

Assertion-based QA with Question-Aware Open Information Extraction

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Document-based QA



Passage Ranking

The attack on Pearl Harbor, also known as the Battle of Pearl Harbor, the Hawaii Operation or Operation AI by the Japanese Imperial General Headquarters , and Operation Z during planning, was a surprise military strike by the Imperial Japanese Navy Air Service against the United States naval base at Pearl Harbor , Hawaii Territory , on the morning of December 7, 1941. The attack led to the United States' entry into World War II .

Assertion based QA

The attack of Pearl Harbor was a military strike on December 7, 1941

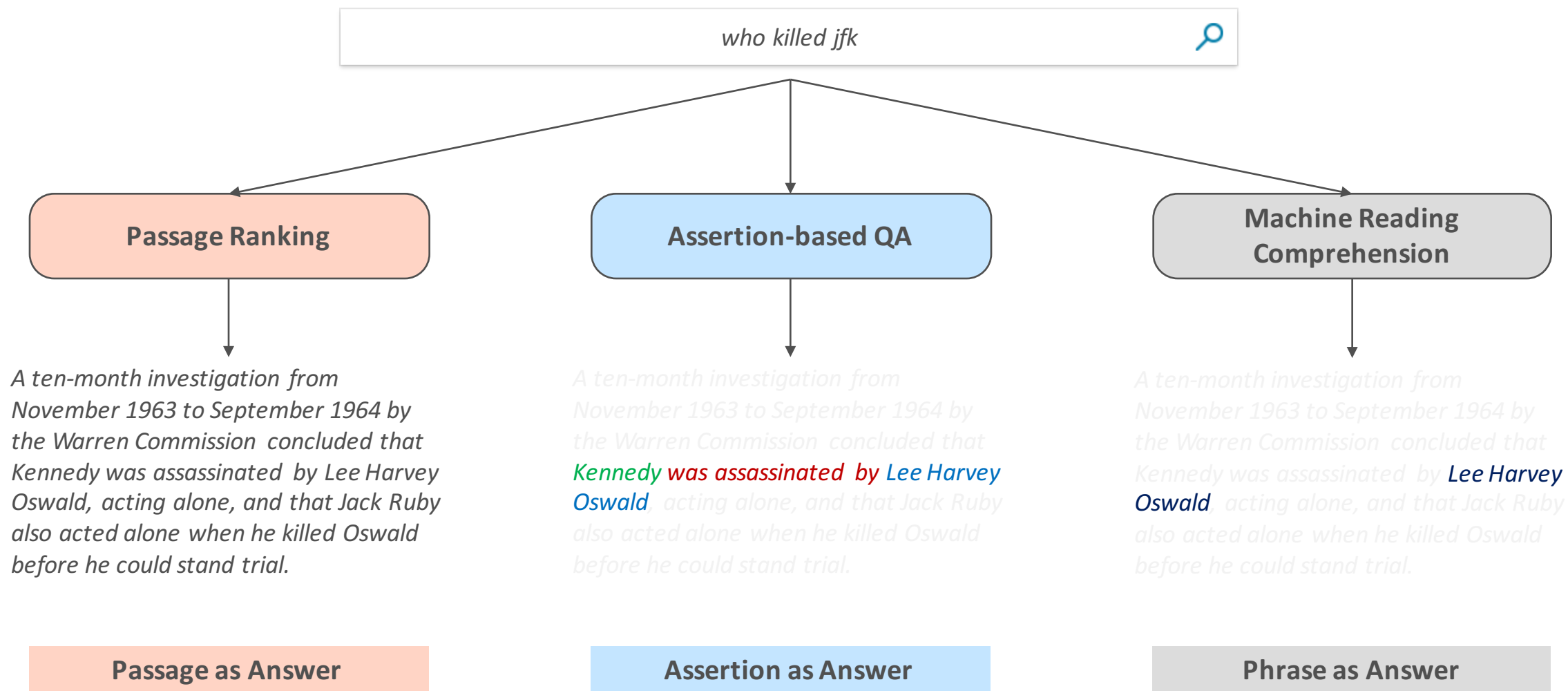
subject

predicate

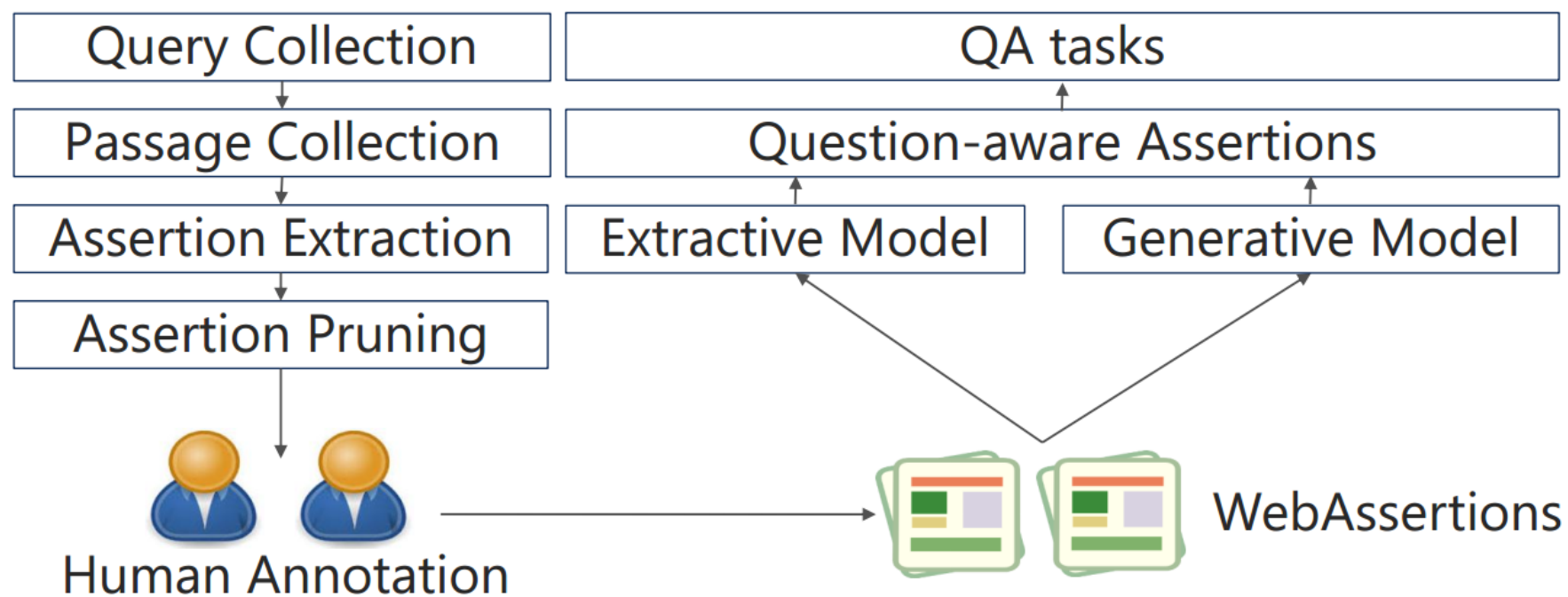
predicate

The focus of this talk

3 Types of PassageQA Approaches



The big picture



ABQA: A Ranking based Approach

the Disney empire 's latest outpost , shanghai Disneyland , will open in late 2015 , reports the associated press .



Rule-based Open IE

the Disney empire 's latest outpost is	shanghai Disneyland	
the Disney empire 's latest outpost will open	in late 2015	
the associated press	reports	the Disney empire 's latest outpost will open in late 2015
Shanghai Disneyland	will open	in late 2015



Assertion Ranking

1. Shanghai Disneyland	will open	in late 2015
2. the Disney empire 's latest outpost	will open	in late 2015
3. the associated press	reports	the Disney empire 's latest outpost will open in late 2015
4. the Disney empire 's latest outpost	is	shanghai Disneyland

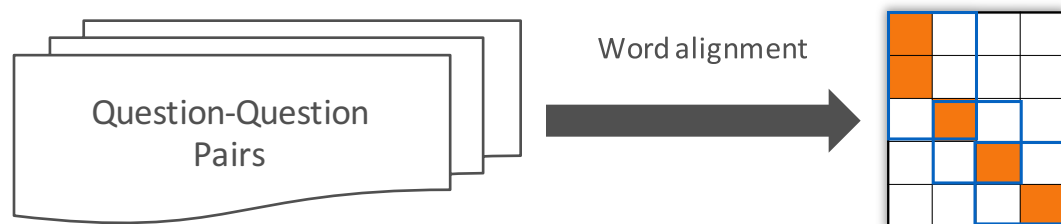
features at different levels



- Word level
- Phrase level
- Sentence level
- ...

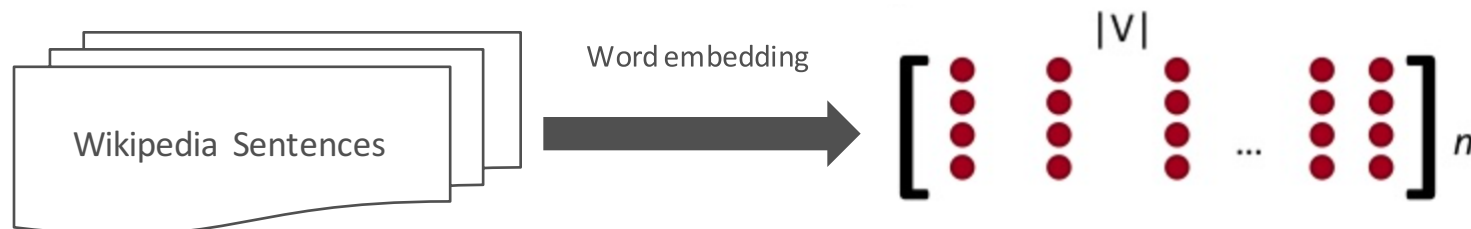
Features

■ Word-to-Word translation model



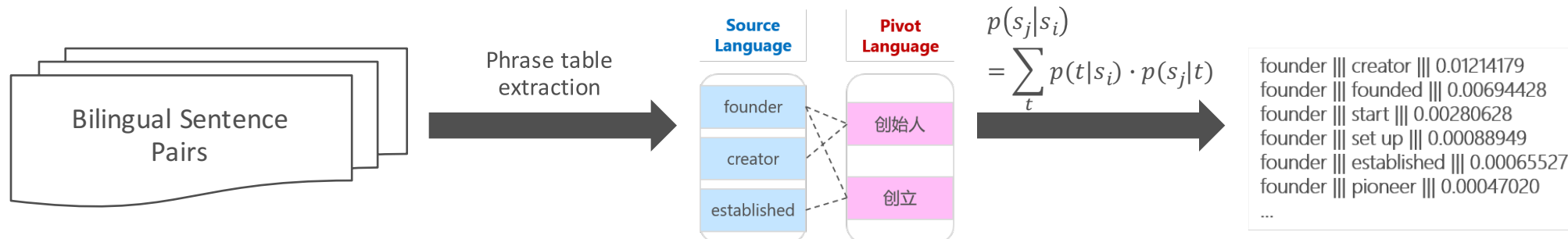
12M <question, related question> pairs from WikiAnswers (English)
17M <question, related question> pairs from Baidu Zhidao (Chinese)

■ Word embedding



10M sentences from English Wikipedia (English)
10M sentences from Chinese Wikipedia (Chinese)

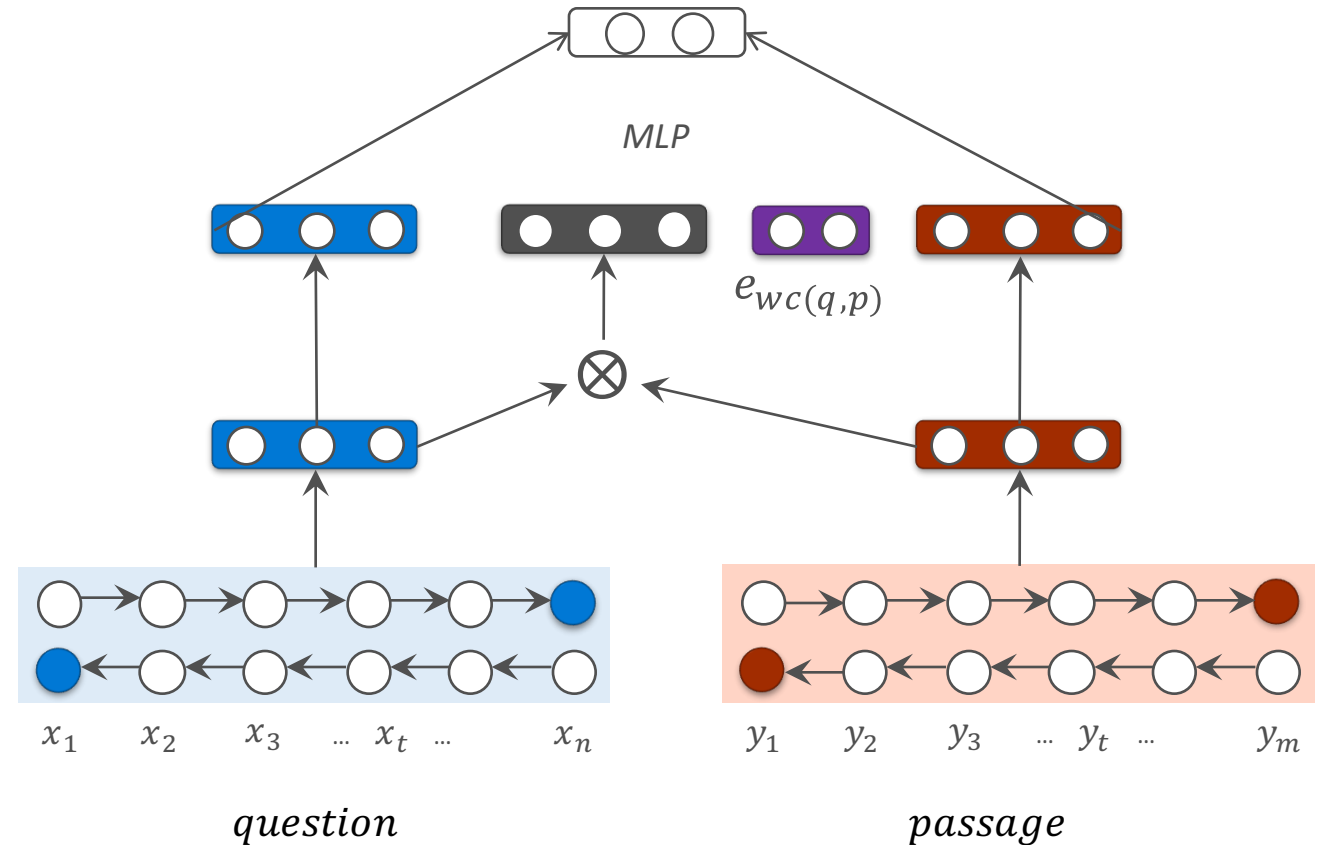
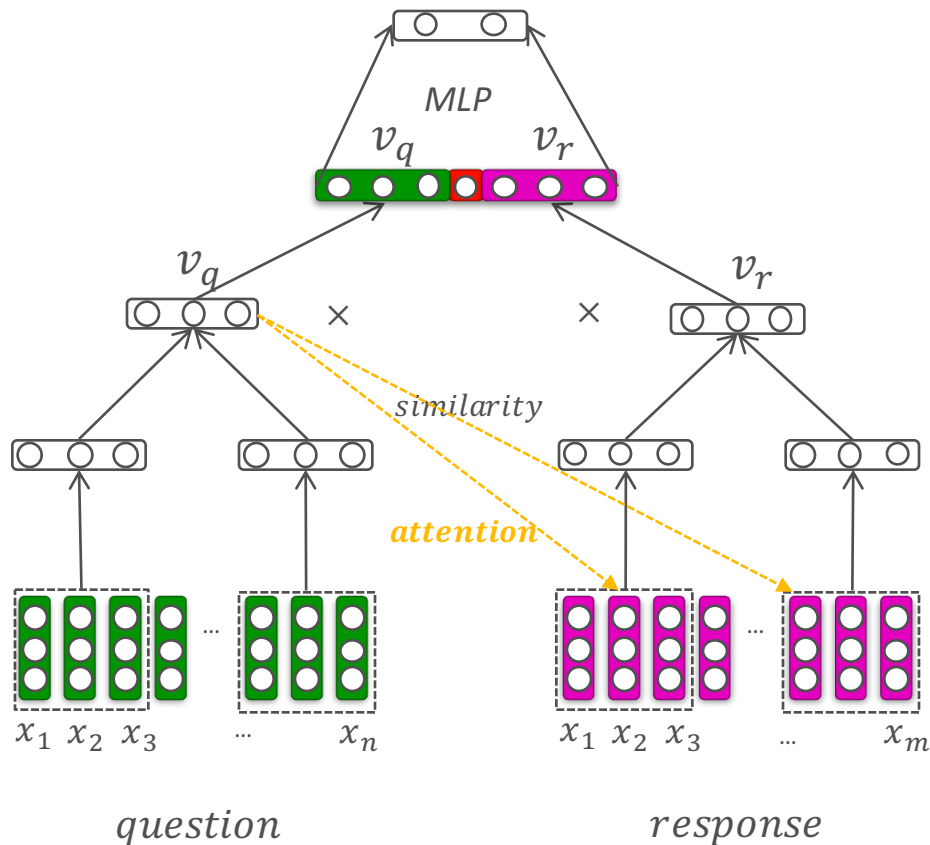
■ Paraphrasing



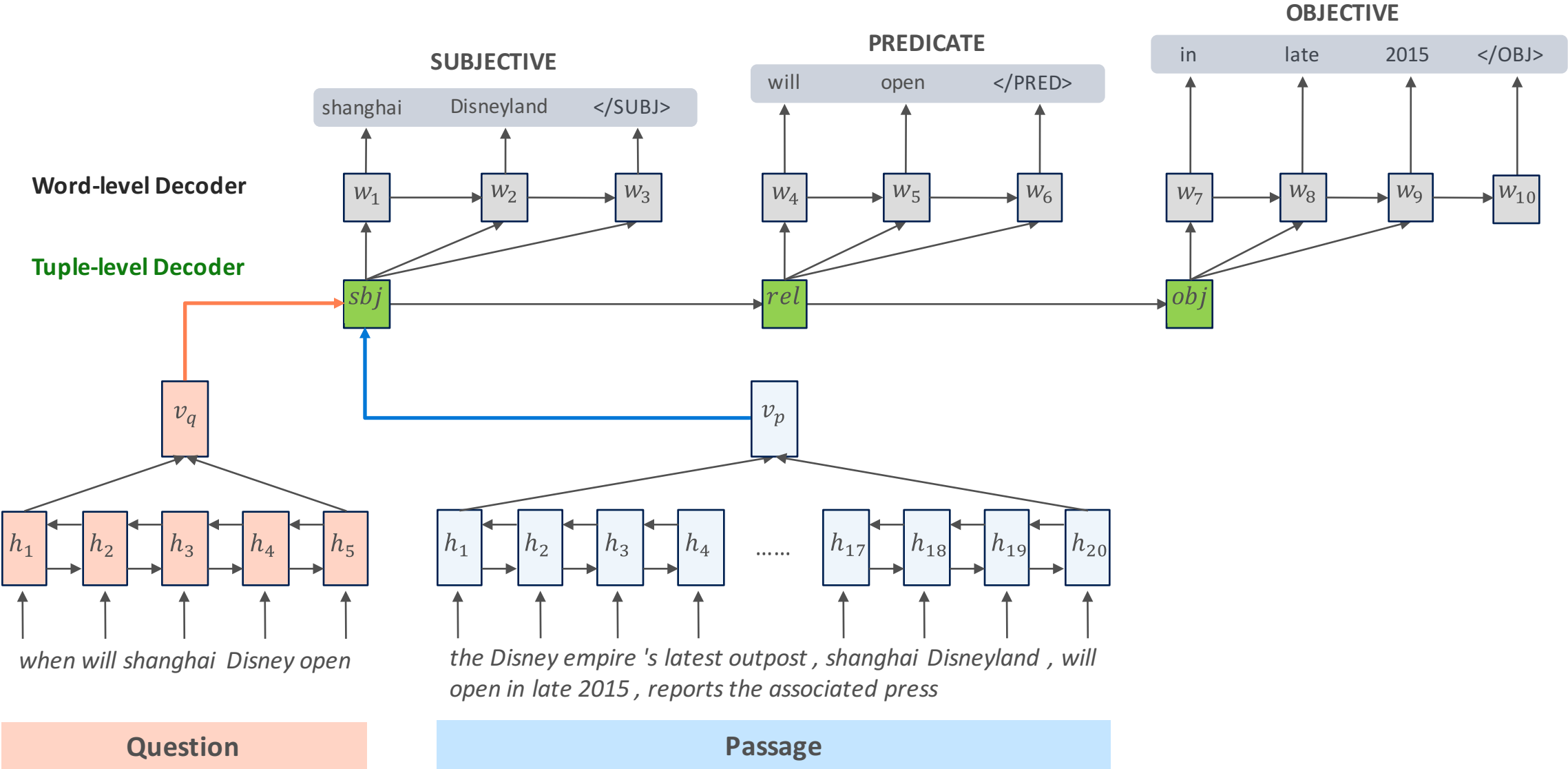
43.8M paraphrase pairs (English)
11.3M paraphrase pairs (Chinese)

Features (cont.)

- **Compute relevance between questions and responses**
 - Use **10M <Question, Answer> pairs** as training data to handle **question queries**
 - Use **10M <Sentence, Next Sentence> pairs** as training data to handle **non-question queries**



ABQA: A Generative Approach with Hierarchical Decoder



Dataset: WebAssertion

- An assertion is annotated as 1 if
 1. it correctly answers the question and
 2. meantime has a complete meaning

Question	when will shanghai disney open
Passage	the Disney empire's latest outpost, Shanghai Disneyland, will open in late 2015, reports the associated press.
Label	Assertion
0	<the Disney empire's latest outpost; is; Shanghai Disneyland >
0	<the Disney empire's latest outpost; will open; in late 2015>
0	<the associated press; reports; the Disney empire's latest outpost will open in late 2015>
1	<Shanghai Disneyland; will open; in late 2015 >

do not answer the question

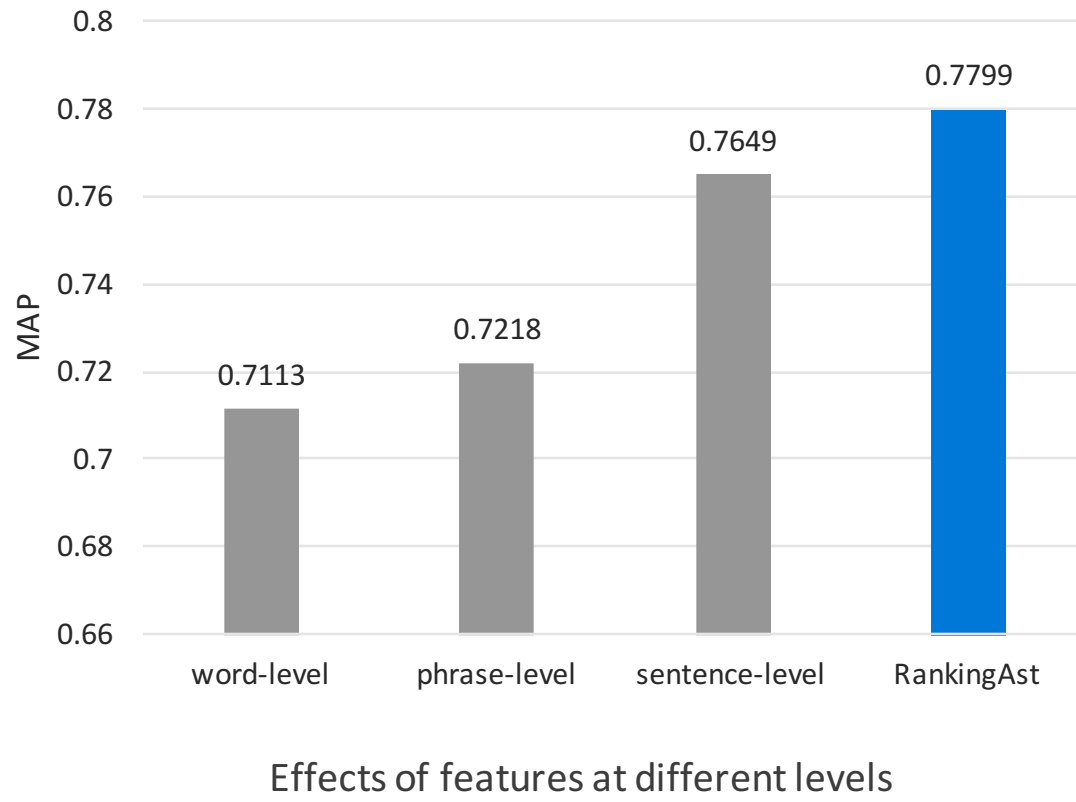
A bad assertion

An annotated example

Statistics of WebAssertions	
# of question-passage	55,960
# of question-passage-assertion	358,427
Avg. assertions / question-passage	6.41
Avg. Words / question	6.00
Avg. Words / passage	39.33
Ave. Words / assertion	8.62

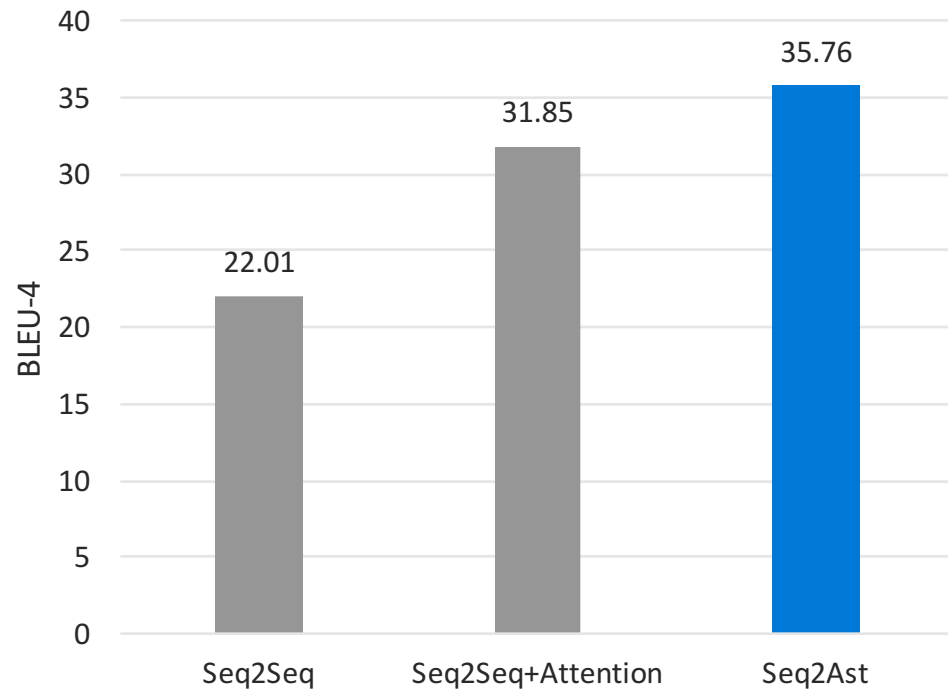
Evaluation on ABQA

- Evaluation on Ranking
 - Our ranking model is **RankingAst**



Evaluation on ABQA

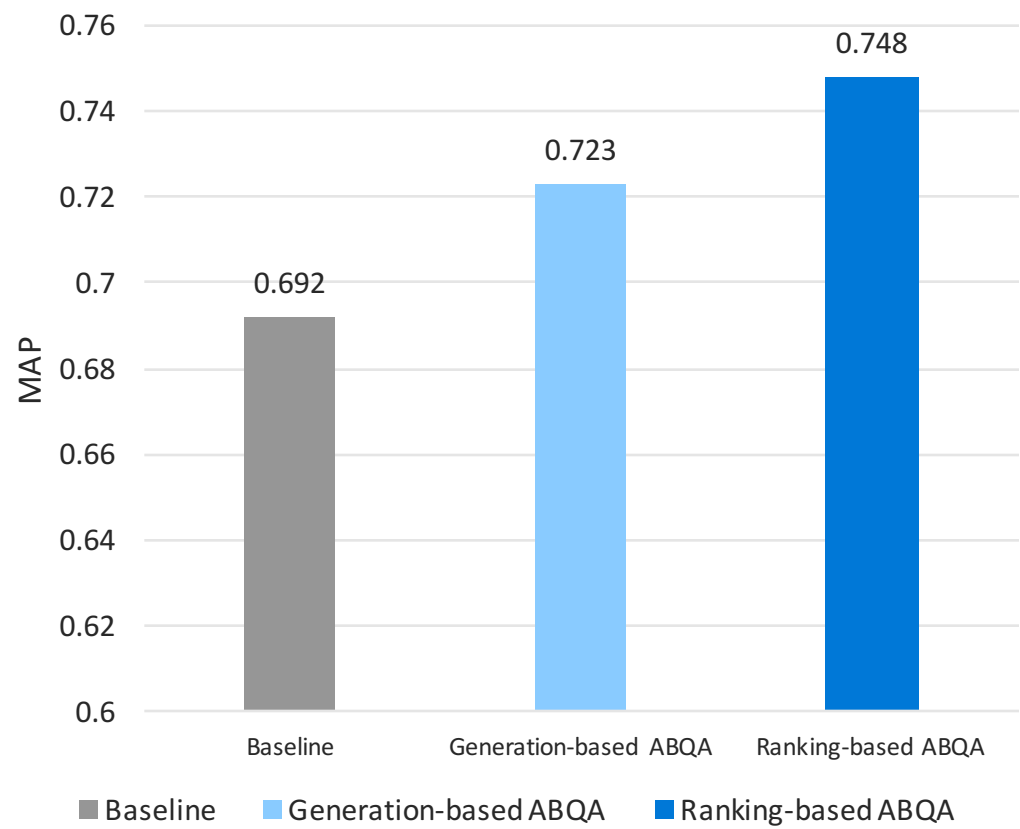
- Evaluation on Generation
 - Our generative model is **Seq2Ast**



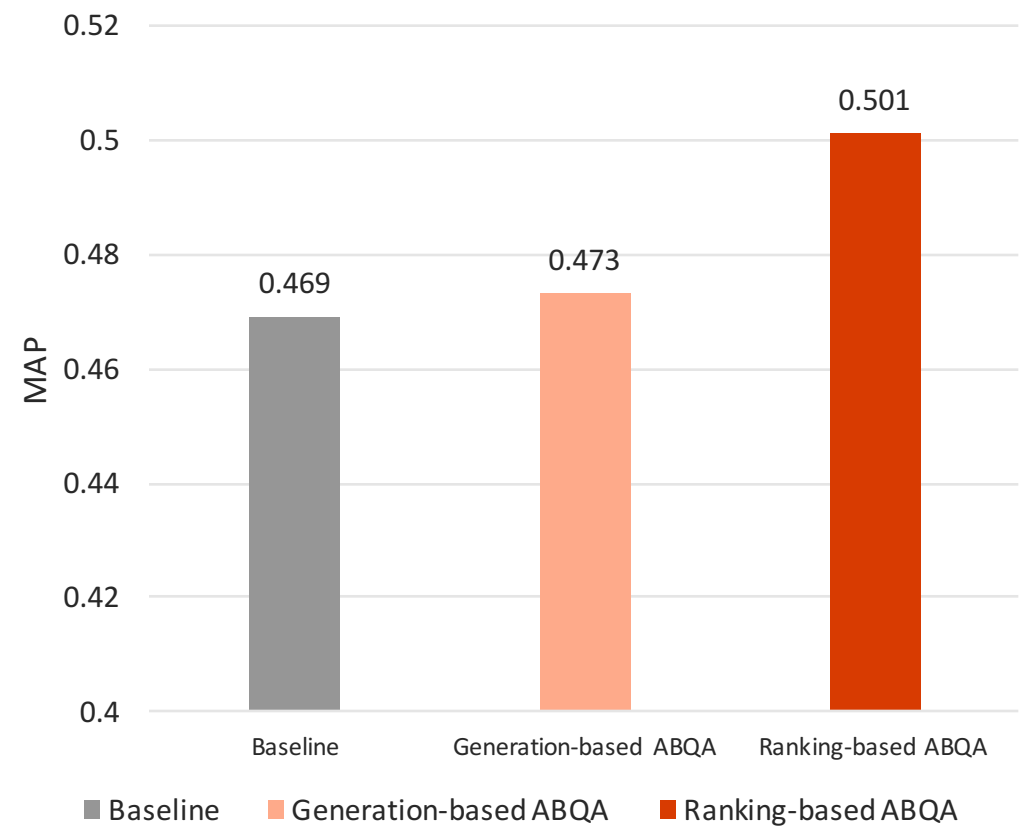
Compare to sequence-to-sequence learning methods

Evaluation

- Integrate ABQA into PassageQA task



WikiQA Dataset



MS MARCO Dataset

Summary

- We present the ABQA task.
 - We build a dataset WebAssertions for the task.
 - We develop both extractive and generative approaches.
 - ABQA results improve the PBQA task.
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- Please contact dutang@microsoft.com for further questions.

Thanks!