A Comparison of Classical and Modern Information Retrieval Approaches on Recipes

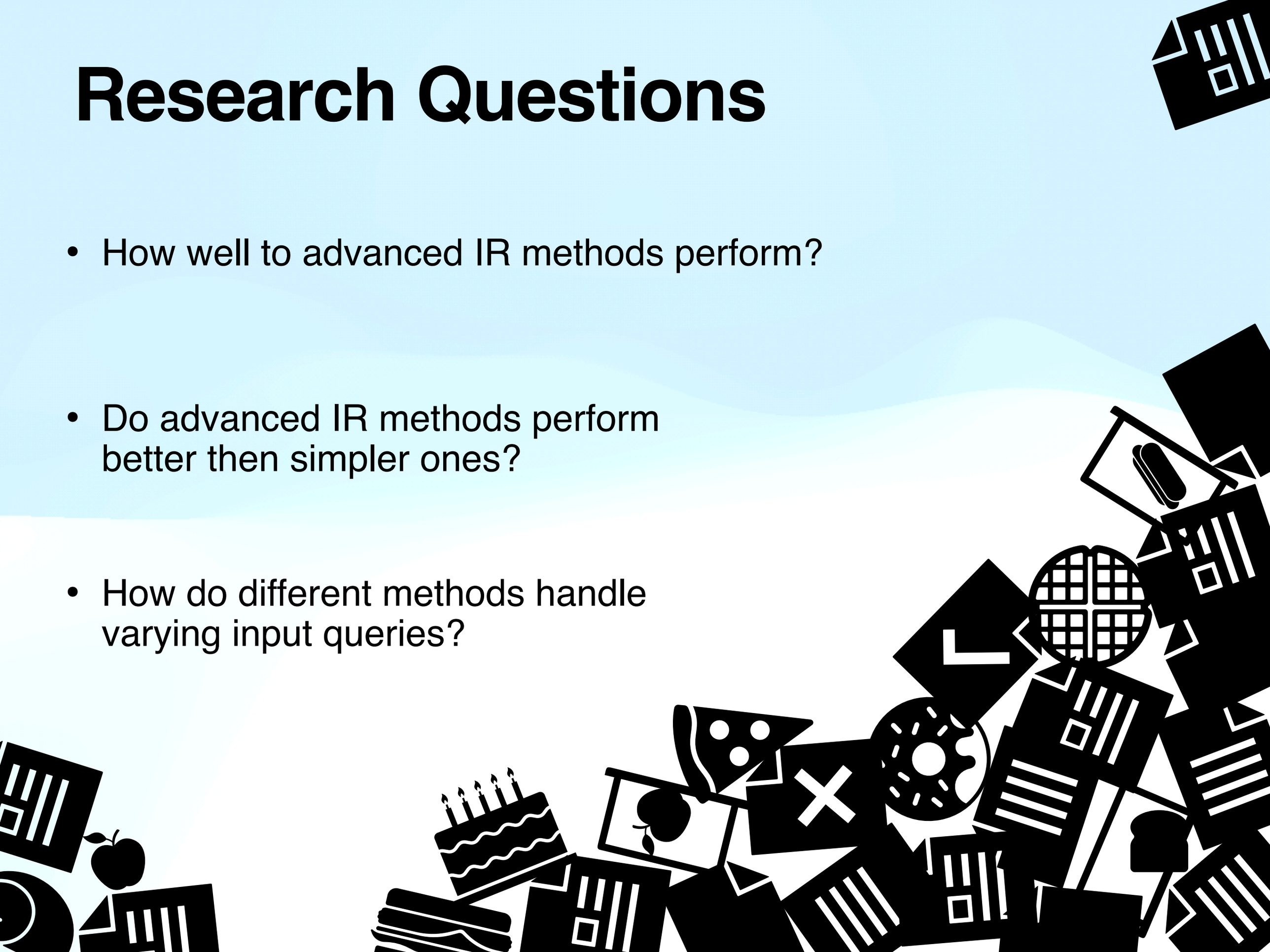
https://github.com/Dowakiin/Advanced-Information-Retrival-WS24-25-Group22

A Project by Group 22:

- Markus Auer-Jammerbund — Team-role: Query pipeline setup, Evaluation, Report
- Thomas Knoll — Team-role: Design Document, *Bert* embeddings, Evaluation, Report
- Jonas Pfisterer — Team-role: *Word2Vec* embeddings, Evaluation, Report
- Thomas Puchleitner — Team-role: Design Document, *TF-IDF* handling, Result processing, Evaluation, Report

Research Questions

- How well to advanced IR methods perform?
- Do advanced IR methods perform better then simpler ones?
- How do different methods handle varying input queries?



Data

Where did we get it from and what did we do to it?

Data:

- The recipes dataset and the pre-trained Bert model are from Hugging Face

Pre-processing:

- Merged the ingredient columns
- Merged the instruction columns
- Reduced the size to 100,000 (from 2 mil.)

Methods

In increasing complexity

TF-IDF

- The old reliable
- Lightweight
- Easy to understand
- Simple to compute
- Lacks context awareness

Word2Vec

- Newer approach
- Simple in theory
- Not so simple to compute
- Has limited context awareness

Bert

- Stare-of-the-art
- Transformer based
- Heavyweight
- Has context awareness

Experiments and Evaluation

Experiment set-up:

- 3 difficulties: easy, medium, and hard
- 3 queries per difficulty
- 7 recommendations per query

Evaluation set-up:

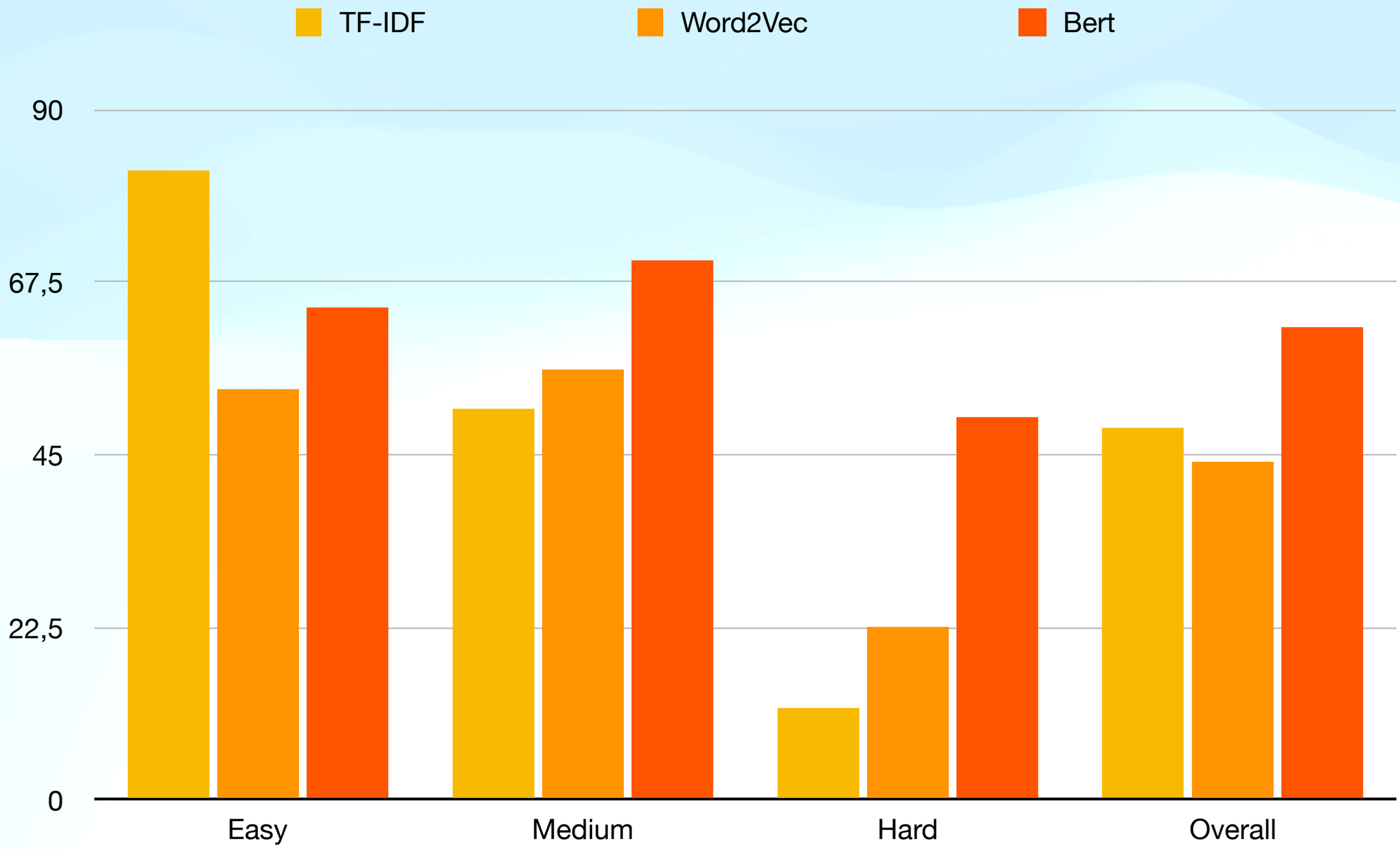
- 4 evaluators
- 63 recommendations
- Evaluate for relevance (Yes / No)

Evaluation:

- Compute the percentage of relevant recommendations across evaluators
- Average results to get a score

Results

Recipe relevance per IR method for different query types



Possible future work

- Test with the whole dataset
- Increase the number of queries (9 is not really statistically significant)
- Deeper analysis of the weak performance of *Word2Vec* (focusing on its parameter settings, training conditions, etc.)