

Chengyu Cloze Test

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1. INTRODUCTION

- Chengyu (成语) is a special type of Chinese idiom.
- 96% Chengyus consist of four characters each. Chengyus were mainly created from ancient stories, literature and sayings.
- A typical way to measure a Chinese learner's Chengyu knowledge is Cloze Test.

Example

我们喜欢用经济去控制一个国家的命脉,用信仰去控制一个种族,用利益让别人为我们

We like to use economy to control a country's faith, use belief to control a race and use profit to control others so that they can ____ for us.

Answer: 火中取栗 (pull chestnuts from the embers)

This is a Chengyu whose origin is from foreign literature. From the 17 century French fabulist Jean de la Fontaine's "The Monkey and the Cat". Bertrand the monkey persuades Raton the cat to pull chestnuts from the embers amongst which they are roasting, promising nothing. As the cat scoops them from the fire one by one, burning his paw in the process, the



monkey gobbles
them up. It's used to
describe a person
used unwittingly or
unwillingly by
another to
accomplish the
other's own purpose
with his own risk but
gets nothing.

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2. METHOD

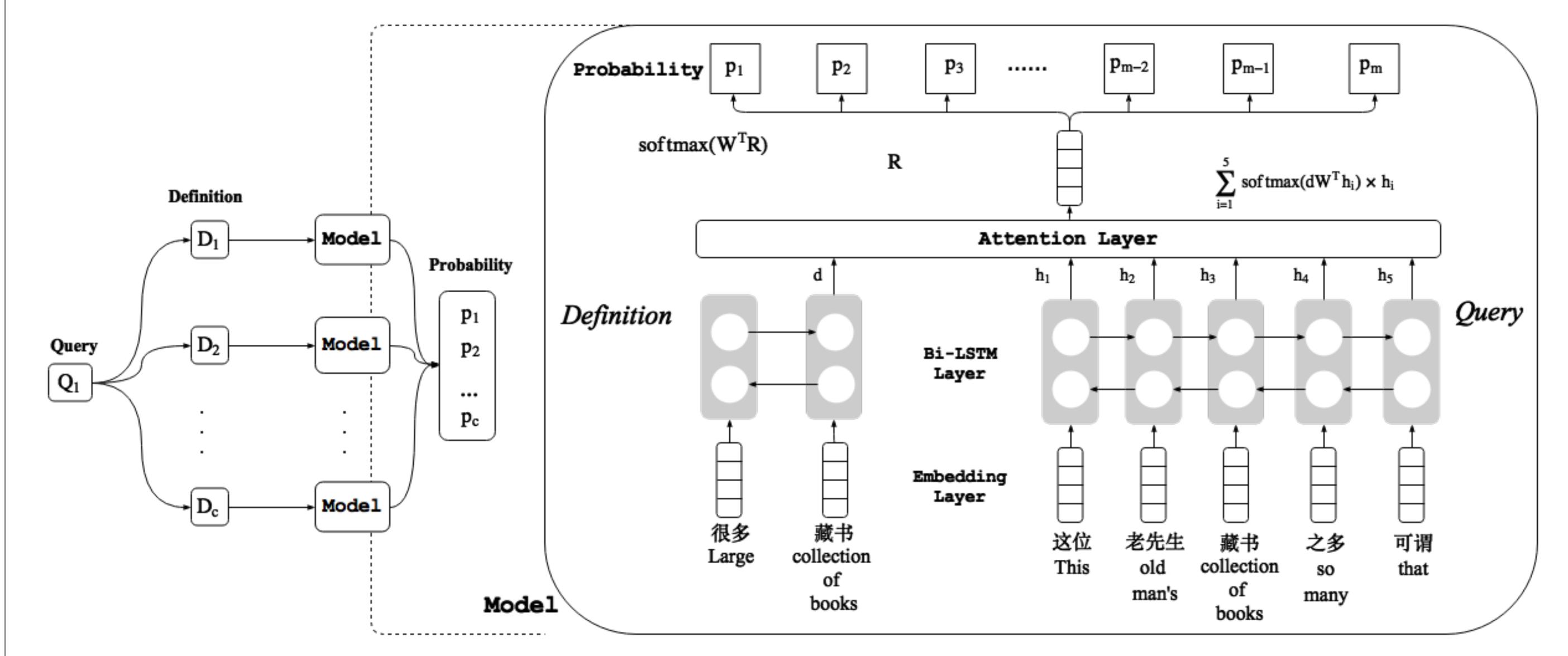


Figure 1: Architecture Overview

- We propose a neural approach to incorporate the definition of each Chengyu as background knowledge.
- We apply a Bi-LSTM network to encode each word with a contextual embedding.
- We further compare the representations of the Chengyu definition and the contextual embedding of each word in the query, and take the weighted sum of the query word contextual embeddings to determine the probability score of the candidate Chengyu

$$e_i = d^T \cdot \mathbf{W}_{\alpha} \cdot h_i$$

$$\alpha_i = \frac{\exp(e_i)}{\sum_{i=1}^n \exp(e_i)}$$
Attention Score

$$\mathbf{R} = \sum_{i=1}^{n} \alpha_i \cdot h_i$$

Weighted Sum

$$\mathbf{p}_i = softmax(\mathbf{W}_{\beta}^T \mathbf{R})$$

Predicted Probability

3. EXPERIMENT

We perform two tests:

- (1) cloze test: for each sentence, we take out the ground-truth Chengyu, and let the system select a Chengyu from four candidates.
- (2) coherence checking in college entrance exam: we collected 14 problem sets, where each problem set consists of four sentences including Chengyus. The system select the sentence that contains the most appropriate Chengyu.

4. ANALYSIS

	Cloze Test	Coherence Checking in College Entrance Exam
Human	70%	42.3%
System	89.5%	35.7%

Table1: System and Human Accuracy Comparison

Table 1 shows our approach achieves comparable performance as human experts. For 18% of our system recommended Chengyus which don't exactly match the ground truth, they are also acceptable choices for the given query contexts.

Positive Example

这事已势不可遏,任何想阻挡他的人都如_____,简直是不自量力。

This event is unstoppable, anyone who tries to stop it will be like _____, almost not recognizing his/her own limited power.

System: 蚍蜉撼树 (an ant shaking a tree, to describe one fails to recognize one's limited power)

Analysis: The definition significantly enriches the semantic meanings of Chengyu itself. 蚍蜉撼树 (an ant shaking a tree) is a metaphor to describe 自不量力(fail to recognize one's own limited power).

Negative Example

he wrote his first works.

村上春树_____,29岁才写他的第一部作品。 Haruki Murakami ______, he was already at age 29 when

Ground Truth:大器晚成 (takes a long time to make a great instrument)

Analysis: We need to know "age 29" is relatively late to produce the first works for a writer.