

论文写作的易读性原则

案例分析：基于Seq2Seq的对话数据增广

报告人：刘一佳

合作者：侯宇泰、车万翔、刘挺

<http://yjliu.net/cv/res/2018-08-19-nlpcc-sws.compressed.pdf>

学术报告中的一些设计技巧

报告人：刘一佳

导师：秦兵、车万翔

错误地利用 报告与论文结构的相似性

Challenges and Contribution

- The first challenge is deriving an optimal alignment in ambiguous situations.
- The second challenge is how to automatically extract word alignments from the alignment graph.
- The third challenge is how to use the rule-based and unsupervised alignment to derive the alignment with downstream tasks learning.
- We proposed an automatic aligner based on transition-based word pairs.

简介

Overview



模型

Our aligner algorithm

- Extracting aligner with both semantic and syntactic information.
- Producing word alignments.

模型

Our oracle parser

模型

Experiments

- We conduct experiments on LDC2004T22.
- We evaluate the alignment F-score and Smatch of resulting parser.

实验

Conclusion

- We propose a new HMM aligner which is used by a novel transition-based HMM oracle parser. Our aligner is able to extract word alignments and words from alignments.
- Both the oracle parser and the aligner show the effectiveness of the proposed HMM aligner and the HMM oracle parser.
- We also describe transition-based HMM oracle parser based on our aligner and transition system and a software performance of the HMM aligner and the HMM oracle parser with only words and POS tags as input.

结论

思考题

- 为什么做学术报告
 - 为了更好地交流
- 做怎样的学术报告
 - ☐ “向听众展示我对问题的深入理解”
 - ☐ “让听众明白我的论文中的技术”
 - ☐ “引起听众的兴趣”

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听众模型

理想中的听众

- 领域专家
- 已经读过你的论文
- 对于你的工作非常感兴趣

现实中的听众

- 来自其他领域
- 刚刚了解到你的工作
- 这个时段没什么可听的，恰巧发现这屋子网络比较好

类比审稿人模型

审稿

你以为审稿人应该这样审稿的：

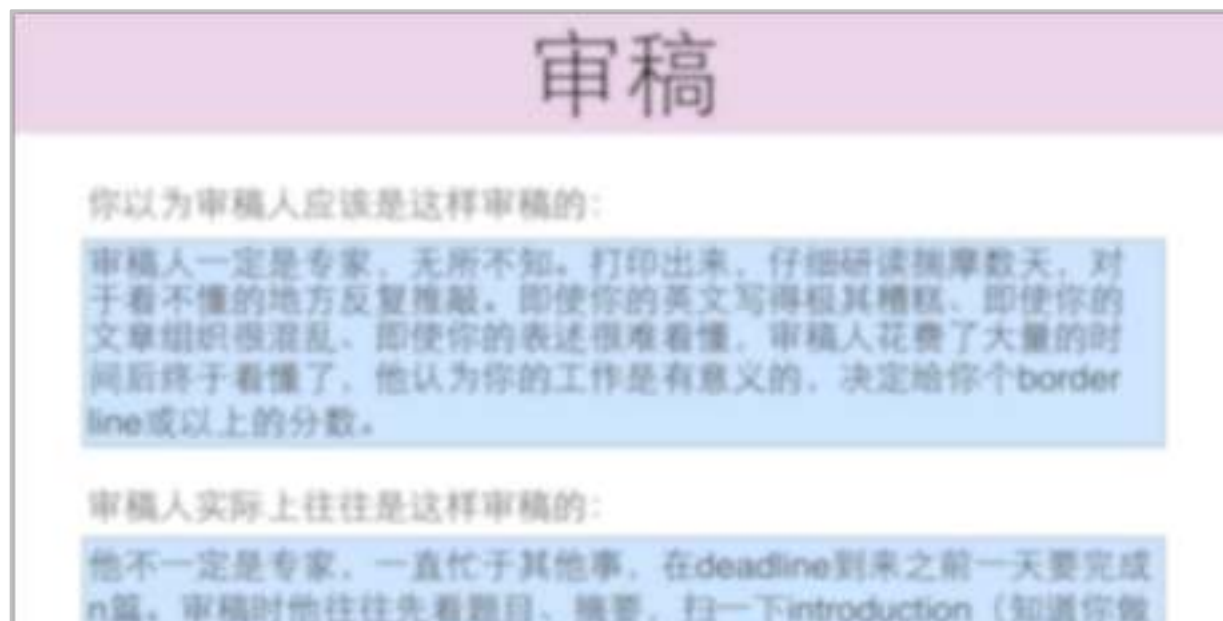
审稿人一定是专家，无所不知。打印出来，仔细研读揣摩数天，对于看不懂的地方反复推敲。即使你的英文写得极其糟糕、即使你的文章组织很混乱、即使你的表述很难看懂，审稿人花费了大量的时间后终于看懂了，他认为你的工作是有意义的，决定给你个border line或以上的分数。

审稿人实际上往往是这样审稿的：

他不一定是专家，一直忙于其他事，在deadline到来之前一天要完成n篇。审稿时他往往先看题目、摘要，扫一下introduction（知道你做什么），然后直接翻到最后找核心实验结果（做得好不好），然后基本确定录还是不录（也许只用5分钟！）。如果决定录，剩下就是写些赞美的话，指出些次要的小毛病。如果决定拒，下面的过程就是细看中间部分找理由拒了。

第一印象定录拒，5分钟内打动审稿人


类比审稿人模型



“You have **two minutes** to engage your audience before they start to doze.” -- Simon Peyton Jones in *How to give a great research talk*

简介部分：展示最好的部分

(Zhang and Nivre 2011, Martins et al. 2013)



Our Work

- A neural network based dependency parser!

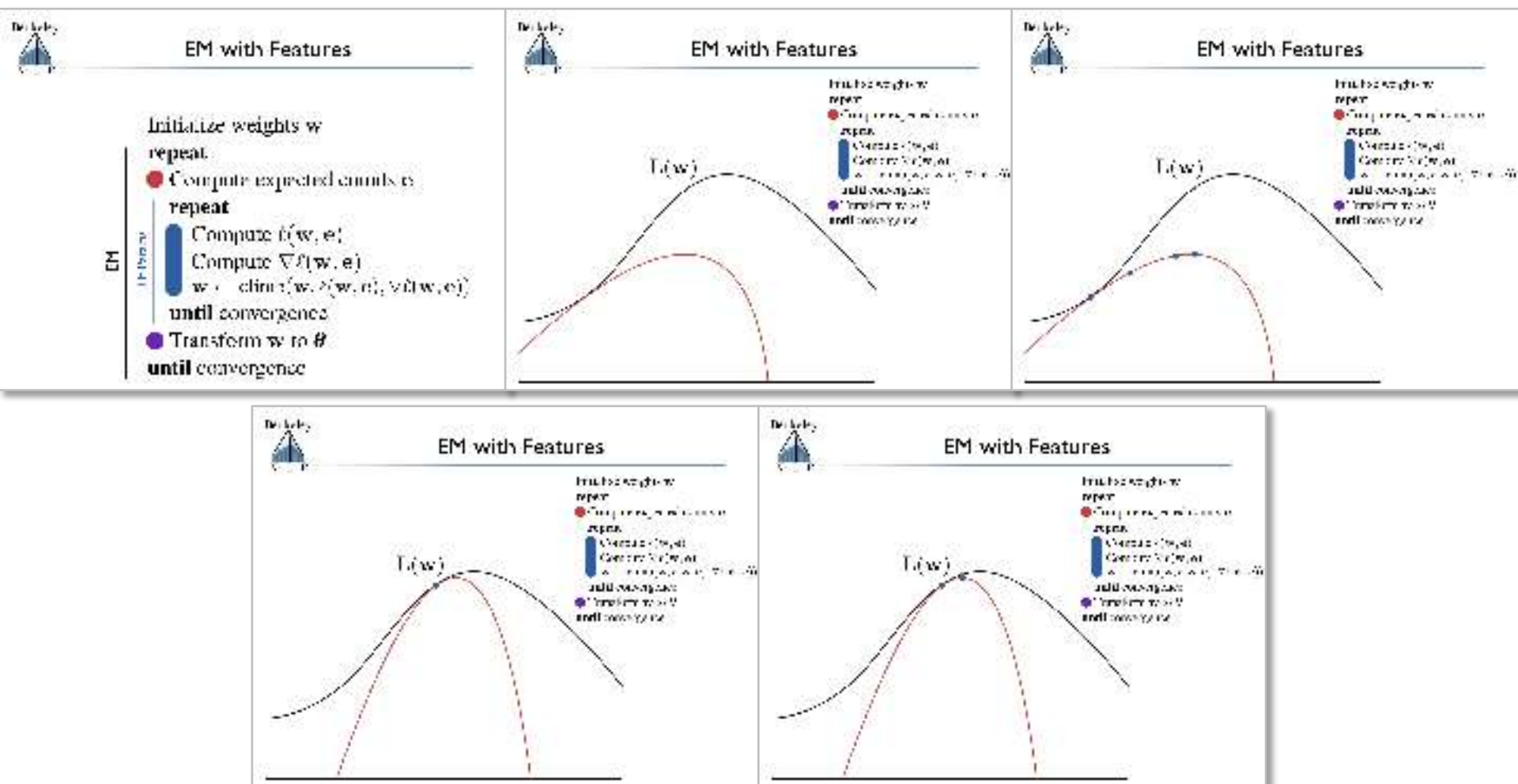
Parsing on English Penn Treebank (§23):

		Unlabeled attachment score (UAS)	sent / s
Transition -based	MaltParser (greedy)	89.9	560
	Our Parser (greedy)	92.0	1013
	Zpar: beam = 64	92.9*	29*
Graph -based	MSTParser	92.0	12
	TurboParser	93.1*	31*

A Fast and Accurate Dependency Parser using Neural Networks

4

模型部分：多用例子



Taylor Berg-Kirkpatrick, Alexandre Bouchard-Côté, John DeNero, and Dan Klein.
2010. Painless Unsupervised Learning with Features, 第28到54页

模型部分：反例

Transition	Current State	Resulting State	Description
DROP	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, \beta, A]$	pops out the word that doesn't convey any semantics (e.g., function words and punctuations).
MERGE	$[\sigma s_0, \delta, b_0 b_1 \beta, A]$	$[\sigma s_0, \delta, b_0 \cdot b_1 \beta, A]$	concatenates a sequence of words into a span, which can be derived as a named entity (name) or date-entity.
CONFIRM(c)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, c \beta, A]$	derives the first element of the buffer (a word or span) into a concept c .
ENTITY(\bar{c})	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, c \beta, A \cup \text{relations}(\bar{c})]$	a special form of CONFIRM that derives the first element into an entity and builds the internal entity AMR fragment.
NEW(c)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, c b_0 \beta, A]$	generates a new concept c and pushes it to the front of the buffer.
LEFT(r)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, b_0 \beta, A \cup \{s_0 \xrightarrow{r} b_0\}]$	links a relation r between the top concepts on the stack and the buffer.
RIGHT(r)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, b_0 \beta, A \cup \{s_0 \xrightarrow{r} b_0\}]$	
CACHE	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma, s_0 \delta, b_0 \beta, A]$	passes the top concept of the stack onto the deque.
SHIFT	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0 \delta b_0, [], \beta, A]$	shifts the first concept of the buffer onto the stack along with those on the deque.
REDUCE	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma, \delta, b_0 \beta, A]$	pops the top concept of the stack.

实验部分：图比表格好

LDC2014T12 Experiments

- alignment F-score

Aligner	Alignment F1 (on hand-align)	Oracle's Search (on dev. dataset)
JAMR	90.6	91.7
Our	95.2	94.7

- parser improvements

model	news14	all
JAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	71.3	65.9
+ Our aligner	73.1	67.6
CAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	68.4	64.6
+ Our aligner	68.8	65.1

Aligner Experiments: Two Open-sourced AMR Parsers



实验部分：图比表格好

信息元素的易理解度



Genes	Category	Top 40 Proteins	Number of Targets
CDK5	proliferation	71	21
	neuronal fate	42	24
	transcription	44	23
	stress	40	26
	cell cycle control	43	22
Cdk5Rb	cell cycle	32	14
	neuronal fate	28	20
	neuronal fate	26	19
	neuronal fate	26	17
	neuronal fate	26	17
Cdk5	neuronal fate	37	18
	neuronal fate	37	17
	neuronal fate	37	17
	neuronal fate	37	17
	neuronal fate	37	17
Cdk5	neuronal fate	37	18
	neuronal fate	37	17
	neuronal fate	37	17
	neuronal fate	37	17
	neuronal fate	37	17

表格

Shift-reduce parsing is efficient but suffers from parsing errors caused by syntactic ambiguity. Figure 8 shows two (partial) derivations for a dependency tree. Consider the item on the top; the *is* operator can either apply a shift action to extend a new item or apply a reduce (left action) to extend a big *g* structure. This is often referred to as conflict in the shift-reduce dependency parsing literature (Jiang et al., 2009). In this work, the shift-reduce parser uses four types of conflict:

正文

$$= \sum_{\alpha=0}^i \sum_{y \in \mathcal{Y} \times \mathcal{X}^{i-\alpha}} P(y|x^{(i)}, \theta) \phi_\alpha(x^{(i)}, y) \sum_{x \in \mathcal{X}} \sum_{y' \in \mathcal{Y} \times \mathcal{X}^{i-\alpha}} P(x, y'|x, y; \theta) \phi_\alpha(x, y')$$

公式

100

[illegible]

算法

Proof of Theorem 1: Let \mathbf{u}^k be the weights before the k th update is made. It follows that $\|\mathbf{u}^k\|_2 = 1$. Suppose the i th row is made of the i th nonzero labels in the initial input set of the example $\mathbf{z} = (z_1, z_2, \dots, z_n) \in \mathbb{R}^{n \times 1}$. \mathbf{u}^k follows from the algorithm applied that $\mathbf{z}^T \mathbf{u}^k = -\mathbf{z}^T \mathbf{u}^{k-1} + \langle \mathbf{z}, \mathbf{u}^{k-1} \rangle - \langle \mathbf{z}, \mathbf{u}^k \rangle$. We take inner products of both sides with the vector \mathbf{z} .

where the inequality follows because of the property of U assumed in Eq. 3. Since $\sigma^2 = 1$, we therefore have $U \leq \sigma^2 = 1$. It follows for arbitrary λ that for all λ , $\mathbb{E}[\sigma^2] \geq \lambda^2 \cdot \mathbb{E}[U]$. Since $U \cdot \sigma^{2(1-\lambda)} \leq [U] \cdot [\sigma^{2(1-\lambda)}]$, it follows that $[\sigma^{2(1-\lambda)}] \geq \lambda$.

证明

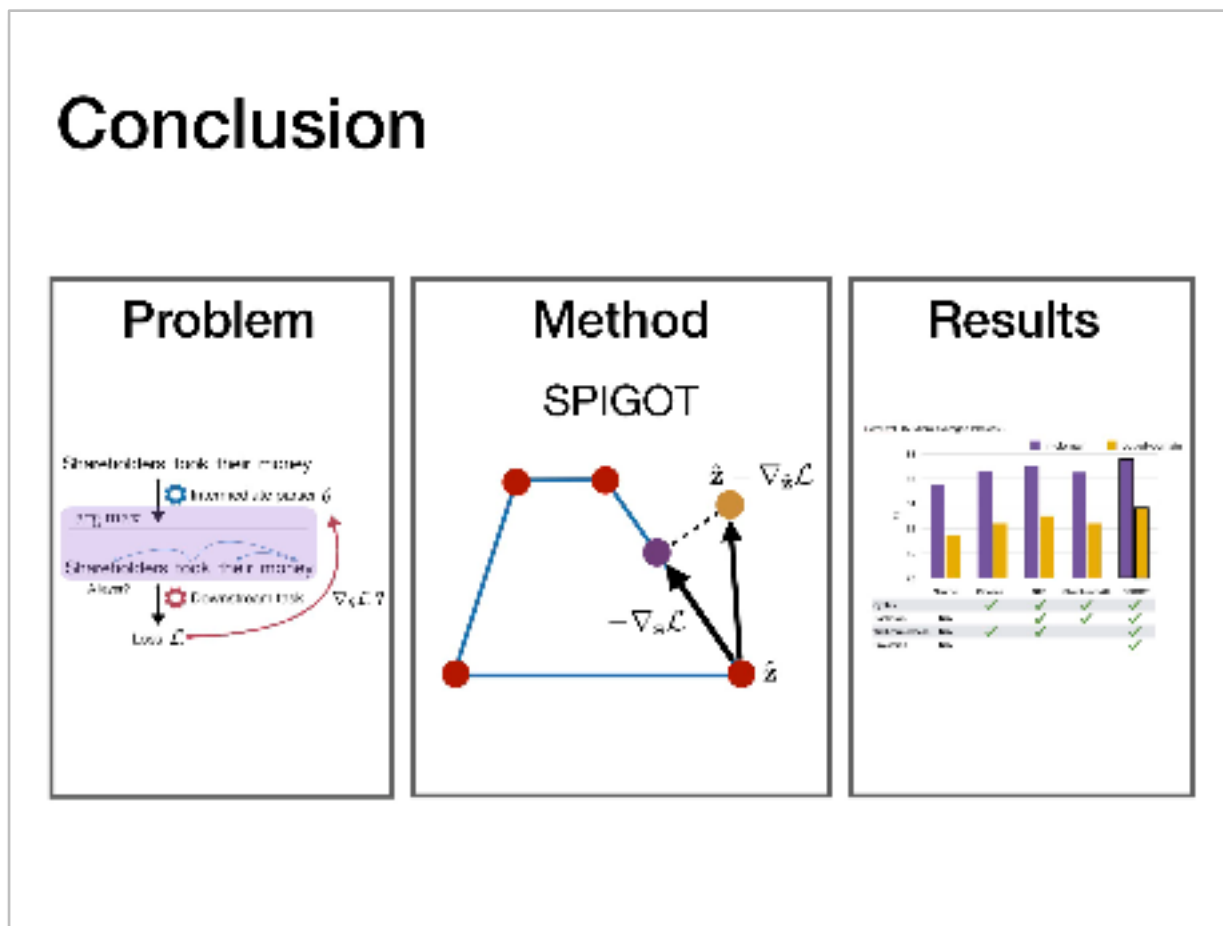


实验部分：图比表格好



用图与例子来描述方法和实验

结论部分：新的展现形式

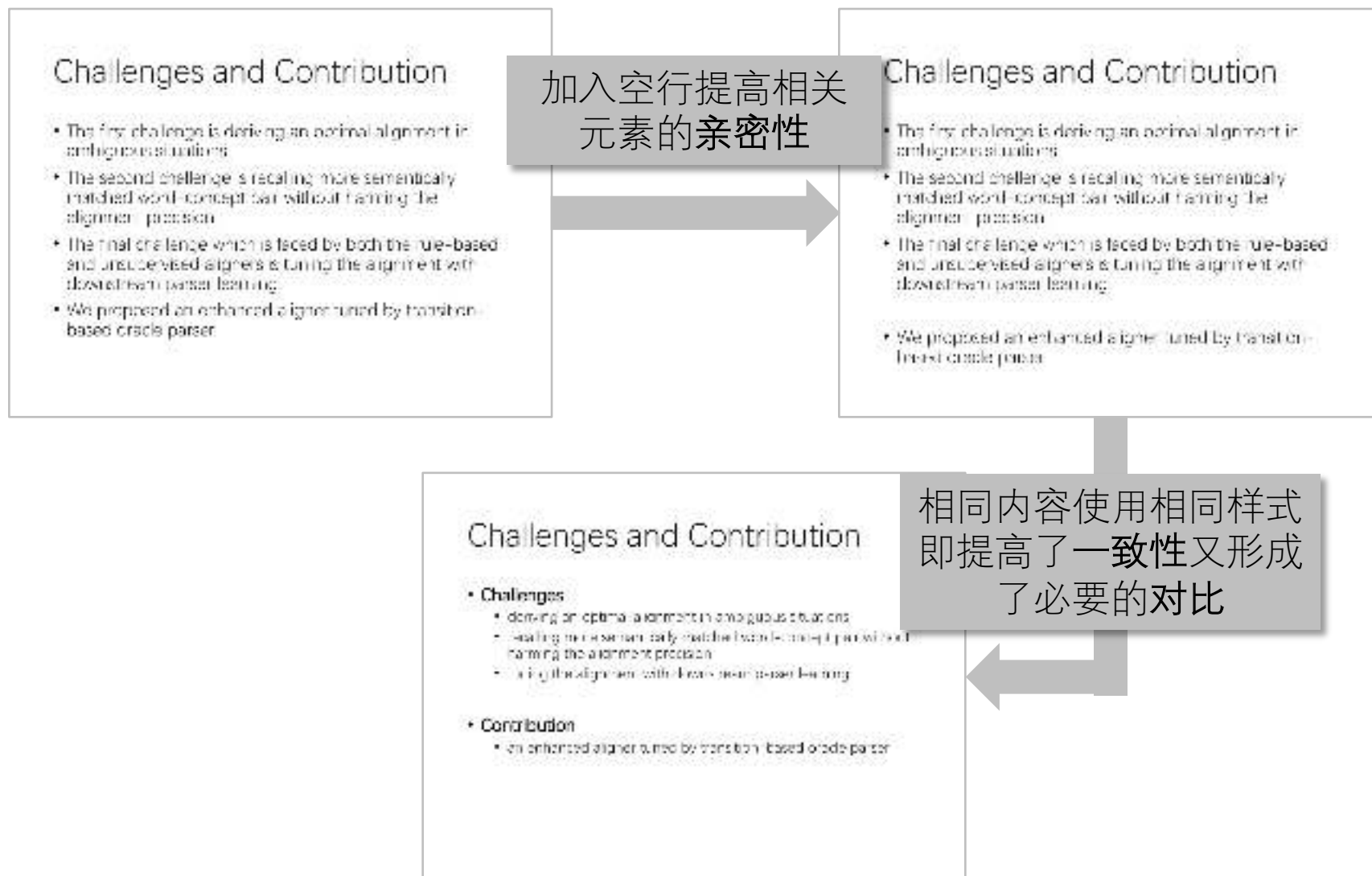


设计原则

- 亲密性：相关的元素应该组织到一起
- 重复：相同的内容达到形式的统一
- 对比：如果两项不完全相同，就应使之截然不同
- 对齐：使元素之间产生关联，有关联的都应对齐



根据设计原则做幻灯片



避免不对齐

Our aligner algorithm

- Enhancing aligner with rich semantic resources
- Producing multiple alignments

```
Input:  $A_0$ : AMR graph with a set of graph fragments  $C$ ;  
a sentence  $W$ ; a set of matching rules  $P_M$ ; and  
a set of updating rules  $P_U$ .  
Output: a set of alignments  $A_0$ .  
1 for  $c \in C$  do  
2    $A_c \leftarrow \emptyset$ .  
3 for  $p_M \in P_M$  do  
4   for  $\langle s_1, s_2 \rangle \leftarrow \text{query}(W)$  do  
5     for  $e \in C$  do  
6       if  $p_M(e, \langle s_1, s_2 \rangle)$  then  
7          $A_c \leftarrow A_c \cup \{ \langle s_1, s_2, e \rangle \}$ .  
8  $\text{updated} \leftarrow \text{true}$ .  
9 while  $\text{updated} \in \text{true}$  do  
10   $\text{updated} \leftarrow \text{false}$ .  
11  for  $p_U \in P_U$  do  
12    for  $\langle s_1, s_2 \rangle \in C \times C$  do  
13      for  $\langle s_1, s_2, e \rangle \in A_c$  do  
14        if  $p_U(\langle s_1, s_2, e \rangle) \cap \langle s_1, s_2, e' \rangle \in A_c$  then  
15           $A_c \leftarrow A_c \cup \langle s_1, s_2, e' \rangle$ .  
16           $\text{updated} \leftarrow \text{true}$ .  
17  $A \leftarrow \emptyset$ .  
18 for  $\langle a_1, \dots, a_n \rangle \in \text{CartesianProduct}(A_1, \dots, A_n)$  do  
19    $\text{legal} \leftarrow \text{true}$ .  
20   for  $a \in \{a_1, \dots, a_n\}$  do  
21      $\langle s_1, s_2, e \rangle \leftarrow a$ .  
22      $\langle s_1', s_2', e' \rangle \leftarrow a_{i \neq i}$ .  
23     if  $s_1 \neq s_1' \vee s_2 \neq s_2'$  then  
24        $\text{legal} \leftarrow \text{false}$ .  
25   if  $\text{legal}$  then  
26      $A \leftarrow A \cup \{ \langle a_1, \dots, a_n \rangle \}$ .
```

“乱” 的原因：视线跳动过多

Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Aligner	Alignment F1 (on hand-align)	Oracle's Smatch (on dev. dataset)
JAMR	90.6	91.7
Our	95.2	94.7

model	newswire	all
JAMR parser: Word, POS, NER, DEP		
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model	newswire	all
Our single parser: Word only		
+ JAMR aligner	68.6	63.9
+ Our aligner	69.3	64.7
Our single parser: Word, POS		
+ JAMR aligner	68.8	64.6
+ Our aligner	69.8	65.2
Our ensemble: Word only + Our aligner		
x3	71.9	67.4
x10	72.5	68.1
Our ensemble: Word, POS + Our aligner		
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“乱” 的解法：重新组织内容

Experiments

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视线跳动在论文写作中的作用

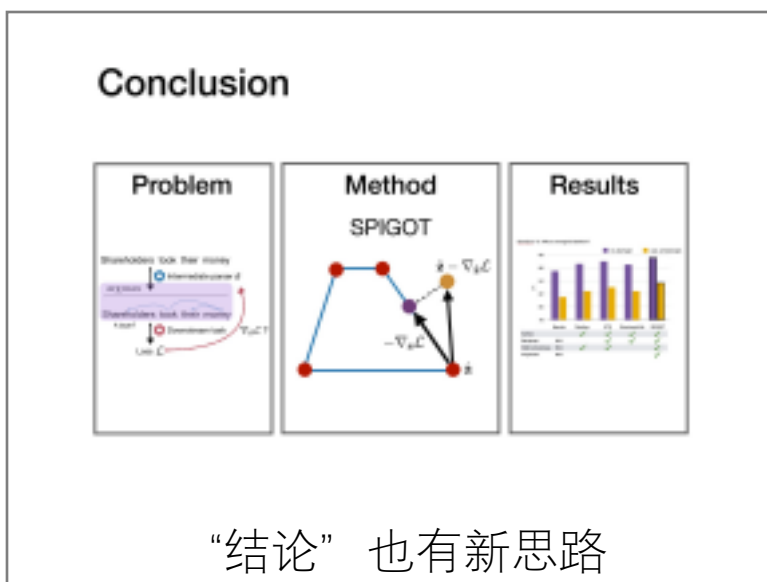
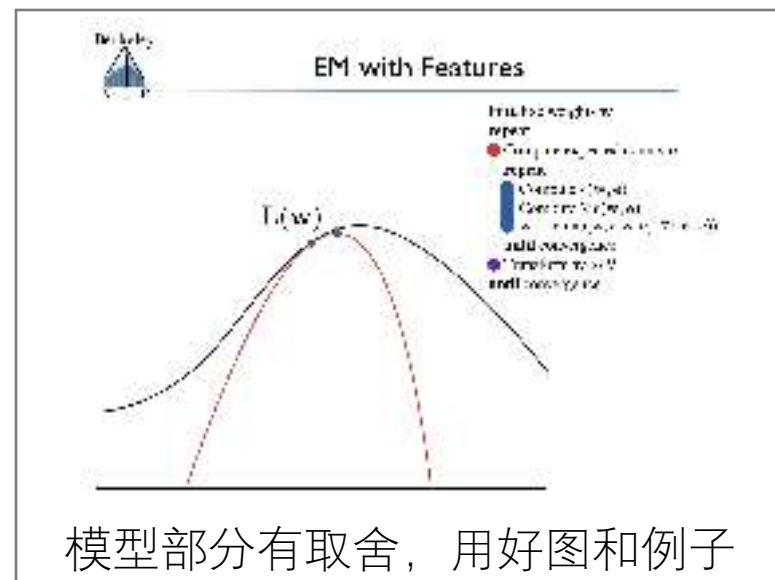
信息流的变化



参考文献

- Simon Peyton Jones: How to give a great talk
- 写给大家看的设计书
- 机器翻译学术论文写作方法与技巧
- 知乎专栏：跟我学个P

总结



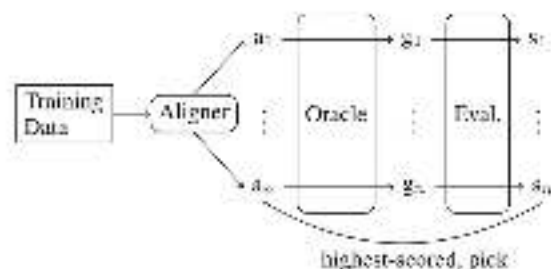
祝大家产出优秀的学术工作

最简单做法：复制粘贴

Challenges and Contribution

- The first challenge is deriving an optimal alignment in ambiguous situations
- The second challenge is recalling more semantically matched word-concept pair without harming the alignment process
- The final challenge which is shared by both the rule-based and statistical aligners is tuning the aligner with downstream parse learning.
- We present an enhanced aligner tuned by trans-ferred parse output

Overview



Our aligner algorithm

- Enhancing aligner with rich semantic resources
- Producing multiple alignments

```

1 Input: A VUE graph with a set of graph fragments  $G$ 
2 and a set of nodes  $M$  to be added to  $G$ . The set
3 and a set of options  $opt$  (Fig. 1).
4 Output: A set of algorithms  $alg$ .
5 1 Set  $alg := \emptyset$ .
6 2  $alg := \emptyset$ .
7 3 Set  $alg := \emptyset$ .
8 4 For  $g \in G$  do
9 5   For  $m \in M$  do
10 6     If  $g$  is a VUE graph then
11 7        $alg := alg \cup \{g, m\}$ 
12 8   End For
13 9 End For
14 5 Input:  $opt = \{opt\}$ .
15 6 While  $opt \neq \emptyset$  do
16 7   For  $opt \in opt$  do
17 8     For  $g \in G$  do
18 9       For  $m \in M$  do
19 10        If  $g$  is a VUE graph then
20 11           $alg := alg \cup \{g, m\}$ 
21 12        End For
22 13      End For
23 14    End For
24 15  End While
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144 39 Set  $alg := \emptyset$ .
145 40 For  $g \in G$  do
146 41   For  $m \in M$  do
147 42    If  $g$  is a VUE graph then
148 43       $alg := alg \cup \{g, m\}$ 
149 44    End For
150 45  End For
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233 68    End For
234 69  End For
235 65 Set  $alg := \emptyset$ .
236 66 For  $g \in G$  do
237 67   For  $m \in M$  do
238 68    If <
```

Our oracle parser

[illegible]

Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Agent	Assigned F.I. (Number of agents)	Number of agents (Number of agents)	model	percentage	F
FAIR	36.5	41.7	Random agent, No policy		
			+ DDPG agent	50.0	59.5
			+ Critic agent	57.7	54.5
Star	35.2	34.7	Random agent, No policy		
			+ DDPG agent	50.0	50.0
			+ Critic agent	50.0	50.0
model					F
FAIR agent, No policy, No DDPG					
+ FAIR agent	71.5	65.5			
+ Star agent	75.1	63.5			
FAIR agent, No policy, No DDPG					
+ FAIR agent	50.0	61.5			
+ Star agent	25.5	62.1			

Conclusion

- We propose a new AMR aligner which is built by a novel transition-based AMR oracle parser. Our aligner is also enhanced by rich semantic resource and recalls more arguments.
- Both the intrinsic and extrinsic evaluations show the effectiveness of our aligner by achieving highest alignment F1 score and consistently improving two open-sourced AMR parsers.
- We also develop transition-based AMR parser based on our aligner and transiton system and it achieves a performance of 68.4 F1 score via ensemble of fully semantic and POS tags as input.

设计原则(1): 亲密性

相关的元素应该组织到一起

- 目的：实现组织性
- 亲密性检查：眯起眼
 - 视线跳动的次数不宜超过3次
 - 过多的跳动需要重新设计
- 实现方式：加空行

“过多跳动” 的反例

Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Aligner	Alignment F1 (on hand-align)	Oracle's Smatch (on dev. dataset)
JAMR	90.6	91.7
Our	95.2	94.7

model	newswire	all
JAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	71.3	65.9
+ Our aligner	73.1	67.6
CAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	68.4	64.6
+ Our aligner	68.8	65.1

model	newswire	all
Our single parser: Word only		
+ JAMR aligner	68.6	63.9
+ Our aligner	69.3	64.7
Our single parser: Word, POS		
+ JAMR aligner	68.8	64.6
+ Our aligner	69.8	65.2
Our ensemble: Word only + Our aligner		
x3	71.9	67.4
x10	72.5	68.1
Our ensemble: Word, POS + Our aligner		
x3	72.5	67.7
x10	73.3	68.4

“过多跳动” 的反例

Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Aligner	Alignment F1 (on hand-align)	Oracle's Smatch (on dev. dataset)
JAMR	90.6	91.7
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CAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	68.4	64.6
+ Our aligner	68.8	65.1

model	newswire	all
Our single parser: Word only		
+ JAMR aligner	68.6	63.9
+ Our aligner	69.3	64.7
Our single parser: Word, POS		
+ JAMR aligner	68.8	64.6
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Our ensemble: Word only + Our aligner		
x3	71.9	67.4
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Our ensemble: Word, POS + Our aligner		
x3	72.5	67.7
x10	73.3	68.4

“过多跳动” 的反例

The image shows a blurred screenshot of a presentation slide. The slide has a title "Experiments" at the top. Below the title, there is a dashed box containing two bullet points. The first bullet point mentions "conduct experiments on L2C2004712". The second bullet point mentions "evaluate the alignment F-score and breadth of related papers". Below the dashed box, there are two tables. The left table has a blue header and the right table has a yellow header. Both tables contain several rows of data. At the bottom of the slide, there is a red banner with white text.

Experiments

- We conduct experiments on L2C2004712
- We evaluate the alignment F-score and breadth of related papers

Model	Alignment F-score	Breadth
Model A	0.85	0.92
Model B	0.78	0.88
Model C	0.82	0.90

Model	Alignment F-score	Breadth
Model D	0.80	0.85
Model E	0.83	0.88
Model F	0.81	0.86

视线在这张幻灯片上跳动的了4到5次

修改方法：重新组织内容

Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Aligner	Alignment F1 (on hand-align)	Oracle's Smatch (on dev. dataset)
JAMR	90.6	91.7
Our	95.2	94.7

model	newswire	all
JAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	71.3	65.9
+ Our aligner	73.1	67.6
CAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	68.4	64.6
+ Our aligner	68.8	65.1

model	newswire	all
Our single parser: Word only		
+ JAMR aligner	68.6	63.9
+ Our aligner	69.3	64.7
Our single parser: Word, POS		
+ JAMR aligner	68.8	64.6
+ Our aligner	69.8	65.2
Our ensemble: Word only + Our aligner		
x3	71.0	67.4
x10	72.5	68.1
Our ensemble: Word, POS + Our aligner		
x3	72.5	67.7
x10	73.3	68.4

LDC2014T12 Experiments

- alignment F-score
- parser improvements

Aligner	Alignment F1 (on hand-align)	Oracle's Smatch (on dev. dataset)
JAMR	90.6	91.7
Our	95.2	94.7

model	newswire	all
JAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	71.3	65.9
+ Our aligner	73.1	67.6
CAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	68.4	64.6
+ Our aligner	68.8	65.1

设计原则

- 亲密性：相关的元素应该组织到一起

Challenges and Contribution

- The first challenge is deriving an optimal alignment in ambiguous situations
- The second challenge is recalling more semantically matched word-concept pair without harming the alignment precision
- The final challenge which is faced by both the rule-based and unsupervised aligners is tuning the alignment with downstream parser learning
- We propose an enhanced aligner tuned by transition-based oracle parser

Overview



Our aligner algorithm

- Enhancing aligner with rich semantic resources
- Producing multiple alignments



Our oracle parser

Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner

Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner
Parser	Aligner	Parser	Aligner

Conclusion

- We propose a new MSA aligner which is tuned by a local transition-based MSA oracle parser. The aligner is also enhanced by rich semantic resources and recalls more alignments
- Both the manual and automatic evaluations show the effectiveness of our aligner by achieving higher alignment F-score and consistently improving two state-of-the-art MSA parsers
- We also develop transition-based MSA parser based on our aligner and transition system and it achieves a performance of 88.4 Smatch F1 score via alignment with only words and POS tags as input

进一步合并，并加粗

Challenges and Contribution

- The first challenge is deriving an optimal alignment in ambiguous situations.
- The second challenge is recalling more semantically matched word-concept pair without harming the alignment precision.
- The final challenge which is faced by both the rule-based and unsupervised aligners is tuning the alignment with downstream parser learning.
- We proposed an enhanced aligner tuned by transition-based oracle parser



Challenges and Contribution

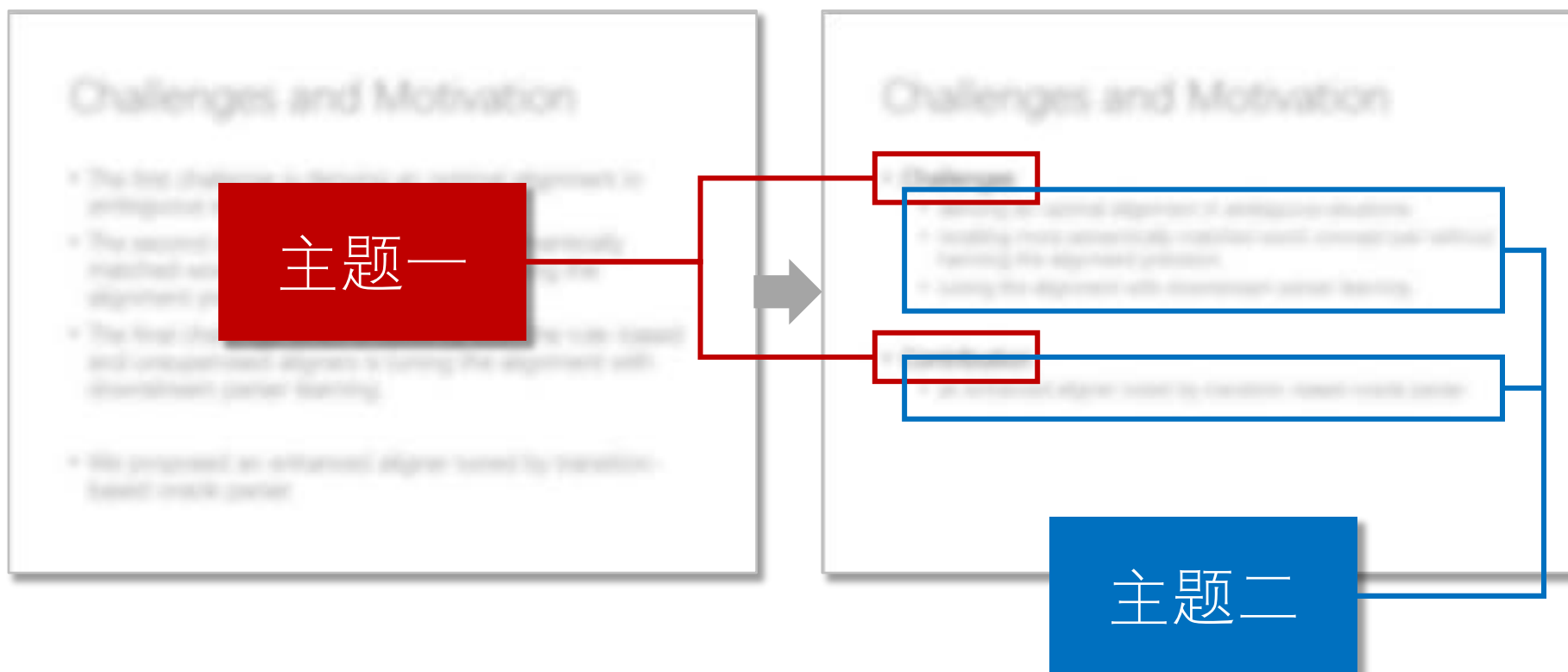
• Challenges

- deriving an optimal alignment in ambiguous situations.
- recalling more semantically matched word-concept pair without harming the alignment precision.
- tuning the alignment with downstream parser learning.

• Contribution

- an enhanced aligner tuned by transition-based oracle parser

进一步合并，并加粗



设计原则(2): 重复

重复相同的内容达到形式的统一

- 目的：提高组织性
- 重复检查：是否使用相同的字体样式等
- 实现方式：使用不同的样式、对齐方式

设计原则

- 亲密性：相关的元素应该组织到一起
- 重复：相同的内容达到形式的统一

“‘过多跳动’的反例”中的对比

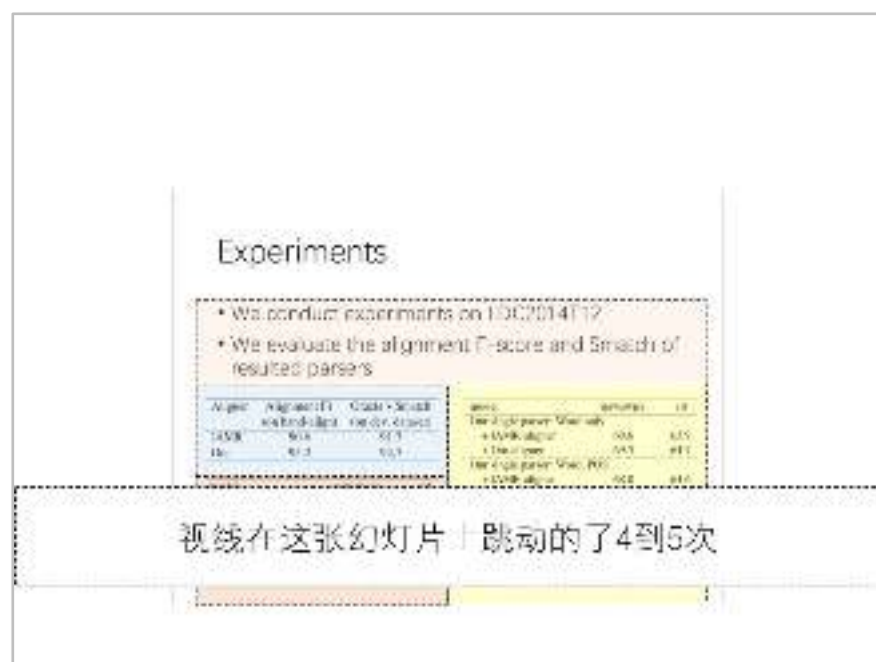


Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Parser	Align F1	Align S _{match}	Align S _{match}
GLUE	61.6	61.7	61.7
He	61.3	61.3	61.3

视线在这张幻灯片上跳动的了4到5次



Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Parser	Align F1	Align S _{match}	Align S _{match}
GLUE	61.6	61.7	61.7
He	61.3	61.3	61.3

视线在这张幻灯片上跳动的了4到5次

设计原则(3): 对比

如果两项不完全相同，就应使之截然不同

- 目的：增强页面效果和提高组织性
- 实现方式：使用不同的样式

设计原则

- 亲密性：相关的元素应该组织到一起
- 重复：相同的内容达到形式的统一
- 对比：如果两项不完全相同，就应使之截然不同

Our aligner algorithm

- Enhancing slogan with rich semantic resources
- Producing multiple alignments

```

1 Input: An AQL graph with a set of graph fragments  $G$ 
2 and a source  $h$ , set of nodes  $g$ , and a set of
3 edges  $e$  to apply the algorithm to.
4 Output: A set of edge annotations.
5 1. Set  $h \leftarrow h \cup G$ 
6 2.  $h \leftarrow h \cup G$ 
7 3. Set  $g \leftarrow g \cup G$ 
8 4. for  $g \in g$  do
9   4.1 for  $e \in e$  do
10    4.1.1 If  $g \in g$  then
11     4.1.1.1  $g \leftarrow g \cup G$ 
12 5.  $g \leftarrow g \cup G$ 
13 6. while  $g \neq \emptyset$  do
14   6.1  $g \leftarrow g \cup G$ 
15   6.2 for  $g \in g$  do
16     6.2.1 If  $g \in g$  then
17       6.2.1.1 for  $e \in e$  do
18         6.2.1.1.1 If  $g \in g$  then
19           6.2.1.1.1.1  $g \leftarrow g \cup G$ 
20           6.2.1.1.1.2  $g \leftarrow g \cup G$ 
21 7.  $g \leftarrow g \cup G$ 
22 8. for  $g \in g$  do
23   8.1 for  $e \in e$  do
24     8.1.1  $g \leftarrow g \cup G$ 
25     8.1.2  $g \leftarrow g \cup G$ 
26     8.1.3  $g \leftarrow g \cup G$ 
27     8.1.4  $g \leftarrow g \cup G$ 
28     8.1.5  $g \leftarrow g \cup G$ 
29     8.1.6  $g \leftarrow g \cup G$ 
30     8.1.7  $g \leftarrow g \cup G$ 
31     8.1.8  $g \leftarrow g \cup G$ 
32     8.1.9  $g \leftarrow g \cup G$ 
33     8.1.10  $g \leftarrow g \cup G$ 
34     8.1.11  $g \leftarrow g \cup G$ 
35     8.1.12  $g \leftarrow g \cup G$ 
36     8.1.13  $g \leftarrow g \cup G$ 
37     8.1.14  $g \leftarrow g \cup G$ 
38     8.1.15  $g \leftarrow g \cup G$ 
39     8.1.16  $g \leftarrow g \cup G$ 
40     8.1.17  $g \leftarrow g \cup G$ 
41     8.1.18  $g \leftarrow g \cup G$ 
42     8.1.19  $g \leftarrow g \cup G$ 
43     8.1.20  $g \leftarrow g \cup G$ 
44     8.1.21  $g \leftarrow g \cup G$ 
45     8.1.22  $g \leftarrow g \cup G$ 
46     8.1.23  $g \leftarrow g \cup G$ 
47     8.1.24  $g \leftarrow g \cup G$ 
48     8.1.25  $g \leftarrow g \cup G$ 
49     8.1.26  $g \leftarrow g \cup G$ 
50     8.1.27  $g \leftarrow g \cup G$ 
51     8.1.28  $g \leftarrow g \cup G$ 
52     8.1.29  $g \leftarrow g \cup G$ 
53     8.1.30  $g \leftarrow g \cup G$ 
54     8.1.31  $g \leftarrow g \cup G$ 
55     8.1.32  $g \leftarrow g \cup G$ 
56     8.1.33  $g \leftarrow g \cup G$ 
57     8.1.34  $g \leftarrow g \cup G$ 
58     8.1.35  $g \leftarrow g \cup G$ 
59     8.1.36  $g \leftarrow g \cup G$ 
60     8.1.37  $g \leftarrow g \cup G$ 
61     8.1.38  $g \leftarrow g \cup G$ 
62     8.1.39  $g \leftarrow g \cup G$ 
63     8.1.40  $g \leftarrow g \cup G$ 
64     8.1.41  $g \leftarrow g \cup G$ 
65     8.1.42  $g \leftarrow g \cup G$ 
66     8.1.43  $g \leftarrow g \cup G$ 
67     8.1.44  $g \leftarrow g \cup G$ 
68     8.1.45  $g \leftarrow g \cup G$ 
69     8.1.46  $g \leftarrow g \cup G$ 
70     8.1.47  $g \leftarrow g \cup G$ 
71     8.1.48  $g \leftarrow g \cup G$ 
72     8.1.49  $g \leftarrow g \cup G$ 
73     8.1.50  $g \leftarrow g \cup G$ 
74     8.1.51  $g \leftarrow g \cup G$ 
75     8.1.52  $g \leftarrow g \cup G$ 
76     8.1.53  $g \leftarrow g \cup G$ 
77     8.1.54  $g \leftarrow g \cup G$ 
78     8.1.55  $g \leftarrow g \cup G$ 
79     8.1.56  $g \leftarrow g \cup G$ 
80     8.1.57  $g \leftarrow g \cup G$ 
81     8.1.58  $g \leftarrow g \cup G$ 
82     8.1.59  $g \leftarrow g \cup G$ 
83     8.1.60  $g \leftarrow g \cup G$ 
84     8.1.61  $g \leftarrow g \cup G$ 
85     8.1.62  $g \leftarrow g \cup G$ 
86     8.1.63  $g \leftarrow g \cup G$ 
87     8.1.64  $g \leftarrow g \cup G$ 
88     8.1.65  $g \leftarrow g \cup G$ 
89     8.1.66  $g \leftarrow g \cup G$ 
90     8.1.67  $g \leftarrow g \cup G$ 
91     8.1.68  $g \leftarrow g \cup G$ 
92     8.1.69  $g \leftarrow g \cup G$ 
93     8.1.70  $g \leftarrow g \cup G$ 
94     8.1.71  $g \leftarrow g \cup G$ 
95     8.1.72  $g \leftarrow g \cup G$ 
96     8.1.73  $g \leftarrow g \cup G$ 
97     8.1.74  $g \leftarrow g \cup G$ 
98     8.1.75  $g \leftarrow g \cup G$ 
99     8.1.76  $g \leftarrow g \cup G$ 
100    8.1.77  $g \leftarrow g \cup G$ 
101    8.1.78  $g \leftarrow g \cup G$ 
102    8.1.79  $g \leftarrow g \cup G$ 
103    8.1.80  $g \leftarrow g \cup G$ 
104    8.1.81  $g \leftarrow g \cup G$ 
105    8.1.82  $g \leftarrow g \cup G$ 
106    8.1.83  $g \leftarrow g \cup G$ 
107    8.1.84  $g \leftarrow g \cup G$ 
108    8.1.85  $g \leftarrow g \cup G$ 
109    8.1.86  $g \leftarrow g \cup G$ 
110    8.1.87  $g \leftarrow g \cup G$ 
111    8.1.88  $g \leftarrow g \cup G$ 
112    8.1.89  $g \leftarrow g \cup G$ 
113    8.1.90  $g \leftarrow g \cup G$ 
114    8.1.91  $g \leftarrow g \cup G$ 
115    8.1.92  $g \leftarrow g \cup G$ 
116    8.1.93  $g \leftarrow g \cup G$ 
117    8.1.94  $g \leftarrow g \cup G$ 
118    8.1.95  $g \leftarrow g \cup G$ 
119    8.1.96  $g \leftarrow g \cup G$ 
120    8.1.97  $g \leftarrow g \cup G$ 
121    8.1.98  $g \leftarrow g \cup G$ 
122    8.1.99  $g \leftarrow g \cup G$ 
123    8.1.100  $g \leftarrow g \cup G$ 
124    8.1.101  $g \leftarrow g \cup G$ 
125    8.1.102  $g \leftarrow g \cup G$ 
126    8.1.103  $g \leftarrow g \cup G$ 
127    8.1.104  $g \leftarrow g \cup G$ 
128    8.1.105  $g \leftarrow g \cup G$ 
129    8.1.106  $g \leftarrow g \cup G$ 
130    8.1.107  $g \leftarrow g \cup G$ 
131    8.1.108  $g \leftarrow g \cup G$ 
132    8.1.109  $g \leftarrow g \cup G$ 
133    8.1.110  $g \leftarrow g \cup G$ 
134    8.1.111  $g \leftarrow g \cup G$ 
135    8.1.112  $g \leftarrow g \cup G$ 
136    8.1.113  $g \leftarrow g \cup G$ 
137    8.1.114  $g \leftarrow g \cup G$ 
138    8.1.115  $g \leftarrow g \cup G$ 
139    8.1.116  $g \leftarrow g \cup G$ 
140    8.1.117  $g \leftarrow g \cup G$ 
141    8.1.118  $g \leftarrow g \cup G$ 
142    8.1.119  $g \leftarrow g \cup G$ 
143    8.1.120  $g \leftarrow g \cup G$ 
144    8.1.121  $g \leftarrow g \cup G$ 
145    8.1.122  $g \leftarrow g \cup G$ 
146    8.1.123  $g \leftarrow g \cup G$ 
147    8.1.124  $g \leftarrow g \cup G$ 
148    8.1.125  $g \leftarrow g \cup G$ 
149    8.1.126  $g \leftarrow g \cup G$ 
150    8.1.127  $g \leftarrow g \cup G$ 
151    8.1.128  $g \leftarrow g \cup G$ 
152    8.1.129  $g \leftarrow g \cup G$ 
153    8.1.130  $g \leftarrow g \cup G$ 
154    8.1.131  $g \leftarrow g \cup G$ 
155    8.1.132  $g \leftarrow g \cup G$ 
156    8.1.133  $g \leftarrow g \cup G$ 
157    8.1.134  $g \leftarrow g \cup G$ 
158    8.1.135  $g \leftarrow g \cup G$ 
159    8.1.136  $g \leftarrow g \cup G$ 
160    8.1.137  $g \leftarrow g \cup G$ 
161    8.1.138  $g \leftarrow g \cup G$ 
162    8.1.139  $g \leftarrow g \cup G$ 
163    8.1.140  $g \leftarrow g \cup G$ 
164    8.1.141 <
```

对齐

Our aligner algorithm

- Enhancing aligner with rich semantic resources
- Producing multiple alignments

```
Input:  $A_0$ : AMR graph with a set of graph fragments  $C$ ;  
a sentence  $W$ ; a set of matching rules  $P_M$ ; and  
a set of updating rules  $P_U$ .  
Output: a set of alignments  $A_0$ .  
1 for  $c \in C$  do  
2    $A_c \leftarrow \emptyset$ .  
3 for  $\rho_M \in P_M$  do  
4   for  $\langle s_1, s_2 \rangle \leftarrow \text{query}(W)$  do  
5     for  $e \in C$  do  
6       if  $\rho_M(e, \langle s_1, s_2 \rangle)$  then  
7          $A_c \leftarrow A_c \cup \{(s_1, e, s_2)\}$ .  
8  
9  $\text{updated} \leftarrow \text{true}$ ;  
10 while  $\text{updated} \in \text{true}$  do  
11    $\text{updated} \leftarrow \text{false}$ ;  
12   for  $\rho_U \in P_U$  do  
13     for  $\langle s, s' \rangle \in C \times C$  do  
14       for  $\langle s_1, s_2 \rangle \in A_c$  do  
15         if  $\rho_U(\langle s, s' \rangle) \cap \langle s_1, s_2 \rangle \neq \emptyset$  then  
16            $A_c \leftarrow A_c \cup \{(s, s', s_2)\}$ .  
17            $\text{updated} \leftarrow \text{true}$ .  
18  
19  $A \leftarrow \emptyset$ .  
20 for  $\langle a_1, \dots, a_n \rangle \in \text{CartesianProduct}(A_1, \dots, A_n)$  do  
21    $\text{legal} \leftarrow \text{true}$ ;  
22   for  $\alpha \in \{a_1, \dots, a_n\}$  do  
23      $\langle s, s', d \rangle \leftarrow \alpha$ .  
24      $\langle s', s', d \rangle \leftarrow \alpha$ .  
25     if  $s \neq s'$  or  $s \neq d$  then  
26        $\text{legal} \leftarrow \text{false}$ .  
27  
28 if  $\text{legal}$  then  
29    $A \leftarrow A \cup \{a_1, \dots, a_n\}$ .
```

设计原则(4): 对齐

使元素之间产生关联，有关联的都应对齐

- 目的：使元素产生关联，而统一且有条理
- 对齐检查：隐线

设计原则

- 亲密性：相关的元素应该组织到一起
- 重复：相同的内容达到形式的统一
- 对比：如果两项不完全相同，就应使之截然不同
- 对齐：使元素之间产生关联，有关联的都应对齐

Challenges and Contribution

• Challenges

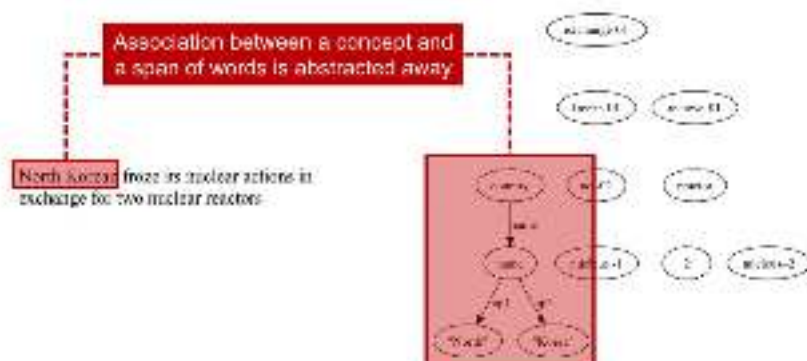
- deriving an optimal alignment in ambiguous situations
- recalling more semantically matched word-concept pair without harming the alignment precision
- tuning the alignment with deep neural network learning

• Contribution

- an enhanced aligner tuned by transition-based oracle parser



Alignment Challenge



Problems in Previous Work

- Ambiguities in matching results
- Limited semantic resources
- Parser training does not feed back to alignment



LDC2014T12 Experiments

- alignment F-score

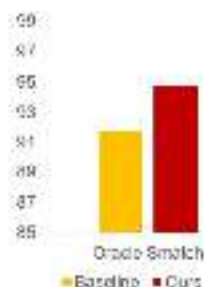
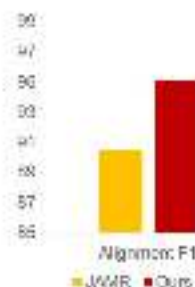
Aligner	Alignment F1 (on lund-align)	Oracle's Smatch (on dev. dataset)
JAMR	90.6	91.3
Ours	95.2	94.7

- parser improvements

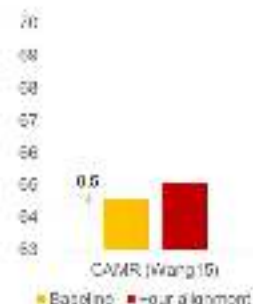
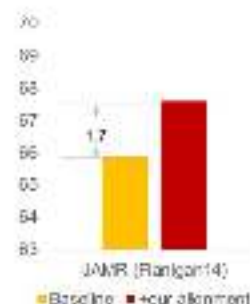
model	news13	all
JAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	71.3	65.9
+ Our aligner	73.1	67.6
CAMR parser: Word, POS, NER, DEP		
+ JAMR aligner	68.4	64.6
+ Our aligner	68.8	65.1



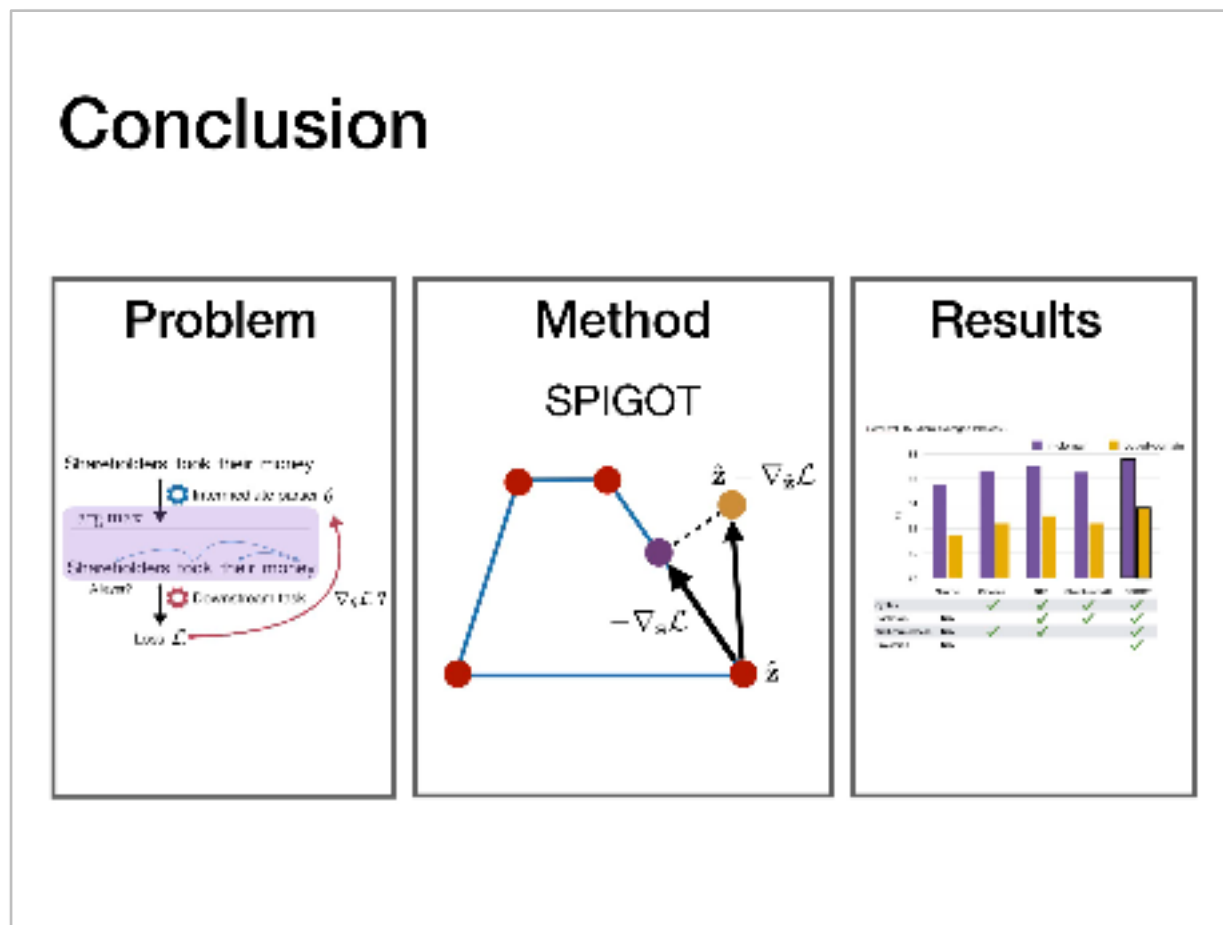
Aligner Experiments: Alignment Evaluation



Aligner Experiments: Two Open-sourced AMR Parsers



“结论” 的新的展现形式

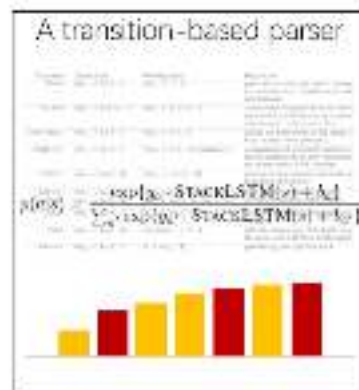
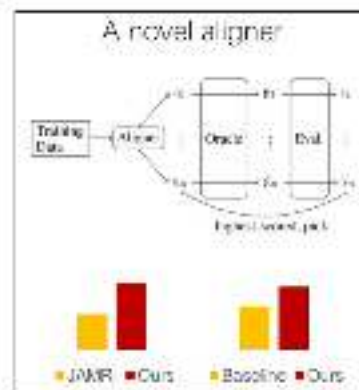


Conclusion

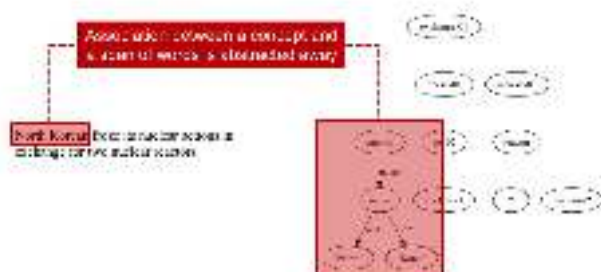
- We propose a new AMR aligner which is tuned by a novel transition-based AMR oracle parser. Our aligner is also enhanced by rich semantic resource and recalls more alignments.
- Both the intrinsic and extrinsic evaluations show the effectiveness of our aligner by achieving higher alignment F1 score and consistently improving two open-sourced AMR parsers.
- We also develop transition-based AMR parser based on our aligner and transition system and it achieves a performance of 68.4 Smatch F1 score via ensemble with only words and POS tags as input.



Conclusions



Alignment Challenge



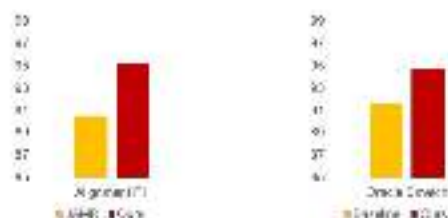
Problems in Previous Work

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- Limited semantic resources
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这里有方法的动画

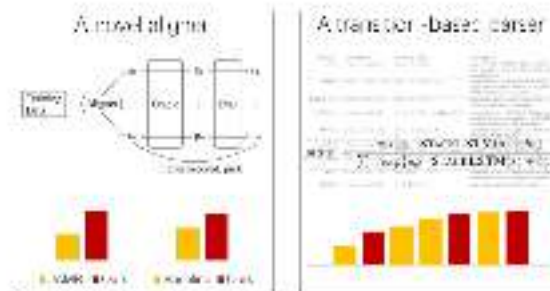
Aligner Experiments: Alignment Evaluation



Aligner Experiments: Two Open-sourced AMR Parsers



Conclusion



Challenges and Contribution

- **Challenges**

- deriving an optimal alignment in ambiguous situations.
- recalling more semantically matched word-concept pair without harming the alignment precision.
- tuning the alignment with downstream parser learning.

- **Contribution**

- an enhanced aligner tuned by transition-based oracle parser

Challenges and Contribution

- The first challenge is deriving an optimal alignment in ambiguous situations.
- The second challenge is recalling more semantically matched word-concept pair without harming the alignment precision.
- The final challenge which is faced by both the rule-based and unsupervised aligners is tuning the alignment with downstream parser learning.
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- alignment F-score

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Our aligner algorithm

- Enhancing aligner with rich semantic resources
- Producing multiple alignments

Input: An AMR graph with a set of graph fragments C ; a sentence W ; a set of matching rules P_M ; and a set of updating rules P_U .

Output: a set of alignments \mathcal{A} .

```

1 for  $c \in C$  do
2    $A_c \leftarrow \emptyset$ ;
3 for  $\rho_M \in P_M$  do
4   for  $w_{s,e} \leftarrow \text{spans}(W)$  do
5     for  $c \in C$  do
6       if  $\rho_M(c, w_{s,e})$  then
7          $A_c \leftarrow A_c \cup (s, e, \text{nil})$ ;
8 updated  $\leftarrow \text{true}$ ;
9 while updated is true do
10   updated  $\leftarrow \text{false}$ ;
11   for  $\rho_U \in P_U$  do
12     for  $c, c' \in C \times C$  do
13       for  $(s, e, d) \in A'_c$  do
14         if  $\rho_U(c, w_{s,e}) \wedge (s, e, c') \notin A_c$  then
15            $A_c \leftarrow A_c \cup (s, e, c')$ ;
16           updated  $\leftarrow \text{true}$ ;
17  $\mathcal{A} \leftarrow \emptyset$ ;
18 for  $(a_1, \dots, a_c) \in \text{CartesianProduct}(A_1, \dots, A_{|C|})$  do
19   legal  $\leftarrow \text{true}$ ;
20   for  $a \in (a_1, \dots, a_c)$  do
21      $(s, e, c') \leftarrow a$ ;
22      $(s', e', d) \leftarrow a_{c'}$ ;
23     if  $s \neq s' \wedge e \neq e'$  then
24       legal  $\leftarrow \text{false}$ ;
25   if legal then
26      $\mathcal{A} \leftarrow \mathcal{A} \cup (a_1, \dots, a_c)$ ;

```


Conclusion

- We propose a new AMR aligner which is tuned by a novel transition-based AMR oracle parser. Our aligner is also enhanced by rich semantic resource and recalls more alignments.
- Both the intrinsic and extrinsic evaluations show the effectiveness of our aligner by achieving higher alignment F1 score and consistently improving two open-sourced AMR parsers.
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Experiments

- We conduct experiments on LDC2004F12
- We evaluate the alignment F-score and breadth of matched pairs

Model	Alignment F-score	Breadth of matched pairs
Baseline	0.15	0.15
Proposed	0.25	0.25

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视线在这张幻灯片上跳动的了4到5次

Experiments

- We conduct experiments on LDC2014T12
- We evaluate the alignment F-score and Smatch of resulted parsers

Aligner	Alignment F1 (on hand-align)	Oracle's Smatch (on dev. dataset)
JAMR	90.6	91.7
Our	95.2	94.7

model	newswire	all
Our single parser: Word only		
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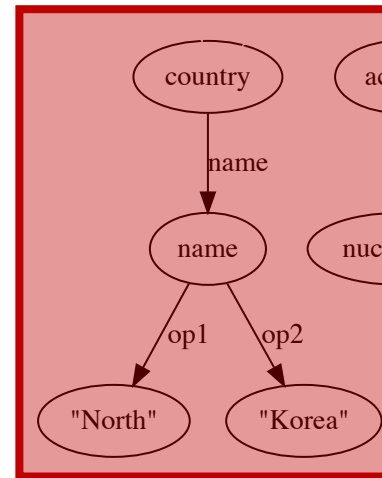
Our oracle parser

Transition	Current State	Resulting State	Description
DROP	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, \beta, A]$	pops out the word that doesn't convey any semantics (e.g., function words and punctuations).
MERGE	$[\sigma s_0, \delta, b_0 b_1 \beta, A]$	$[\sigma s_0, \delta, b_0 \cdot b_1 \beta, A]$	concatenates a sequence of words into a span, which can be derived as a named entity (name) or date-entity.
CONFIRM(c)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, c \beta, A]$	derives the first element of the buffer (a word or span) into a concept c.
ENTITY(c)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, c \beta, A \cup \text{relations}(c)]$	a special form of CONFIRM that derives the first element into an entity and builds the internal entity AMR fragment.
NEW(c)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, c b_0 \beta, A]$	generates a new concept c and pushes it to the front of the buffer.
LEFT(r)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, b_0 \beta, A \cup \{s_0 \xleftarrow{r} b_0\}]$	links a relation r between the top concepts on the stack and the buffer.
RIGHT(r)	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0, \delta, b_0 \beta, A \cup \{s_0 \xrightarrow{r} b_0\}]$	
CACHE	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma, s_0 \delta, b_0 \beta, A]$	passes the top concept of the stack onto the deque.
SHIFT	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma s_0 \delta b_0, [], \beta, A]$	shifts the first concept of the buffer onto the stack along with those on the deque.
REDUCE	$[\sigma s_0, \delta, b_0 \beta, A]$	$[\sigma, \delta, b_0 \beta, A]$	pops the top concept of the stack.

Alignment Challenge

Association between a concept and a span of words is abstracted away

North Korean froze its nuclear actions in exchange for two nuclear reactors



exchange-01

freeze-01

recieve-01

ac-02

reactor

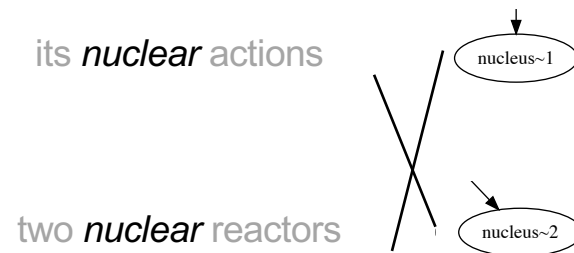
nucleus~1

2

nucleus~2

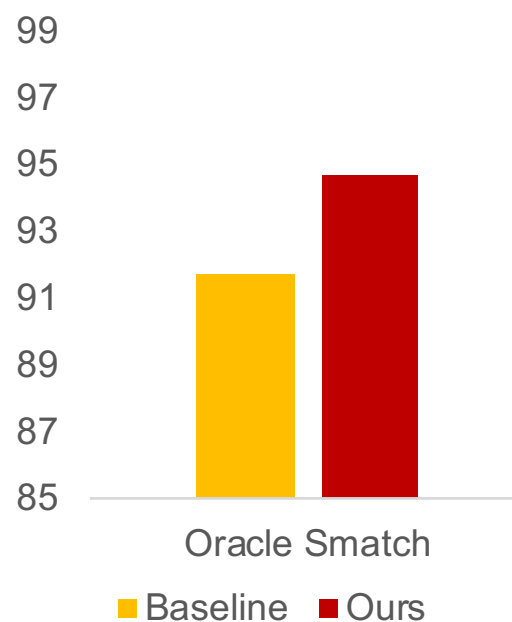
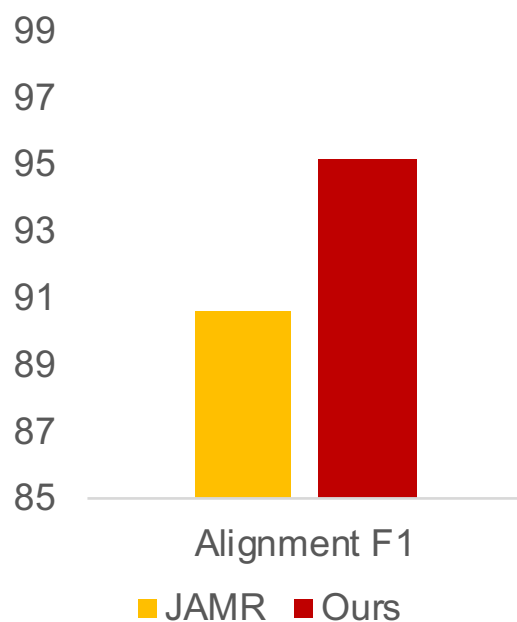
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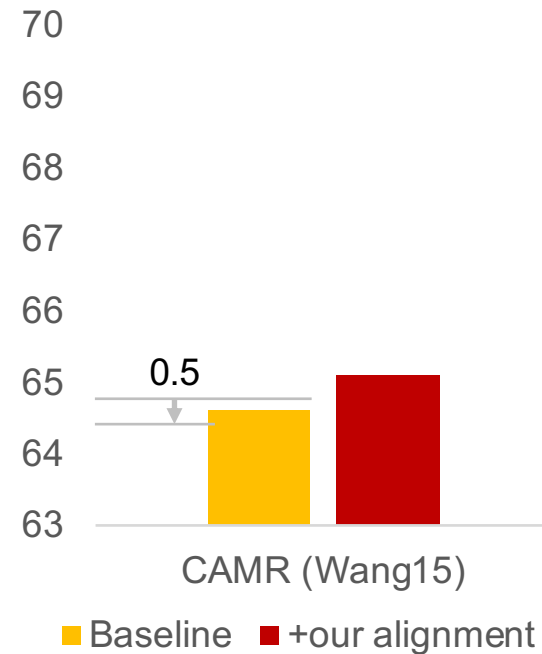
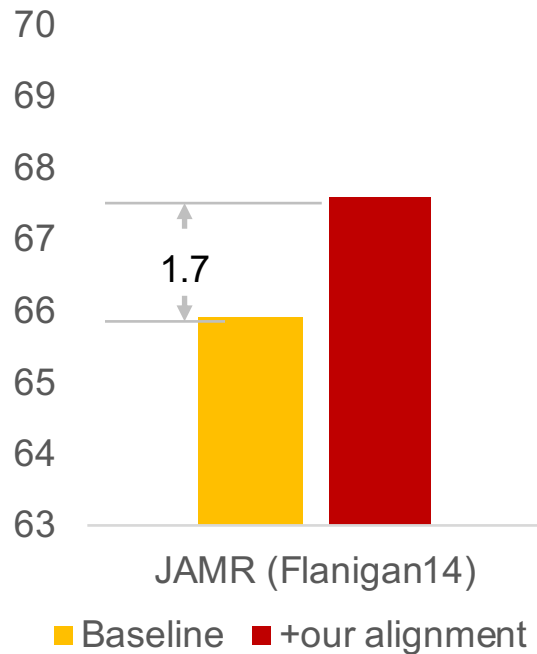


An example of ambiguities

Aligner Experiments: Alignment Evaluation

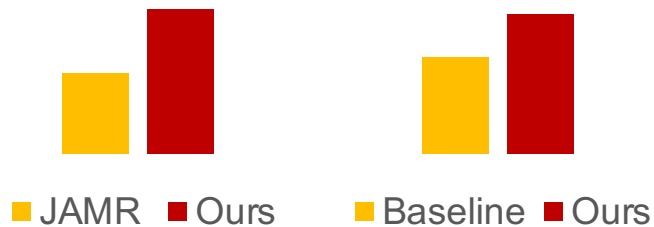
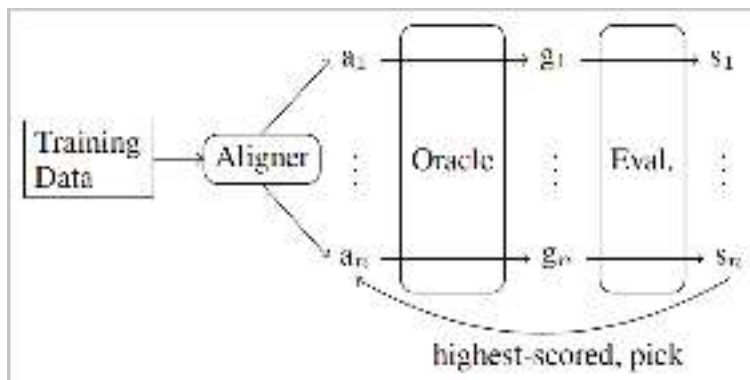


Aligner Experiments: Two Open-sourced AMR Parsers



Conclusion

A novel aligner



A transition-based parser

Transition	Current Stack	Aligning Stack	Description
SHIFT	(a_1, a_2, \dots, a_n)	(g_1, g_2, \dots, g_n)	Shift off the top of the current stack and push it onto the aligning stack.
REDUCE	(a_1, a_2, \dots, a_n)	(g_1, g_2, \dots, g_n)	Reduce the top of the current stack and push it onto the aligning stack.
STACKLSTM	(a_1, a_2, \dots, a_n)	(g_1, g_2, \dots, g_n)	StackLSTM is a sequence of operations, each of which is defined by a neural network that takes as input the current stack and the current aligning stack.
ALIGN	(a_1, a_2, \dots, a_n)	(g_1, g_2, \dots, g_n)	Align the top of the current stack and the top of the aligning stack.
STOP	(a_1, a_2, \dots, a_n)	(g_1, g_2, \dots, g_n)	Stop the parser.

$$p(a|s) = \frac{\exp\{g_a \cdot \text{STACKLSTM}(s) + b_a\}}{\sum_a \exp\{g_a \cdot \text{STACKLSTM}(s) + b_a\}}$$
