed in)

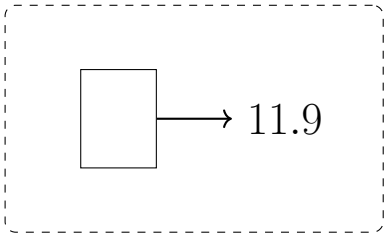


- If you have any questions beforehand, please ask them via Discord

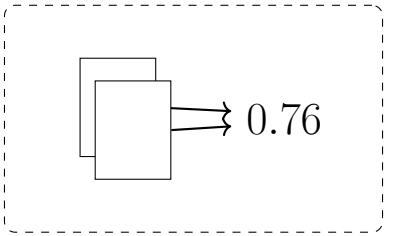
Refer to [temir.org] for more details.

IR Ranking Paradigms

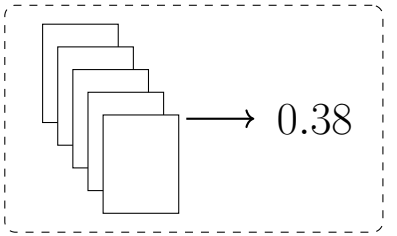
Pointwise [Fuhr, 1992]



Pairwise [Joachims, 2002]



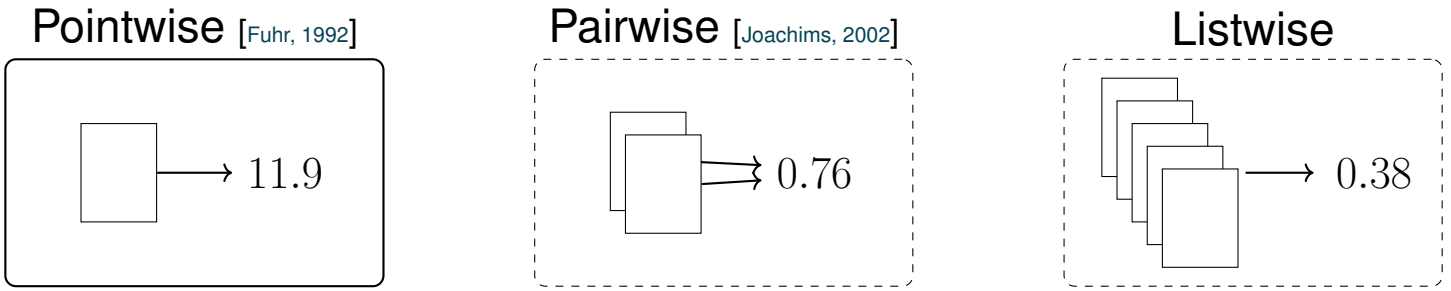
Listwise



How do they differ?

Refer to [IR:I-173] & [IR:III-[251-258]] for more details.

IR Ranking Paradigms

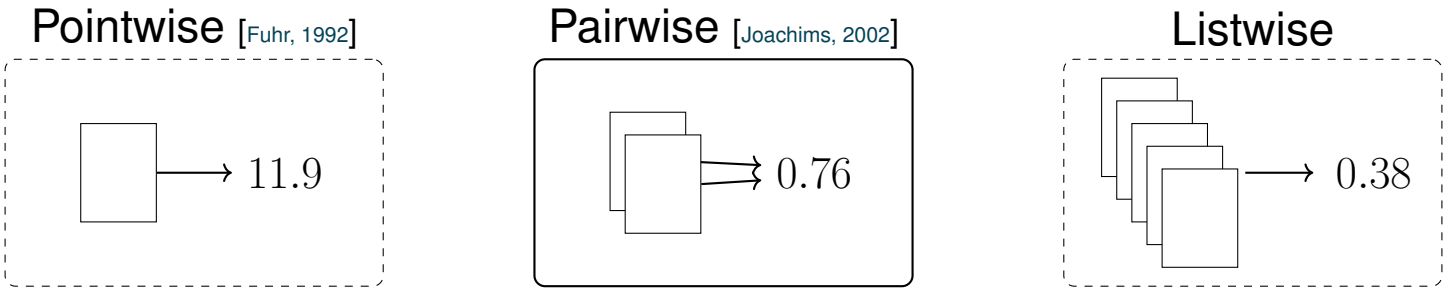


How do they differ?

- *Pointwise* approaches predict the relevance of each document *independently*, without considering the relationships between documents.

Refer to [IR:I-173] & [IR:III-[251-258]] for more details.

IR Ranking Paradigms

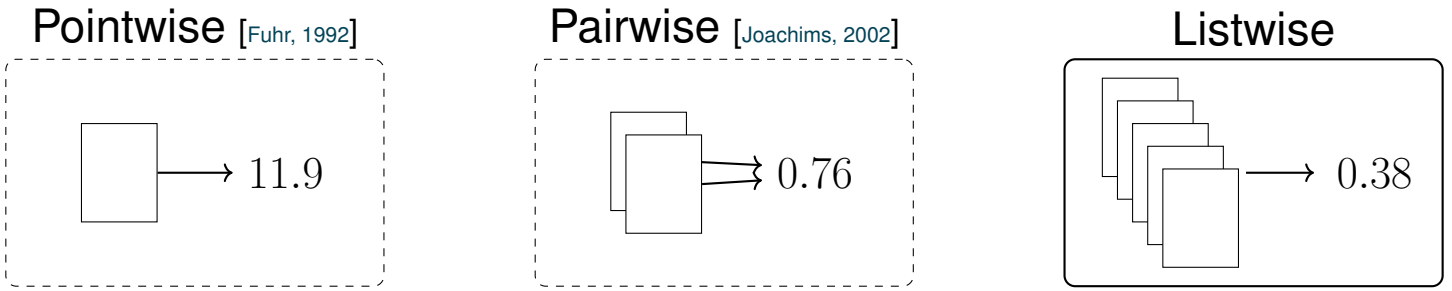


How do they differ?

- *Pointwise* approaches predict the relevance of each document *independently*, without considering the relationships between documents.
- *Pairwise* approaches predict the *relative* relevance of pairs of documents.

Refer to [IR:I-173] & [IR:III-[251-258]] for more details.

IR Ranking Paradigms



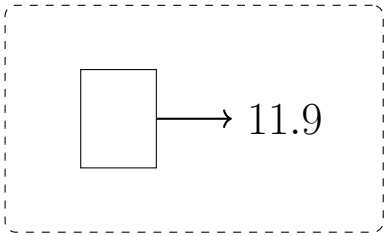
How do they differ?

- *Pointwise* approaches predict the relevance of each document *independently*, without considering the relationships between documents.
- *Pairwise* approaches predict the *relative* relevance of pairs of documents.
- *Listwise* approaches predict the relevance of a list of documents as a whole.

Refer to [IR:I-173] & [IR:III-[251-258]] for more details.

IR Ranking Paradigms

Pointwise [Fuhr, 1992]



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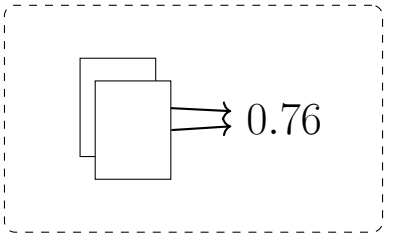
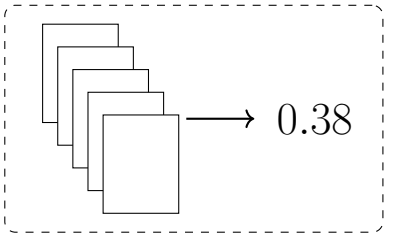


Listwise



How do they differ?

The IR ranking paradigms differ in the object they compare.

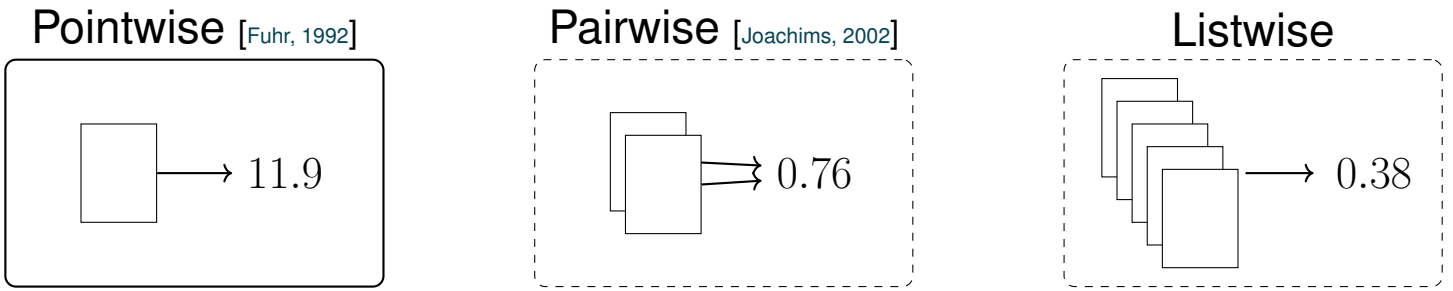
Paradigm	What is compared
Pointwise	A single document
Pairwise	Two documents
Listwise	An entire ranking

In all cases, comparisons are made with respect to a fixed query.

Refer to [IR:I-173] & [IR:III-[251-258]] for more details.

IR Ranking Paradigms

Pointwise Approaches



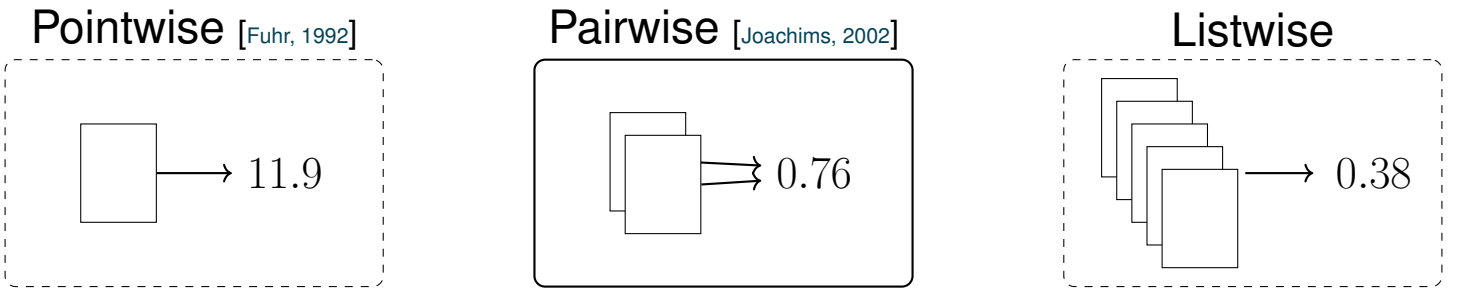
Assuming relevance $\rho : \mathbf{Q} \times \mathbf{D} \to \mathbb{R}$ is a function of a query $\mathbf{q}$ and *one* document $\mathbf{d}$, we distinguished different types of retrieval models [IR:III-[8,14]]:

- *Logical* models
- *Algebraic* models
- *Probabilistic* models
- *Bayesian* models
- *Information theoretic* models

Refer to [IR:I-173], [IR:III-[8,14]] & [IR:III-[251-258]] for more details.

IR Ranking Paradigms

Pairwise Approaches



Assuming relevance $\rho : \mathbf{Q} \times \mathbf{D} \times \mathbf{D} \to \mathbb{R}$ is a function of a query $\mathbf{q}$ and *two* documents $\mathbf{d_i}, \mathbf{d_j}$, we saw a specific neural retrieval models [IR:I-[174-181]]:

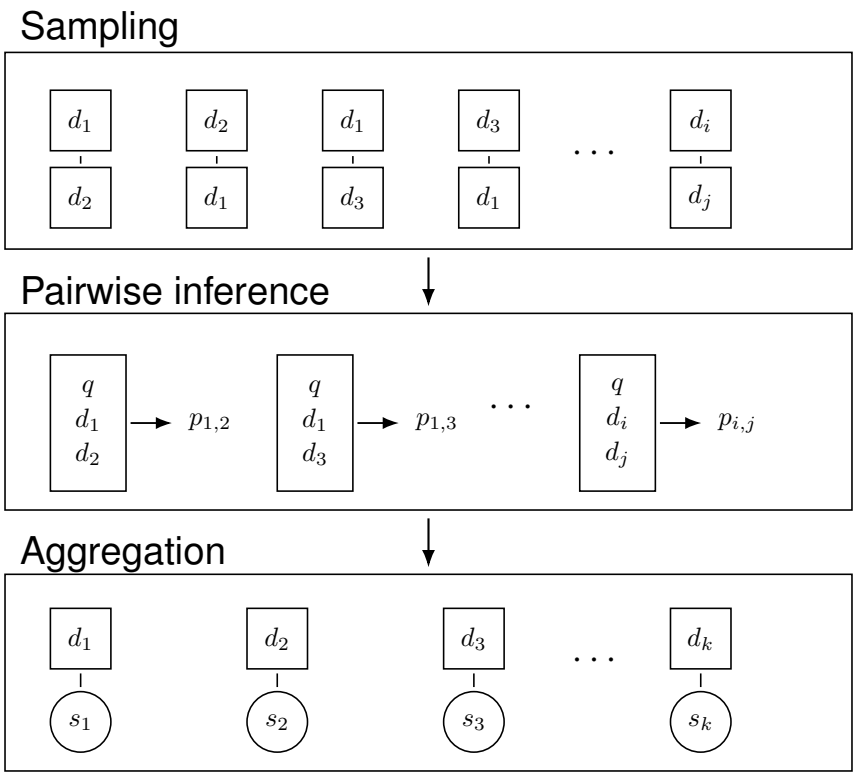
duoT5 [Pradeep et al., 2021]

- Used as *reranker* given candidate documents retrieved by a first-stage retrieval model (e.g., BM25)
- *Compares* documents $\to$ document relevance scores are derived from pairwise comparisons

Refer to [IR:I-179] & [Pradeep et al., 2021] for more details.

IR Ranking Paradigms

Pairwise Approaches: duoT5 [Pradeep et al., 2021]



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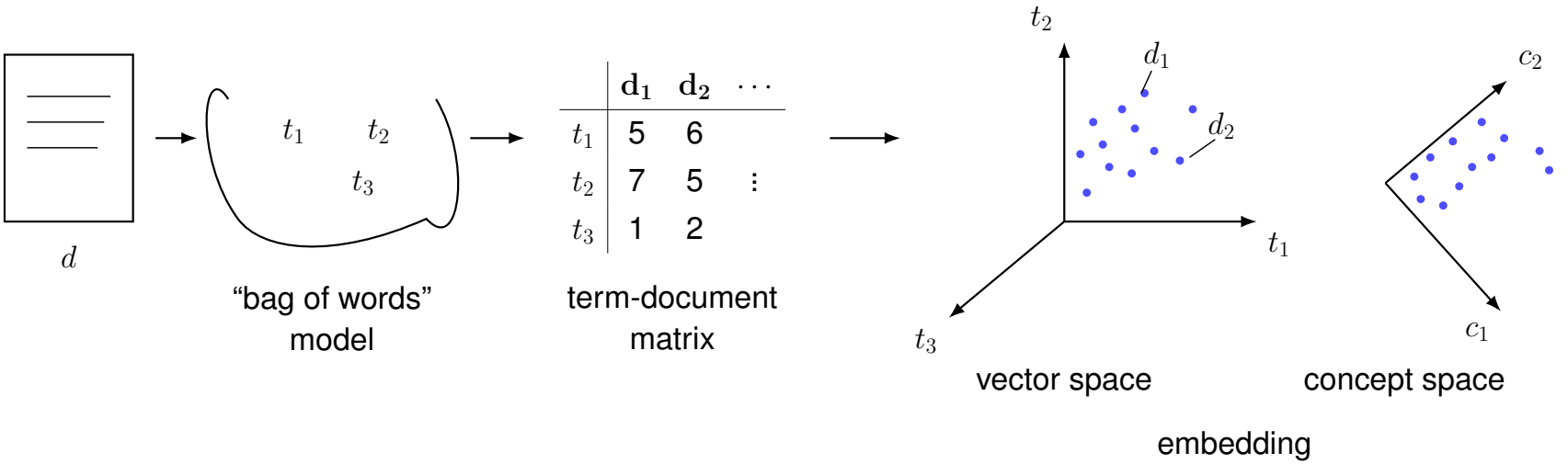
Metrics

Analytic Document Modeling



- High-dimensional spaces: Vector directions are more important than distances $\rightarrow$ cosine similarity is more meaningful than Euclidean distance

Refer to [IR:III-16] for more details.

WOWS

- International Workshop on Open Web Search (WOWS)
- Held at ECIR 2026, 29.03-02.04.2026, Delft, Netherlands
- More information: [WOWS 2026 website]
- Optional participation: Submit your work (call for papers now open)

Best of luck with your exam preparation and the exam!