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The value of knowledge

Science Checker
A Bidirectional Paradigm for Transparency and Logical Reasoning

INTERNET 2024
OSS LLMs and decentralized systems for Search, Discovery and Indexing on the Internet

Opscidia
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Science & Publication

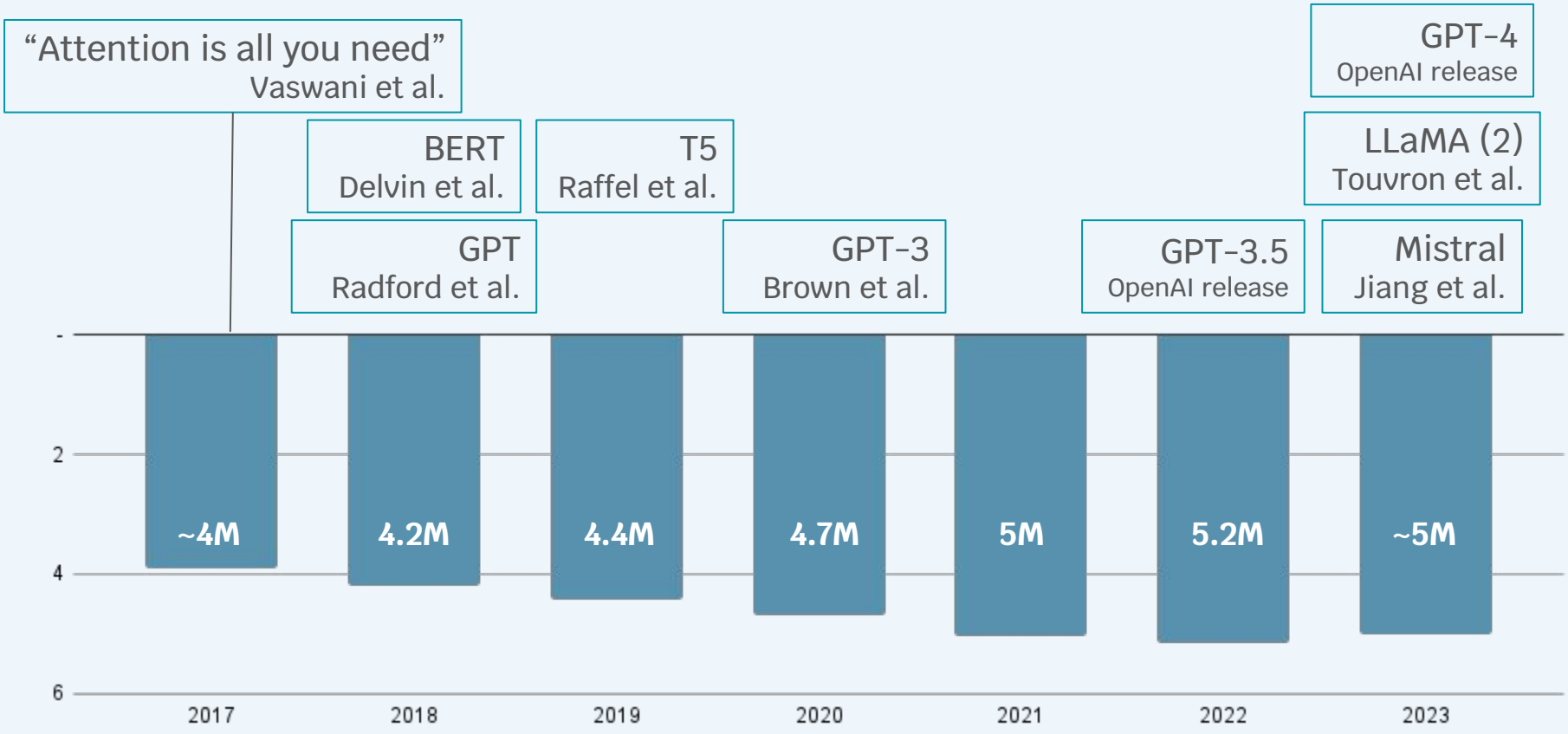


Figure 1: Number of published peer-reviewed publications per year. *Bornmann et al*.

Science Checker

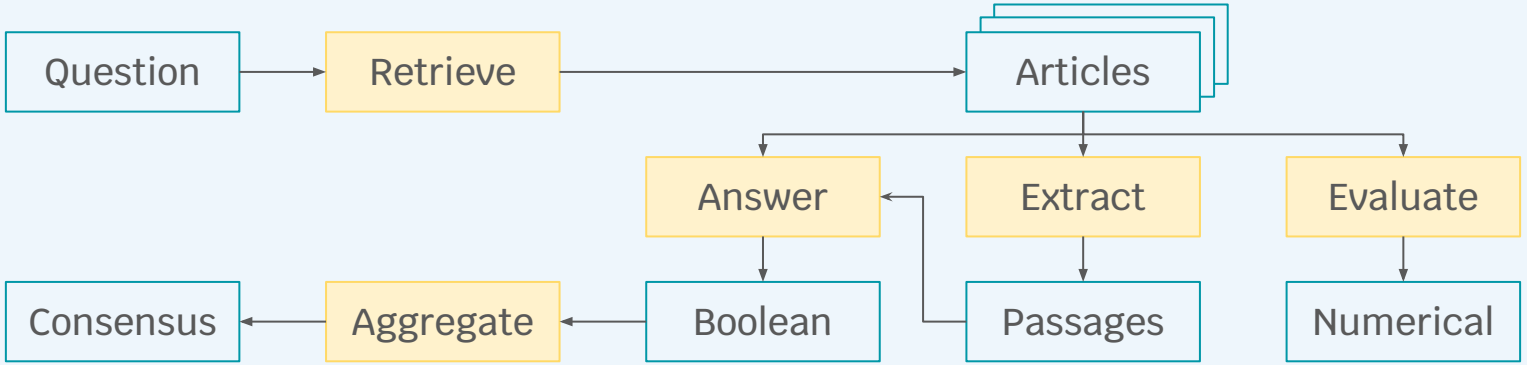


Figure 2: Actual version of Science Checker system

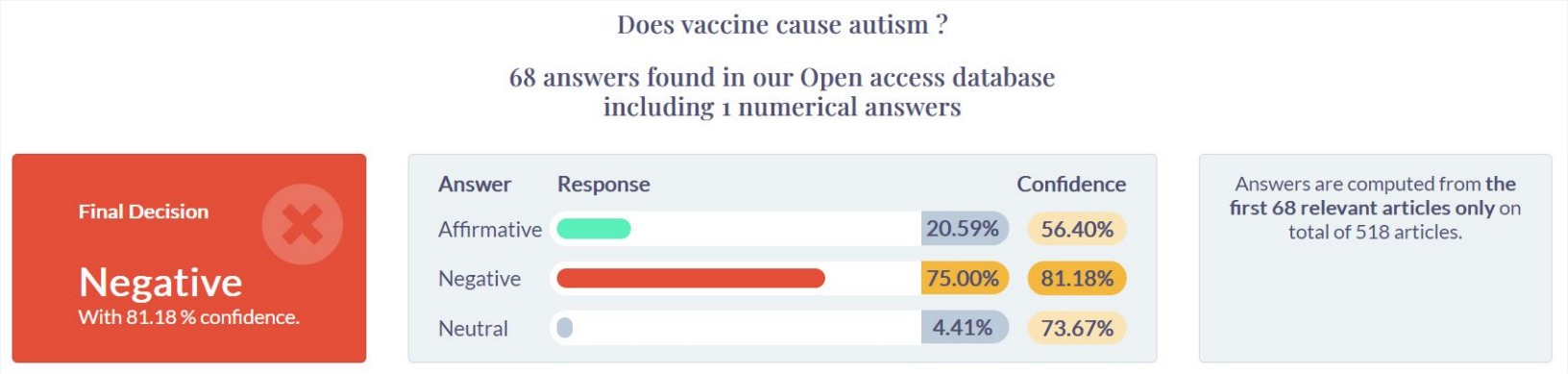
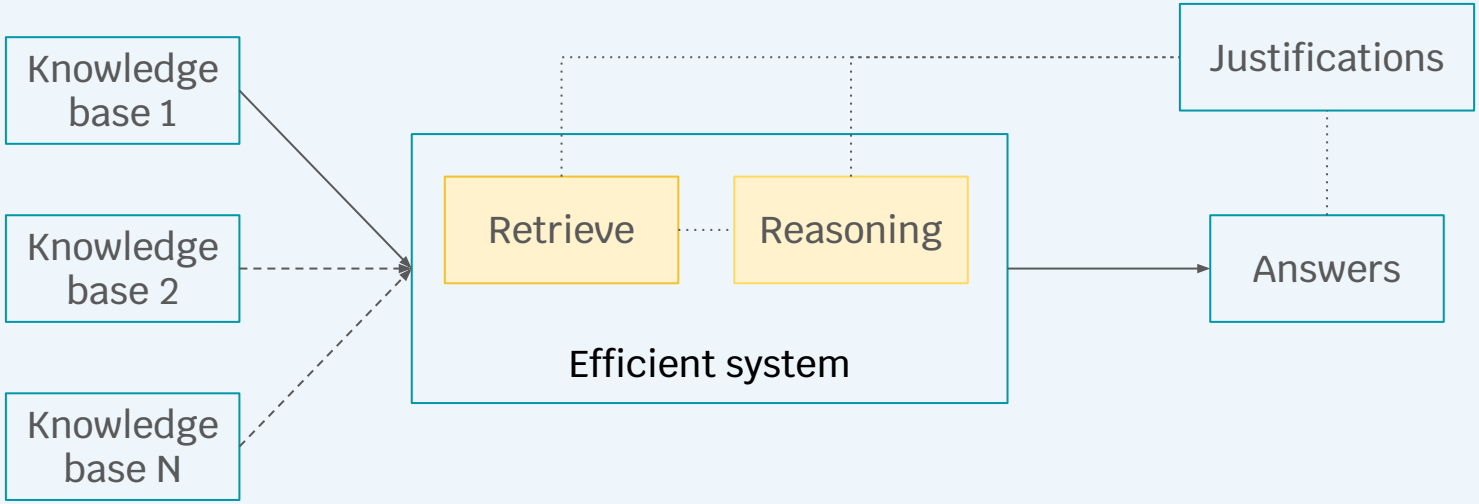


Figure 3: Example of output of actual version of Science Checker platform

Motivation


Knowledge base 1
Knowledge base 2
Knowledge base N
Retrieve
Reasoning
Efficient system
Justifications
Answers

Article retriever

	Sparse (BM25)	Dense
Effectiveness	Low	High
Efficiency	High	Low
Latency	Very low	High
Expression match	True	False
Semantic match	False	True

Table 1: Dense vs. Sparse Retrieval Strategy Selection. *Arabzadeh et al*.

Document retrieval

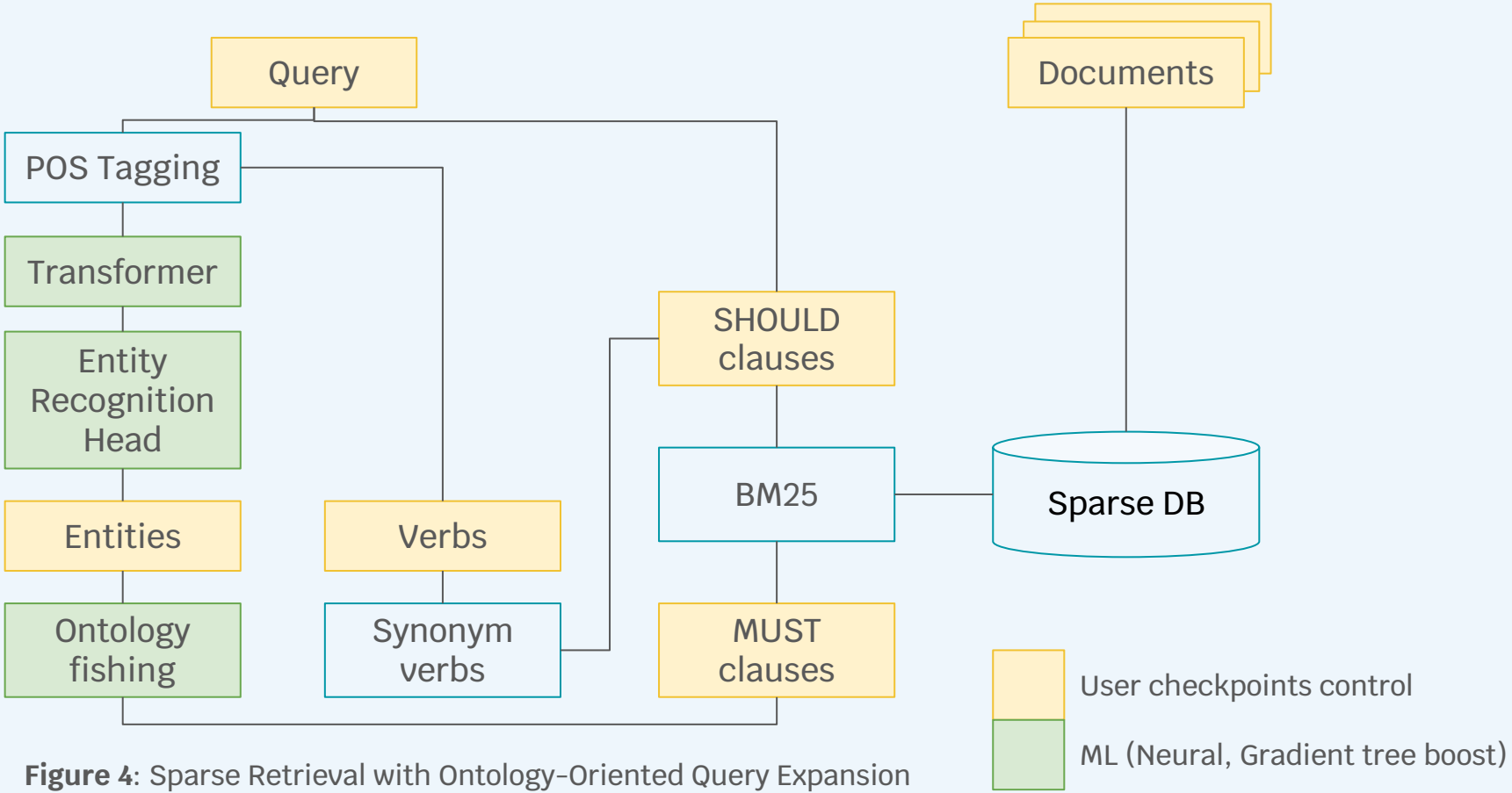


Figure 4: Sparse Retrieval with Ontology-Oriented Query Expansion

Results

Model	Max Length	nDCG@10
BM25	8192	**57.0**
mDPR	512	23.9
mContriveer	512	28.7
mE5-large	512	33.0
E5-mistral-7b	8192	43.3
openai-ada-002	8191	38.7
jina-embeddings-v2-base-en	8192	37.0
M3-Embedding		
Dense	8192	48.9
Sparse	8192	62.1
Dense+Sparse	8192	**64.2**
Ours		
Optimized most_fields	-	62.4
Must entity Wiki expansion	-	59.6
Should entity Wiki expansion	-	**64.8**

Table 2: nDCG@10 of the different versions of our system on MLDR. *Chen et al*.

Reasoning & Question Answering

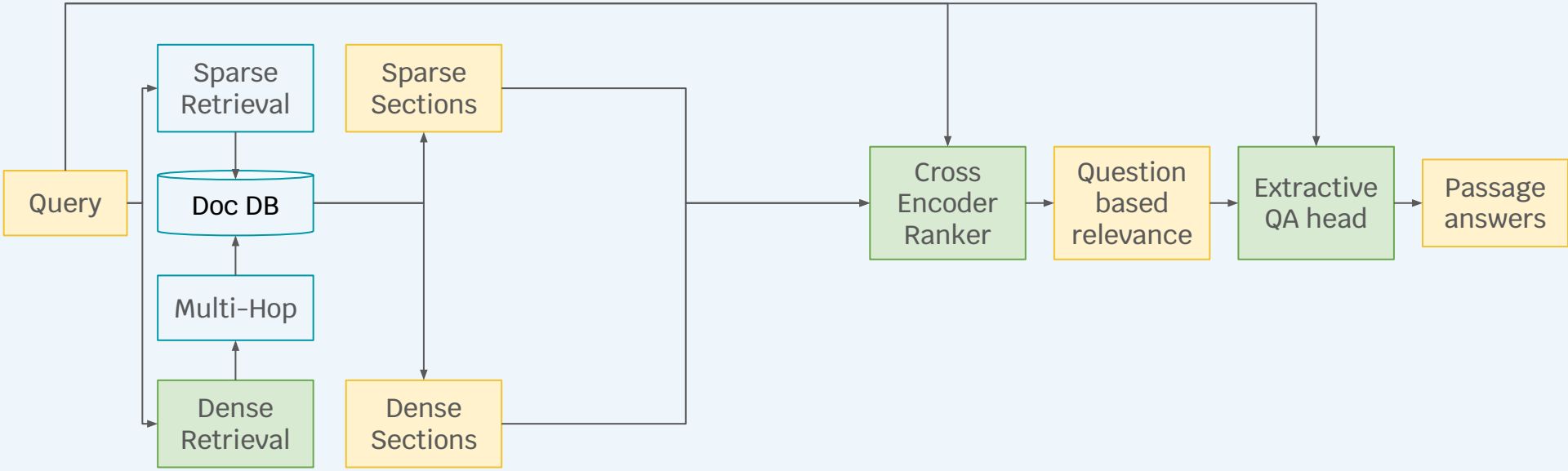


Figure 5: Answer Generation with Iterative Deepening

Reasoning & Question Answering Evolution

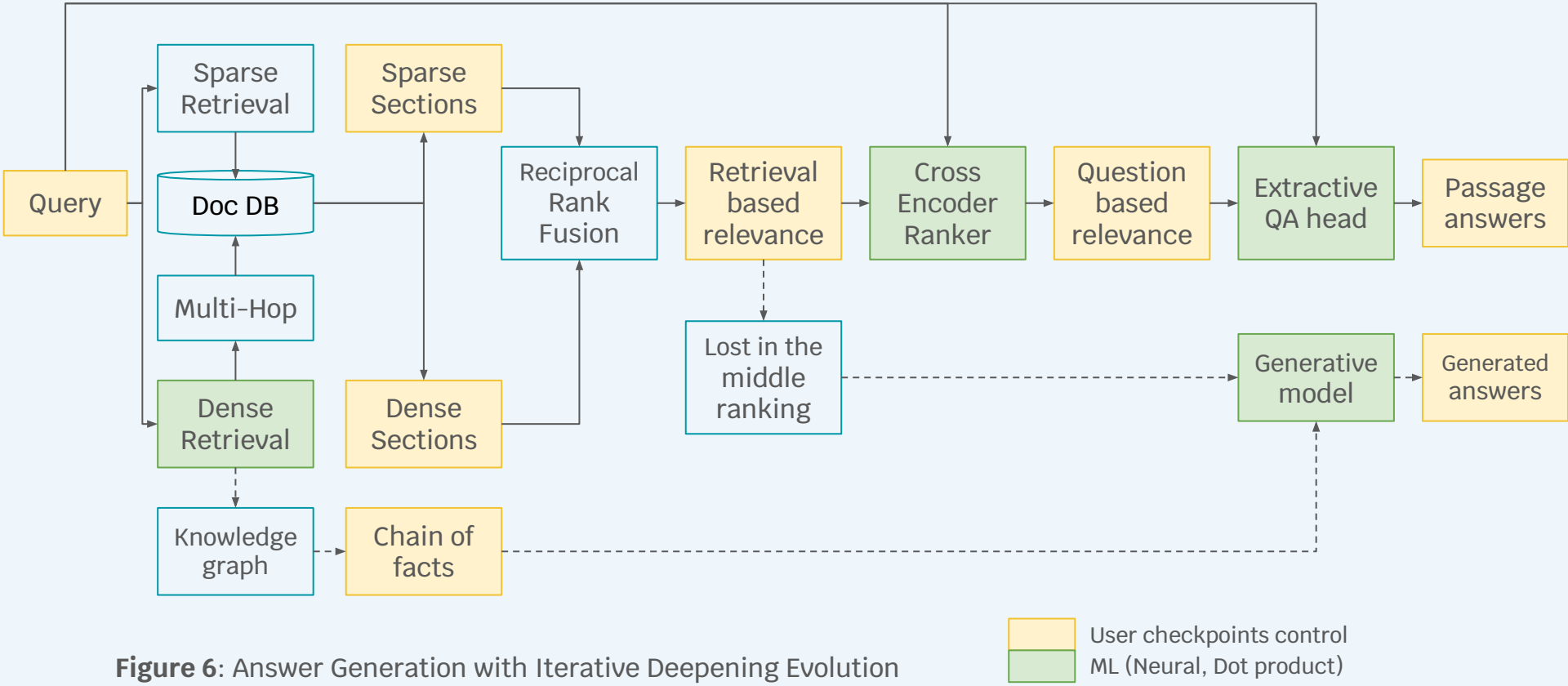


Figure 6: Answer Generation with Iterative Deepening Evolution

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