Dense Retrieval with Entity Views

Seminar "Modern Infomation Retrieval", Summer 2023

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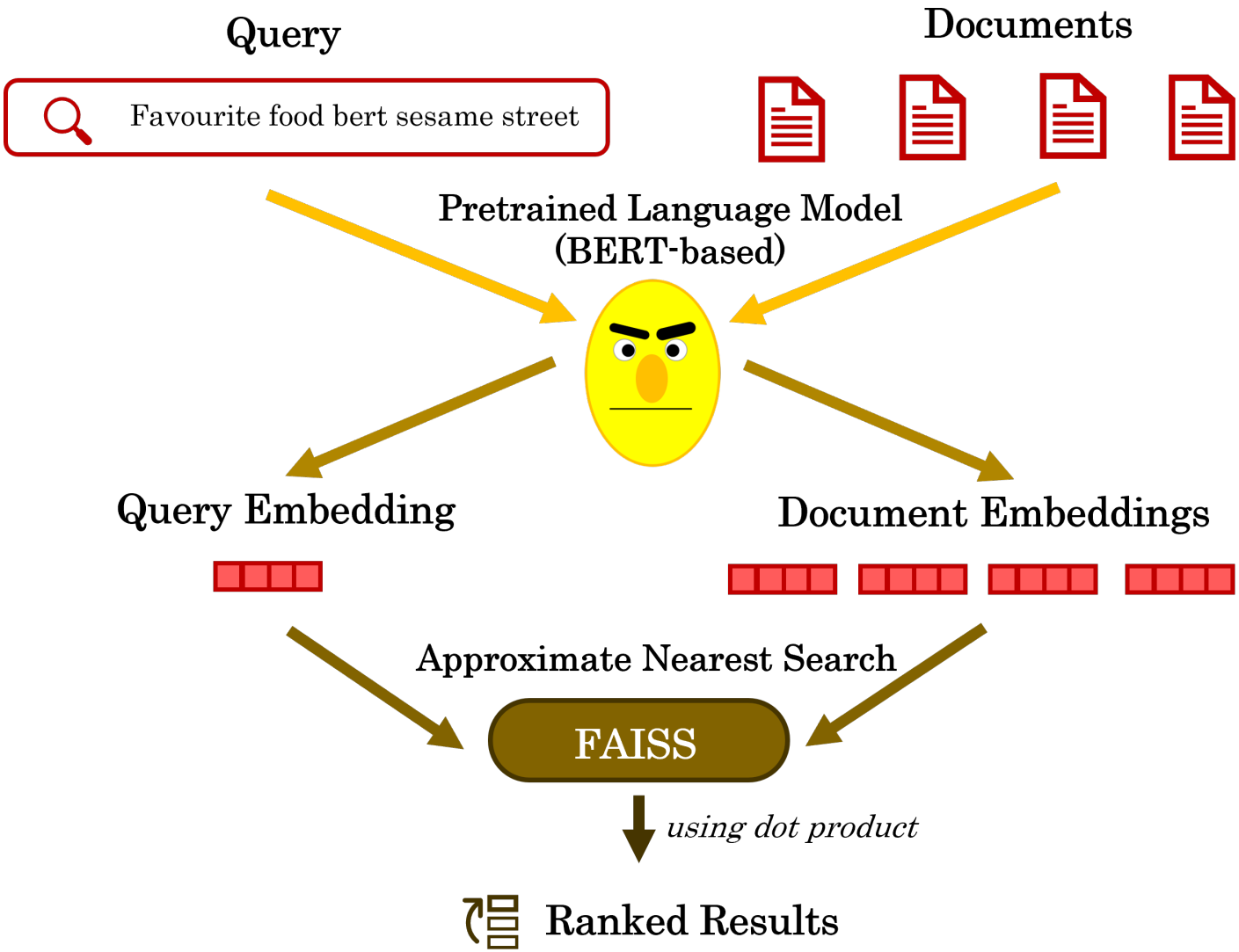
Outline

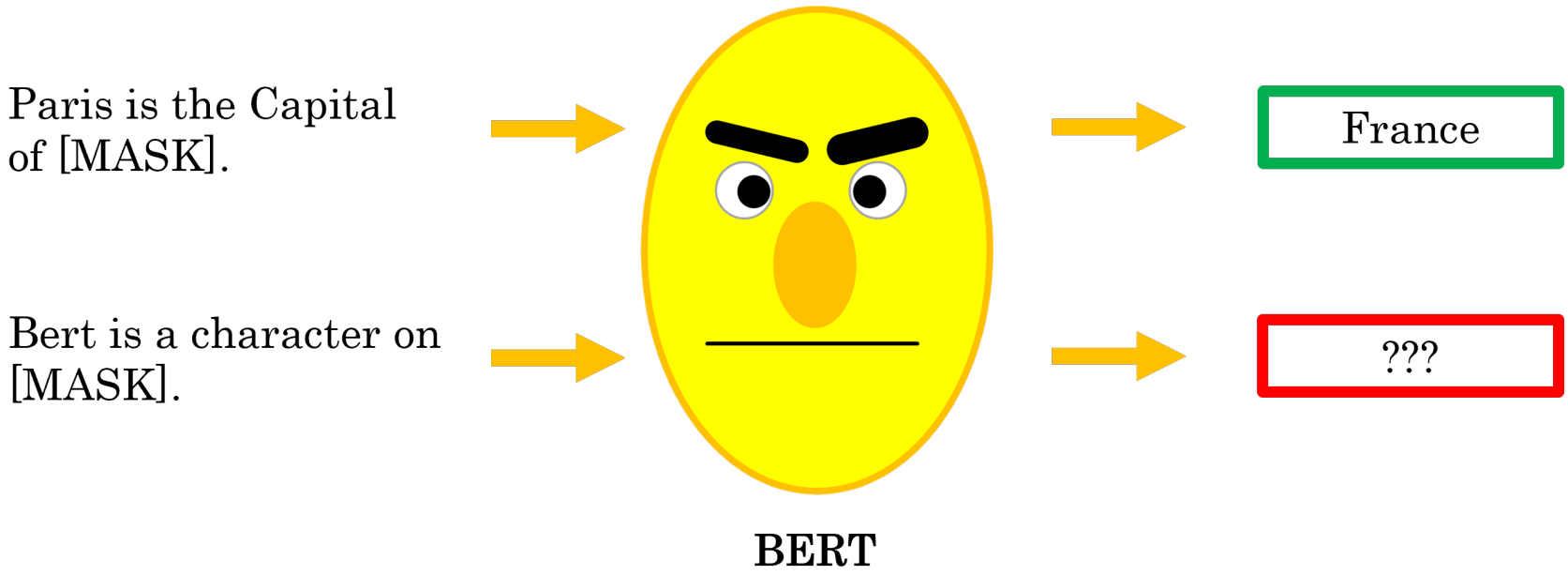
1. What's the issue? – Motivation
2. What has been already there? – Related Work
3. What's new? – Methodology
4. What's the outcome? — Evaluation & Results

Outline

Introduction – General Model



Motivation



⇒ Language models do not fully capture information about real-world entities, especially for uncommon entities.

Example

Bert / BERT | Sesame Street | Google

Query q

Favourite food bert sesame street

Document d_1

Bert is a beloved character from the children's television show Sesame Street. [...] One thing that brings Bert joy on Sesame Street is indulging in his favorite food, oatmeal cookies.

Document d_2

BERT might also refer to a text model that captures the meaning of words in a sentence by considering the context of each word. [...] It was initially developed by researchers at Google and has been widely adopted across Google's products and services.

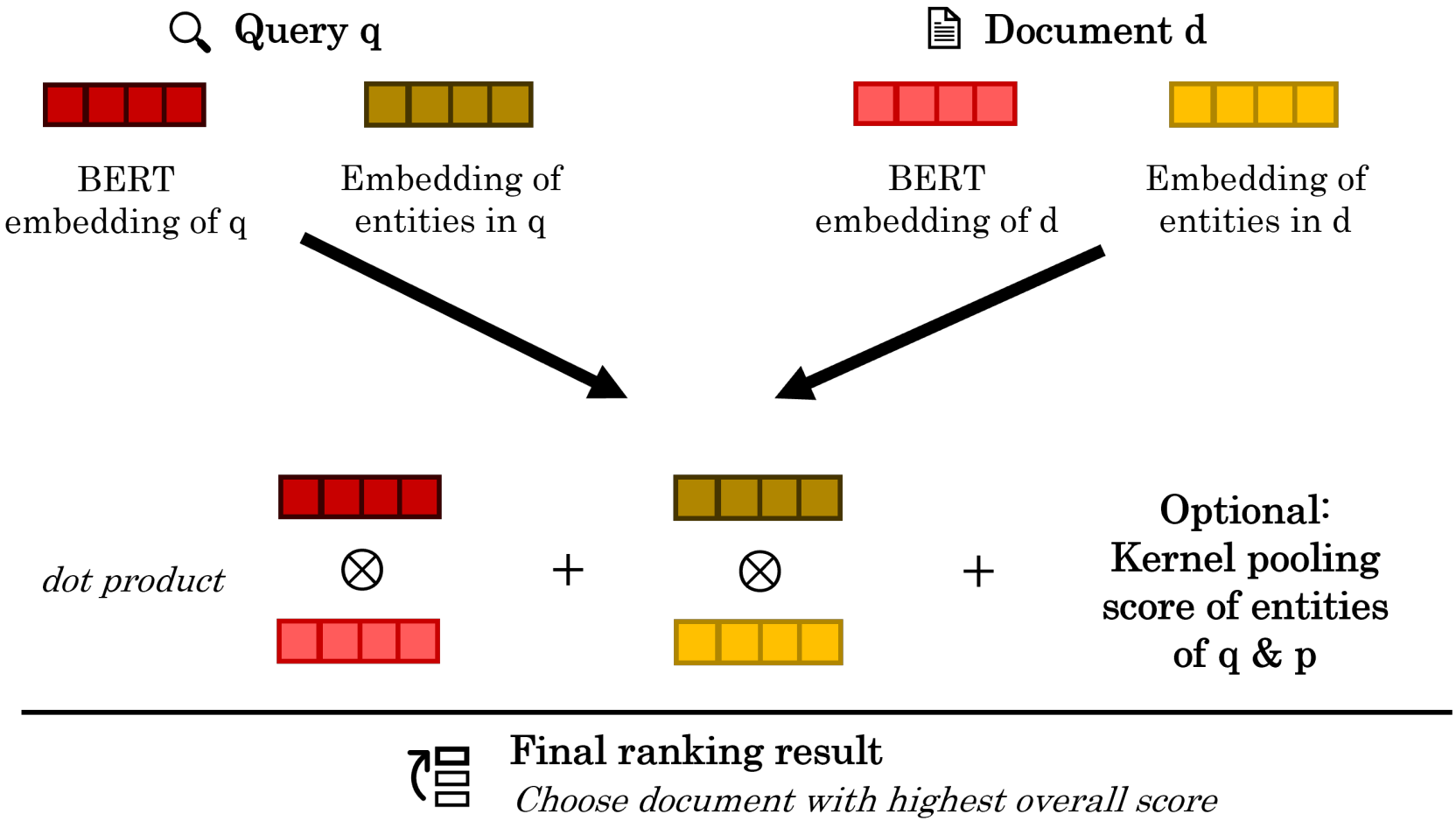
Outline

Related Work

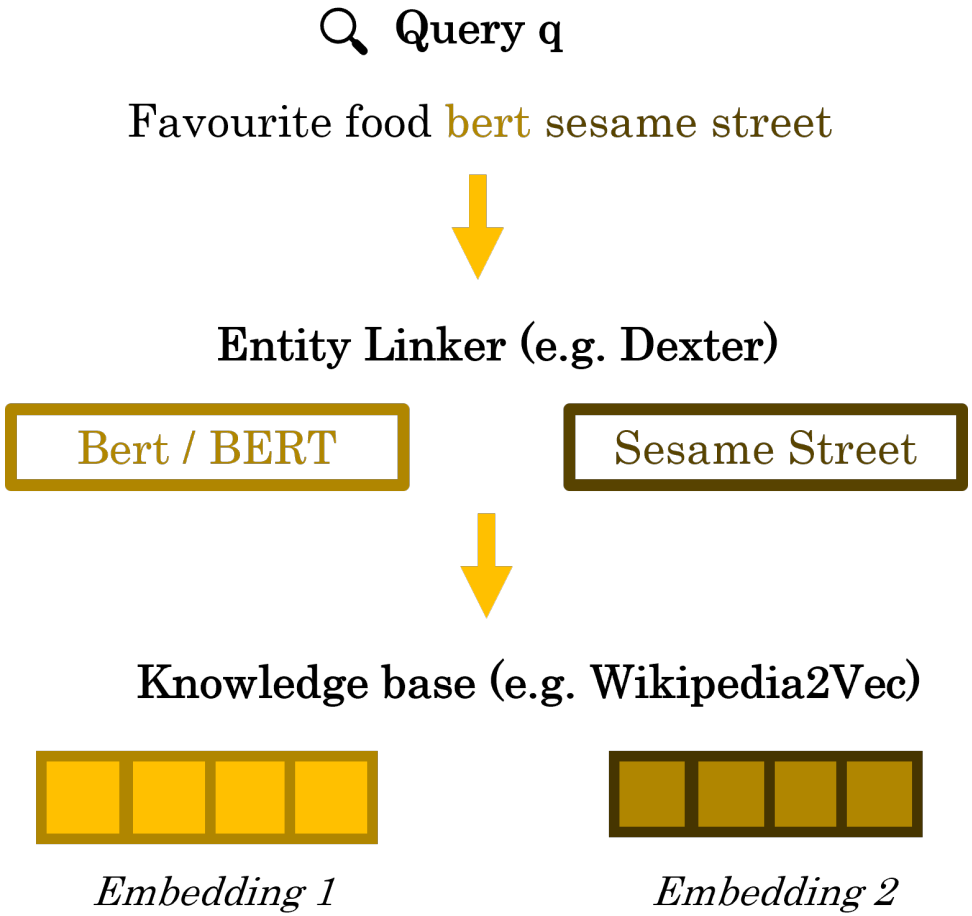
TODO

Outline

General Model



Extracting Entities



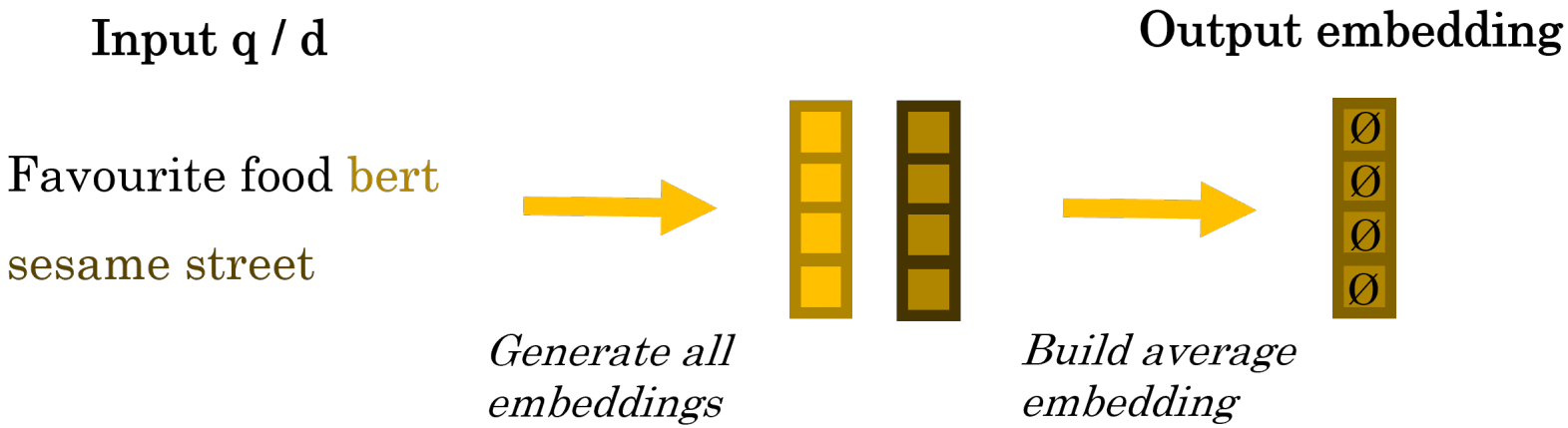
Multiple Approaches

- Single Entity Representation (EVA Single)
- Query-Aware Single Entity Representation (EVA Single-QA)
- Multiple Entity View Representation (EVA Multi)

$\Rightarrow$ Optionally for all models: Adding Kernel pooling score (e.g. KNRM)

Single Entity Representation

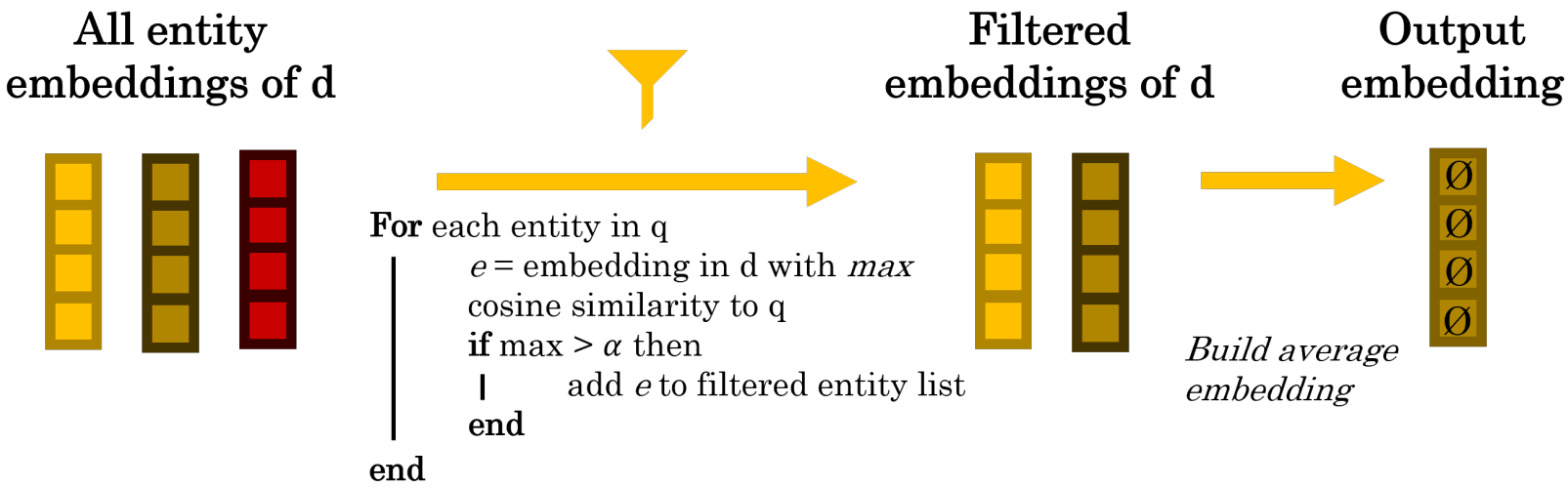
- Same method for queries and documents
- For queries: Method is applied to all three approaches



⇒ Problem: No focus on query information, possibly including irrelevant entities

Query-Aware Single Entity Representation

- Assumption: Query is known before calculations
- Idea: Select only entities in document with high similarity to query entities



Due to ???, output embeddings are transformed using a learned Matrix W_{entity}. $\Rightarrow \text{Embedding}_{\text{final}} = \text{Embedding}_{\text{Output}}^{T} W_{\text{entity}}$.

Outline