

## 制作清晰简洁的学术汇报PPT只需学会这几招

笔记本: b论文写作

创建时间: 2020/5/24 22:27

更新时间: 2020/5/29 11:59

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- 1、大纲清晰
- 2、多种字体颜色
- 3、使用母语（中文）
- 4、模型方面，不同模块使用红框圈起来表示
- 5、实验结果图表方面，对于信息量大的图表，在以此列出结论的同时，使用不同底色的背景标注对应的数据结果
- 6、能用例子尽量用例子，相比于公式和代码，例子更易于理解
- 7、语言上吐字清晰，语言流畅，起承转合

南开大学的PPT模板非常好！

参考 南开大学 陈少维 PPT

The 58th Annual Meeting of the Association for Computational Linguistics (ACL 2020)



智能信息处理实验室

# Synchronous Double-channel Recurrent Network for Aspect-Opinion Pair Extraction

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报告人 陈少维

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# 这是非常典型的一个大纲，四个部分：

- 1、研究背景与动机（包括任务描述、现存问题/挑战）
- 2、提出的方法/模型
- 3、实验分析
- 4、总结

## 目录



### 内容目录

#### 一、研究背景与研究动机

#### 二、同步双通道循环神经网络

#### 三、实验分析

#### 四、总结

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#### 背景与动机

#### 同步双通道循环神经网络

#### 实验分析

#### 总结

##### □ 意见实体抽取：

- 旨在抽取评价方面集合和（或）评价词集合
- 许多工作关注于：
  - Aspect term extraction
  - Opinion term extraction
  - Aspect and opinion term co-extraction
- 忽略了评价方面和评价词之间对应关系的建模
  - Nice-looking 和 delicious 均表达正向情感
  - 从外观和味道两个角度
  - 准确建模对应关系可以支撑后续更细粒度的意见挖掘任务
    - 意见二元组情感分类
    - 意见二元组聚类

##### Review:

The food was nice-looking and delicious.

##### The result of Opinion Entity Extraction:

Aspect: {food}

Opinion Expression: {nice-looking, delicious}

##### The result of Aspect-Opinion Pair Extraction:

{food, nice-looking}

{food, delicious}

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## 意见二元组抽取 (Aspect-Opinion Pair Extraction, AOPE)

- 相关研究工作较少
- 三个主要挑战:
  - 如何准确识别对应关系
    - 关系结构复杂
    - 可能存在一对多、多对一、嵌套、交叠等
  - 如何恰当融合意见实体抽取和关系检测两个子任务
    - 相互依赖
  - 如何同步抽取实体和关系, 并使得两者相互指导
    - “hot dog” 和 “tasty”
    - 结合实体整体语义有助于识别关系
    - 检测到两个词存在对应关系, 则一个应为评价方面, 另一个为评价词

Review :  
The food and service in this bar are perfect and unforgettable.

The result of Aspect Extraction:  
{ food, service }

The result of Opinion Expression Extraction:  
{ perfect, unforgettable }

Results of Aspect-Opinion Pair Extraction:  
( food, perfect )  
( food, unforgettable )  
( service, perfect )  
( service, unforgettable )

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## 目录



内容目录

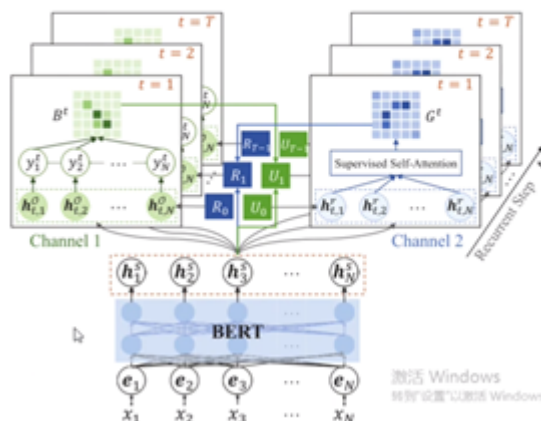
- 一、研究背景与研究动机
- 二、同步双通道循环神经网络
- 三、实验分析
- 四、总结

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## 基于同步双通道循环神经网络的意见二元组抽取模型 (Synchronous Double-channel Recurrent Network, SDRN)

- 编码层: BERT
  - 学习更丰富的上下文语义
- 同步双通道循环网络
  - 意见实体抽取单元: CRF
    - 准确识别实体边界
  - 关系检测单元: Self-Attention
    - 识别复杂的对应关系
  - 信息同步单元
    - 使两通道相互指导、相互促进



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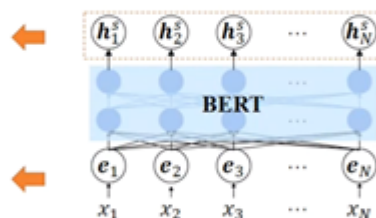
### □ 编码层 (Encoding Layer)

- BERT 作为编码层, 学习丰富的上下文语义
- 将 BERT 中最后一层 Transformer 的输出作为上下文表示序列  $H^s = \{h_1^s, h_2^s, \dots, h_N^s\}$

- 词初始向量表示:

$$e_i = e_i^w + e_i^s + e_i^p$$

其中,  $e_i^w$  为词嵌入表示,  $e_i^s$  为段落嵌入表示,  $e_i^p$  为位置嵌入表示



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### □ 双通道结构 (Double-channel)

- 意见实体抽取单元 (Opinion Entity Extraction Unit)
  - CRF: 准确识别意见实体边界

条件随机场 (CRF):

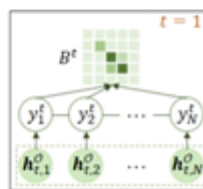
$$P^t = H_t^o W_p + b_p$$

$$S(X, Y^t) = \sum_{i=1}^N Q_{y_{i-1}^t, y_i^t} + \sum_{i=1}^N P_{i, y_i^t}^t$$

$$p(Y^t | X) = \frac{\exp(S(X, Y^t))}{\sum_{\tilde{Y}^t \in Y_X^t} \exp(S(X, \tilde{Y}^t))}$$

对最后一个循环步构建损失:

$$\mathcal{L}_E = \log \sum_{\tilde{Y}^t \in Y_X^t} \exp(S(X, \tilde{Y}^t)) - S(X, Y)$$



- 关系检测单元 (Relation Detection Unit)

- 词级别自注意力机制: 识别复杂的对应关系

词级别自注意力机制:

$$g_{i,j}^t = \frac{\exp(\gamma(h_{t,i}^r, h_{t,j}^r))}{\sum_{k=1}^N \exp(\gamma(h_{t,i}^r, h_{t,k}^r))}$$

$$\gamma(h_{t,i}^r, h_{t,j}^r) = \tanh(h_{t,i}^r W_r^1 + h_{t,j}^r W_r^2) W_r^3$$

$$p(z_{i,j} | x_i, x_j) = \begin{cases} g_{i,j}^t, & \text{if } z_{i,j} = 1 \\ 1 - g_{i,j}^t, & \text{if } z_{i,j} = 0 \end{cases}$$

对最后一个循环步构建损失:

$$\mathcal{L}_R = - \sum_{i=1}^N \sum_{j=1}^N p(z_{i,j} | x_i, x_j) \log \hat{p}(z_{i,j} | x_i, x_j)$$

联合学习:

$$\mathcal{L}(\theta) = \mathcal{L}_E + \mathcal{L}_R$$

### □ 信息同步单元 (Synchronization Unit)

- 实体同步机制 (Entity Synchronization Mechanism, ESM)

- 计算每个词所属实体的语义表示:

$$u_{t,i} = \sum_{j=1}^N \varphi(B_{i,j}^t) h_j^s$$

- 更新关系检测单元的隐藏表示  $H_t^r$ :

$$h_{t+1,i}^r = \sigma(u_{t,i} W_r^4 + h_i^s W_r^5)$$

- 关系同步机制 (Relation Synchronization Mechanism, RSM)

- 计算每个词对应的关系语义表示:

$$r_{t,i} = \sum_{j=1}^N \varphi(\phi(g_{i,j}^t)) h_j^s$$

- 更新意见实体抽取单元的隐藏表示  $H_t^o$ :

$$h_{t+1,i}^o = \sigma(r_{t,i} W_o^1 + h_i^s W_o^2)$$

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## 推理层(Inference Layer)

意见实体抽取模块 预测结果:  $Y = \{y_1, y_2, \dots, y_N\}$

评价方面集合:  $A = \{a_1, a_2, \dots, a_{|A|}\}$

评价词集合:  $O = \{o_1, o_2, \dots, o_{|O|}\}$

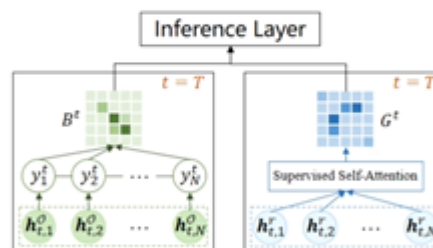
对于所有可能的 (评价方面, 评价词) 二元组:

关系检测模块  
预测结果  $G^T$

$a = \{x_{i_3^a}, \dots, x_{i_E^a}\}$   
 $o = \{x_{i_3^o}, \dots, x_{i_E^o}\}$

$$\delta = \frac{1}{2} \left( \frac{1}{|a|} \sum_{k=i_3^a}^{i_E^a} \sum_{l=i_3^o}^{i_E^o} g_{k,l} + \frac{1}{|o|} \sum_{l=i_3^o}^{i_E^o} \sum_{k=i_3^a}^{i_E^a} g_{l,k} \right)$$

当关联程度  $\delta$  高于给定的阈值  $\delta^*$  时, 抽取  $(a, o)$  为意见二元组



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## 实验分析

### 数据集

✓ 来源:

- SemEval Challenge 2014 竞赛
- SemEval Challenge 2015 竞赛
- J.D. Power and Associates Sentiment Corpora
- MPQA version 2.0

✓ 对于三个来自 SemEval 竞赛的数据, 本文基于 Wang 等人<sup>[1,2]</sup>对评价词的标注结果, 进一步手工标注了评价方面和评价词之间的对应关系。

表1: 数据集统计

| Dataset                  |        | #Sent | #A   | #O    | #R   |
|--------------------------|--------|-------|------|-------|------|
| SemEval-14<br>Restaurant | Train  | 3041  | 3693 | 3512  | 2809 |
|                          | Test   | 800   | 1134 | 1014  | 936  |
| SemEval-14<br>Laptop     | Train  | 3045  | 2359 | 2500  | 1535 |
|                          | Test   | 800   | 653  | 677   | 380  |
| SemEval-15<br>Restaurant | Train  | 1315  | 1205 | 1217  | 1231 |
|                          | Test   | 685   | 542  | 516   | 516  |
| JDPA                     | Camera | 3125  | 6107 | 4557  | 4144 |
|                          | Car    | 6501  | 8272 | 11123 | 8709 |
| MPOA                     |        | 9471  | 4676 | 5849  | 4823 |

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<sup>[1]</sup>Wang W, Pan S J, Dahlmeier D, et al. Coupled MultiLayer Attentions for Co-Extraction of Aspect and Opinion Terms. In: AAAI, 2017: 3316 ~ 3322.

<sup>[2]</sup>Wang W, Pan S J, Dahlmeier D, et al. Recursive Neural Conditional Random Fields for Aspectbased Sentiment Analysis. In: EMNLP, 2016: 616 ~ 626.

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## 实验分析

➢ 评价指标: 微平均F1值 (Micro-F1)

➢ 对比算法:

✓ 流水线模型 (Pipeline Model):

- 意见实体抽取: DE-CNN、HAST、IMN、RINANTE、SPAN
- 关系检测: 采用本文模型 (SDRN) 中的关系检测模块

✓ 联合学习模型 (Joint Model):

- IDF: 基于强制定义因子图的方法
- CRF+ILP: 基于整数线性规划的 CRF 方法
- LSTM+SLL+RLL: 采用 LSTM 学习语义特征, 并设计多个不同的联合损失函数进行模型训练。

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## □ 实验分析

## ➤ 实验结果：意见二元组抽取

## ✓ SDRN 在全部数据集上均取得了最优性能

- SDRN、SPAN+RD 和其他对比算法相比，BERT可以学习更丰富的上下文语义
- 在JDPA、MPQA数据集，SDRN 没有使用手工特征，并取得明显提升

表2：三个SemEval数据集上意见二元组抽取结果

|          | Models           | 14-Res       |              |              |
|----------|------------------|--------------|--------------|--------------|
|          |                  | 14-Res       | 14-Lap       | 15-Res       |
| Pipeline | HAST+RD          | 73.55        | 64.05        | 65.20        |
|          | DE-CNN+RD        | 71.02        | 61.11        | 64.19        |
|          | IMN+RD           | 73.69        | 62.98        | 65.56        |
|          | SPAN+RD          | 74.17        | 65.99        | 67.55        |
|          | RINANTE+RD       | 74.34        | 64.17        | 65.42        |
| Joint    | SDRN w/o ESM     | 74.60        | 66.57        | 69.28        |
|          | SDRN w/o RSM     | 75.01        | 66.43        | 69.33        |
|          | SDRN w/o ESM&RSM | 74.28        | 65.74        | 67.67        |
|          | SDRN             | <b>76.48</b> | <b>67.13</b> | <b>70.94</b> |

表3：JDPA、MPQA数据集上意见二元组抽取结果

| Models       | JDPA Camera  | JDPA Car     | MPQA         |
|--------------|--------------|--------------|--------------|
| IDF Pipeline | 21.5         | 26.6         | N/A          |
| IDF Joint    | 14.1         | 16.1         | N/A          |
| CRF+ILP      | N/A          | N/A          | 57.04        |
| LSTM+SLL+RLL | N/A          | N/A          | 54.98        |
| SDRN         | <b>48.63</b> | <b>47.85</b> | <b>63.95</b> |

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## □ 实验分析

## ➤ 实验结果：意见二元组抽取（消融实验）

- 单纯加深网络层数，相较于流水线的方法缺乏竞争力
- 采用关系同步单元（RSM）或实体同步单元（ESM），模型性能会有所提升
- 当同时采用两个同步单元时，模型取得了最优的性能

表4：三个SemEval数据集上意见二元组抽取结果

|          | Models           | 14-Res       |              |              |
|----------|------------------|--------------|--------------|--------------|
|          |                  | 14-Res       | 14-Lap       | 15-Res       |
| Pipeline | HAST+RD          | 73.55        | 64.05        | 65.20        |
|          | DE-CNN+RD        | 71.02        | 61.11        | 64.19        |
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|          | RINANTE+RD       | 74.34        | 64.17        | 65.42        |
| Joint    | SDRN w/o ESM     | 74.60        | 66.57        | 69.28        |
|          | SDRN w/o RSM     | 75.01        | 66.43        | 69.33        |
|          | SDRN w/o ESM&RSM | 74.28        | 65.74        | 67.67        |
|          | SDRN             | <b>76.48</b> | <b>67.13</b> | <b>70.94</b> |

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## □ 实验分析

## ➤ 实验结果：意见实体抽取

- 与关系检测模块进行联合训练，可以提升意见实体抽取的性能
- aspect and opinion term co-extraction 模型优于 aspect term extraction 模型

表5：三个SemEval数据集上意见实体抽取结果

| Models                                    | 14-Res       |              | 14-Lap       |              | 15-Res       |              |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
|   | A            | O            | A            | O            | A            | O            |
| WDEmb (Yin et al., 2016)                  | 84.97        | N/A          | 75.16        | N/A          | 69.73        | N/A          |
| RNCRF <sup>†</sup> (Wang et al., 2016)    | 84.93        | 84.11        | 78.42        | 79.44        | 67.74        | 67.62        |
| CMLA <sup>†</sup> (Wang et al., 2017)     | 85.29        | 83.18        | 77.80        | 80.17        | 70.73        | 73.68        |
| HAST (Li et al., 2018)                    | 85.61        | 85.46*       | 79.52        | 78.58*       | 71.46        | 70.77*       |
| DE-CNN (Xu et al., 2018)                  | 85.20        | 81.99*       | 81.59        | 76.34*       | 68.28        | 68.56*       |
| IMN <sup>†</sup> (He et al., 2019)        | 83.33        | 85.61        | 77.96        | 77.51        | 70.04        | 71.94        |
| SPAN (Hu et al., 2019)                    | 86.20*       | 86.52*       | 80.67*       | 82.07*       | 73.65*       | 79.13*       |
| GMT-CMLA <sup>†</sup> (Yu et al., 2019)   | 84.50        | 85.20        | 78.69        | 79.89        | 70.53        | 72.78        |
| RINANTE <sup>†</sup> (Dai and Song, 2019) | 86.45        | 85.67        | 80.16        | 81.96        | 69.90        | 72.09        |
| SDRN                                      | <b>89.49</b> | <b>87.84</b> | <b>83.67</b> | <b>82.25</b> | <b>74.05</b> | <b>79.65</b> |

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## 实验分析

### 实验结果：收敛性分析 + 参数敏感性分析

- 通常在 15 个 epoch 左右达到收敛，收敛速度较快
- 随着循环步数的增加，模型的性能呈现先增加后趋于平稳（或轻微下降）的趋势，最优的结果出现在两个循环步

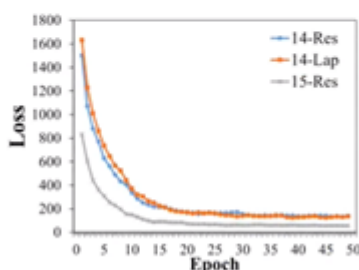


图1：收敛性分析

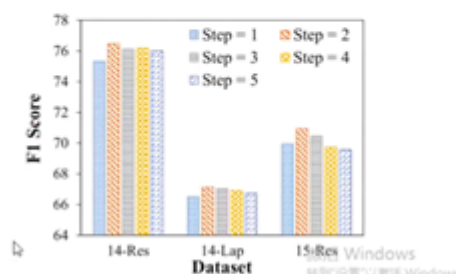


图2：参数敏感性分析

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## 实验分析

### 实验结果：样例分析

- 流水线模型：错误传导
- SDRN w/o ESM&RSM：缺乏信息交互、难以应对复杂关系

表5：样例分析

| Reviews  | SPAN+RD   | SDRN w/o ESM&RSM  | SDRN  |
|--|---|---|---|
| 1. The receiver was full of [superlatives] <sub>1,2</sub> for the [quality] <sub>1</sub> and [performance] <sub>2</sub> .  | (quality, superlatives)<br>(performance, superlatives)                      | (receiver, superlatives) ✗<br>(quality, superlatives)<br>(performance, superlatives)            | (quality, superlatives)<br>(performance, superlatives)  |
| 2. The [selection of food] <sub>1</sub> is [excellent] <sub>1</sub> , and the [atmosphere] <sub>2</sub> is [great] <sub>2</sub> .  | (selection, excellent) ✗<br>(food, excellent) ✗<br>(atmosphere, great)      | (selection of food, excellent)<br>(atmosphere, great)   | (selection of food, excellent)<br>(atmosphere, great)   |
| 3. The [bartenders] <sub>1</sub> and the [managers] <sub>2</sub> are really [nice] <sub>1,2</sub> and the [decor] <sub>3,4,5</sub> is very [comfy] <sub>3</sub> and [laid-back] <sub>4</sub> , all the while being [trendy] <sub>5</sub> . | (bartenders, nice)<br>(managers, nice)<br>(decor, comfy)<br>(decor, trendy) | (bartenders, nice)<br>(managers, nice)<br>(decor, comfy)<br>(-, laid-back) ✗<br>(decor, trendy) | (bartenders, nice)<br>(managers, nice)<br>(decor, comfy)<br>(decor, laid-back)<br>(decor, trendy) |

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## 总结

- 本文关注于意见二元组抽取 (AOPE) 任务
- 本文提出了同步双通道循环神经网络模型
- 通过采用词级别有监督自注意力机制可以有效检测复杂的对应关系
- 通过信息同步单元使两个通道相互指导
- 论文数据和代码：<https://github.com/NKU-IIPLab/SDRN>

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# 参考 中科院软件所 付成 PPT

## Hierarchical Matching Network for Heterogeneous Entity Resolution

Cheng Fu<sup>1,3</sup>, Xianpei Han<sup>1,2</sup>, Jiaming He<sup>4</sup>, Le Sun<sup>1,2</sup>

<sup>1</sup>Chinese Information Processing Laboratory <sup>2</sup>State Key Laboratory of Computer Science

Institute of Software, Chinese Academy of Sciences

<sup>3</sup>University of Chinese Academy of Sciences

<sup>4</sup>Brandeis University

May 23, 2020

### ISCAS Entity Resolution (ER)

- Identifying **records of the same entity** within one or across multiple data sources

| Name          | Position    | Address      |   | Name          | Position   | Address              |
|---------------|-------------|--------------|---|---------------|------------|----------------------|
| John Dent     | Accountant  | Berkeley, CA | ↔ | John          | Accountant | Berkeley, California |
| Bush          | Salesperson | Phoenix, AZ  | ↔ | J. Bush       | Marketer   | Phoenix, Arizona     |
| Frank         | Designer    | Houston, TX  | ↔ | Frank         | Designer   | Chicago, Illinois    |
| Mark A. White | Engineer    | Seattle, WA  | ↔ | Mark B. White | Engineer   | Seattle, Washington  |



## ISCAS Entity Resolution (ER)

- Identifying **records of the same entity** within one or across multiple data sources

| Name          | Position    | Address      |   | Name          | Position   | Address              |
|---------------|-------------|--------------|---|---------------|------------|----------------------|
| John Dent     | Accountant  | Berkeley, CA | ↔ | John          | Accountant | Berkeley, California |
| Bush          | Salesperson | Phoenix, AZ  | ↔ | J. Bush       | Marketer   | Phoenix, Arizona     |
| Frank         | Designer    | Houston, TX  | ↔ | Frank         | Designer   | Chicago, Illinois    |
| Mark A. White | Engineer    | Seattle, WA  | ↔ | Mark B. White | Engineer   | Seattle, Washington  |

- Plays important roles in many tasks
  - Data mining
  - Data integration
  - Knowledge graph completion
  - Knowledge fusion
  - ...

3

27:18 / 03:10:37

源四 数据 中 图 标

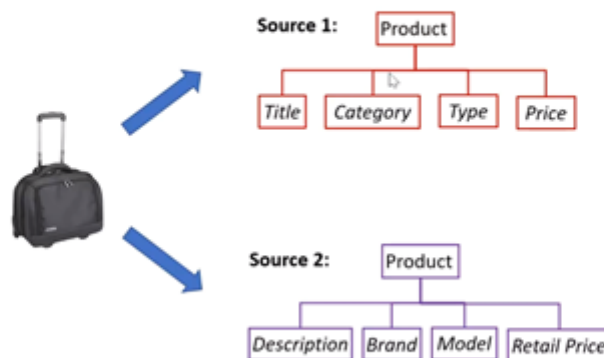
## ISCAS Challenges for Heterogeneous Entity Resolution

- Schema heterogeneity problem
- Dirty data problem

6

## ISCAS Schema Heterogeneity Problem

- Describe the same entity using different attributes



7

对于不同颜色的使用，使得读者更容易抓住作者想要表达的点！

## ISCAS Dirty data problem

The diagram shows a table with four columns: Title, Brand, Model, and Price. The data row contains: 'microsoft laptop bag microsoft 39203', 'microsoft bags cases', an empty cell, and an empty cell. Annotations include: a red dashed box around 'microsoft 39203' in the Title column, a red dashed box around 'microsoft bags cases' in the Brand column, and a red dashed box around the empty Model cell. A red curved arrow labeled 'Misplaced-type' points from the red box in the Brand column to the red box in the Model column. A purple curved arrow labeled 'Redundant-type' points from the red box in the Title column to the red box in the Brand column. A green dashed box labeled 'Noisy-type' is around the 'bags cases' part of the Brand cell.

| Title                                | Brand                | Model | Price |
|--------------------------------------|----------------------|-------|-------|
| microsoft laptop bag microsoft 39203 | microsoft bags cases |       |       |

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使用带背景的字框抛出问题，抓住观众注意力。

## ISCAS Related work

- DeepMatcher [Mudgal et al., 2018]

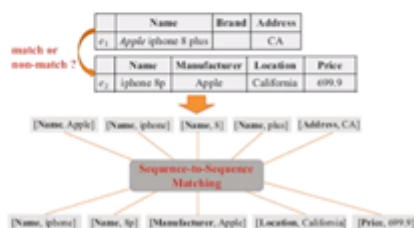
The diagram shows a table with four columns: Title, Brand, Model, and Price. The data row contains: 'microsoft laptop bag microsoft 39203', 'microsoft bags cases', an empty cell, and '96.99'. A blue arrow points from the 'microsoft bags cases' cell to a box below containing the full row: 'microsoft laptop bag microsoft 39203 microsoft bags cases 96.99'.

| Title                                | Brand                | Model | Price |
|--------------------------------------|----------------------|-------|-------|
| microsoft laptop bag microsoft 39203 | microsoft bags cases |       | 96.99 |

↓

microsoft laptop bag microsoft 39203 microsoft bags cases 96.99

- Seq2SeqMatcher [Nie et al., 2019]



Not make full use of hierarchical entity structure information.

14

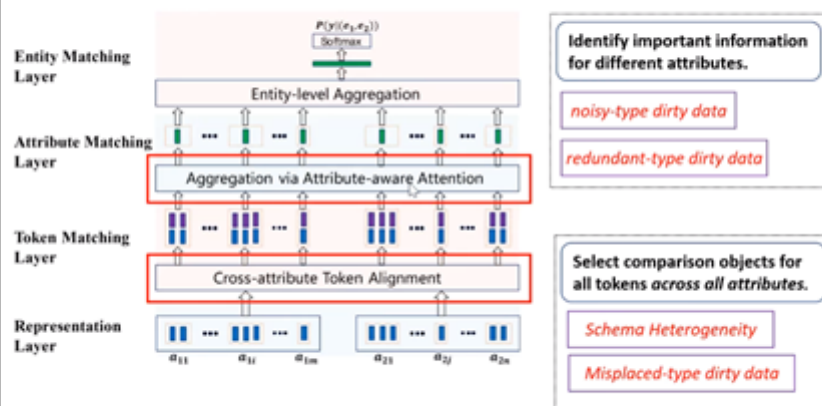
对于大纲，只突出显示马上要介绍的章节，其他的置灰。

- Introduction
- Hierarchical Matching Network for Heterogeneous ER
- Experiments
- Conclusion

15

分模块介绍模型，红框标记，右边对应不同颜色文本框解释。

ISCAS Hierarchical Entity Matching Framework



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实验部分，表信息量较大时，抛出结论，使用颜色背景标记出对应数据

## ISCAS Experimental Results

| Type          | Dataset                           | F1 score |              |     |                 | For heterogeneous ER |              |
|---------------|-----------------------------------|----------|--------------|-----|-----------------|----------------------|--------------|
|               |                                   | Magellan | Deep-Matcher | MPM | Seq2Seq-Matcher | HierMatcher          |              |
| Dirty         | Walmart-Amazon <sub>2</sub>       | 37.4     | 53.8         | -   | 68.3            | <b>68.5</b>          | +14.7        |
|               | DBLP-ACM <sub>2</sub>             | 91.9     | 98.1         | -   | <b>98.4</b>     | 98.1                 | +0.0         |
|               | DBLP-Scholar <sub>2</sub>         | 82.5     | 93.8         | -   | 94.1            | <b>94.5</b>          | +0.7         |
|               | Average                           | -        | -            | -   | -               | -                    | <b>+5.1</b>  |
| Heterogeneous | Walmart-Amazon <sub>3</sub> (1-n) | -        | 67.1         | -   | 75.6            | <b>80.7</b>          | +13.6        |
|               | Walmart-Amazon <sub>4</sub> (n-n) | -        | 63.4         | -   | 74.7            | <b>81.4</b>          | +18.0        |
|               | Walmart-Amazon <sub>5</sub> (n-n) | -        | 66.5         | -   | 74.4            | <b>81.0</b>          | +14.5        |
|               | Average                           | -        | -            | -   | -               | -                    | <b>+15.4</b> |

Aligned attribute based

HierMatcher can effectively solve the schema heterogeneity and dirty data problems in ER.

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## ISCAS Experimental Results

| Type          | Dataset                           | F1 score             |             |       |
|---------------|-----------------------------------|----------------------|-------------|-------|
|               |                                   | HierMatcher<br>-ave' | HierMatcher |       |
| Homogeneous   | Walmart-Amazon <sub>1</sub>       | 77.1                 | <b>81.6</b> | -2.6  |
|               | Amazon-Google                     | 70.0                 | <b>74.9</b> |       |
|               | DBLP-ACM <sub>1</sub>             | 98.1                 | 98.8        |       |
|               | DBLP-Scholar <sub>1</sub>         | 94.9                 | <b>95.3</b> |       |
| Dirty         | Walmart-Amazon <sub>2</sub>       | 61.4                 | <b>68.5</b> | -2.8  |
|               | DBLP-ACM <sub>2</sub>             | 97.3                 | 98.1        |       |
|               | DBLP-Scholar <sub>2</sub>         | 93.9                 | <b>94.5</b> |       |
|               | Average                           | -                    | -           |       |
| Heterogeneous | Walmart-Amazon <sub>3</sub> (1-n) | 67.5                 | <b>80.7</b> | -13.0 |
|               | Walmart-Amazon <sub>4</sub> (n-n) | 67.6                 | <b>81.4</b> |       |
|               | Walmart-Amazon <sub>5</sub> (n-n) | 69.0                 | <b>81.0</b> |       |
|               | Average                           | -                    | -           |       |

Effectively identifying important information for each attribute is critical for ER.

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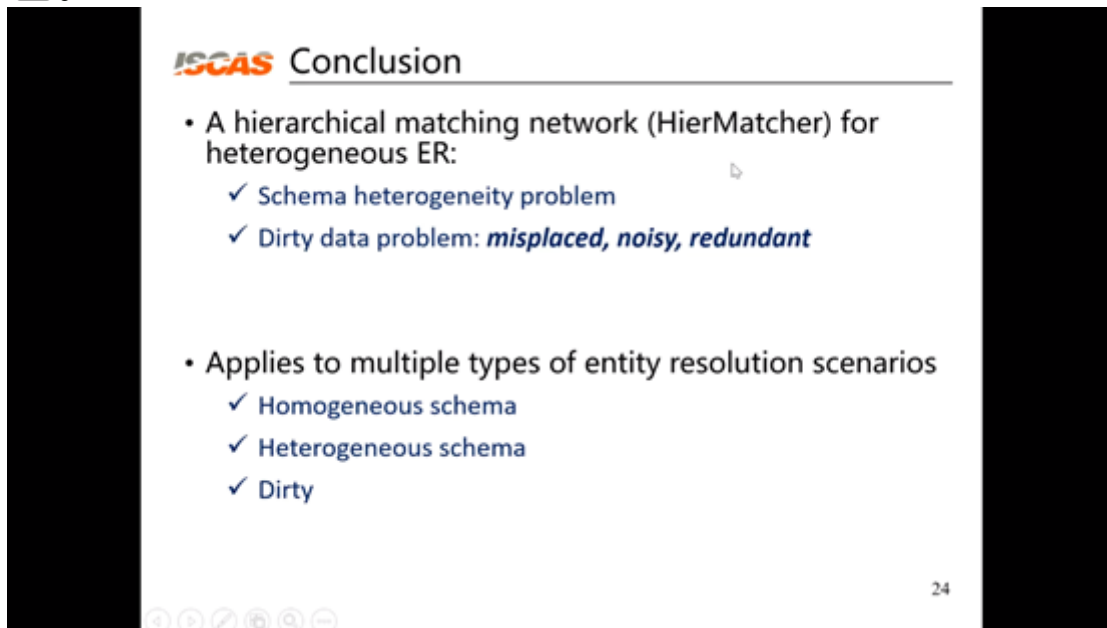
## ISCAS Experimental Results

| Type          | Dataset                           | F1 score |              |      |                 | HierMatcher<br>-ave' | HierMatcher | $\Delta F1$  | $\Delta F1'$ |
|---------------|-----------------------------------|----------|--------------|------|-----------------|----------------------|-------------|--------------|--------------|
|               |                                   | Magellan | Deep-Matcher | MPM  | Seq2Seq-Matcher |                      |             |              |              |
| Homogeneous   | Walmart-Amazon <sub>1</sub>       | 71.9     | 67.6         | 73.6 | 78.2            | 77.1                 | <b>81.6</b> | +8.0         | +3.4         |
|               | Amazon-Google                     | 49.1     | 69.3         | 70.7 | 61.2            | 70.0                 | <b>74.9</b> | +4.2         | +13.7        |
|               | DBLP-ACM <sub>1</sub>             | 98.4     | 98.4         | -    | <b>98.9</b>     | 98.1                 | 98.8        | +0.4         | -0.1         |
|               | DBLP-Scholar <sub>1</sub>         | 92.3     | 94.7         | -    | <b>95.3</b>     | 94.9                 | <b>95.3</b> | +0.6         | +0.0         |
| Dirty         | Walmart-Amazon <sub>2</sub>       | 37.4     | 53.8         | -    | 68.3            | 61.4                 | <b>68.5</b> | +14.7        | +0.2         |
|               | DBLP-ACM <sub>2</sub>             | 91.9     | 98.1         | -    | <b>98.4</b>     | 97.3                 | 98.1        | +0.0         | -0.3         |
|               | DBLP-Scholar <sub>2</sub>         | 82.5     | 93.8         | -    | 94.1            | 93.9                 | <b>94.5</b> | +0.7         | +0.4         |
|               | Average                           | -        | -            | -    | -               | -                    | -           | <b>+5.1</b>  | <b>+0.1</b>  |
| Heterogeneous | Walmart-Amazon <sub>3</sub> (1-n) | -        | 67.1         | -    | 75.6            | 67.5                 | <b>80.7</b> | +13.6        | +5.1         |
|               | Walmart-Amazon <sub>4</sub> (n-n) | -        | 63.4         | -    | 74.7            | 67.6                 | <b>81.4</b> | +18.0        | +6.7         |
|               | Walmart-Amazon <sub>5</sub> (n-n) | -        | 66.5         | -    | 74.4            | 69.0                 | <b>81.0</b> | +14.5        | +6.6         |
|               | Average                           | -        | -            | -    | -               | -                    | -           | <b>+15.4</b> | <b>+6.1</b>  |

HierMatcher applies to multiple types of ER scenarios.

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总结，带√的项目符号很不错，且使用不同字体颜色。



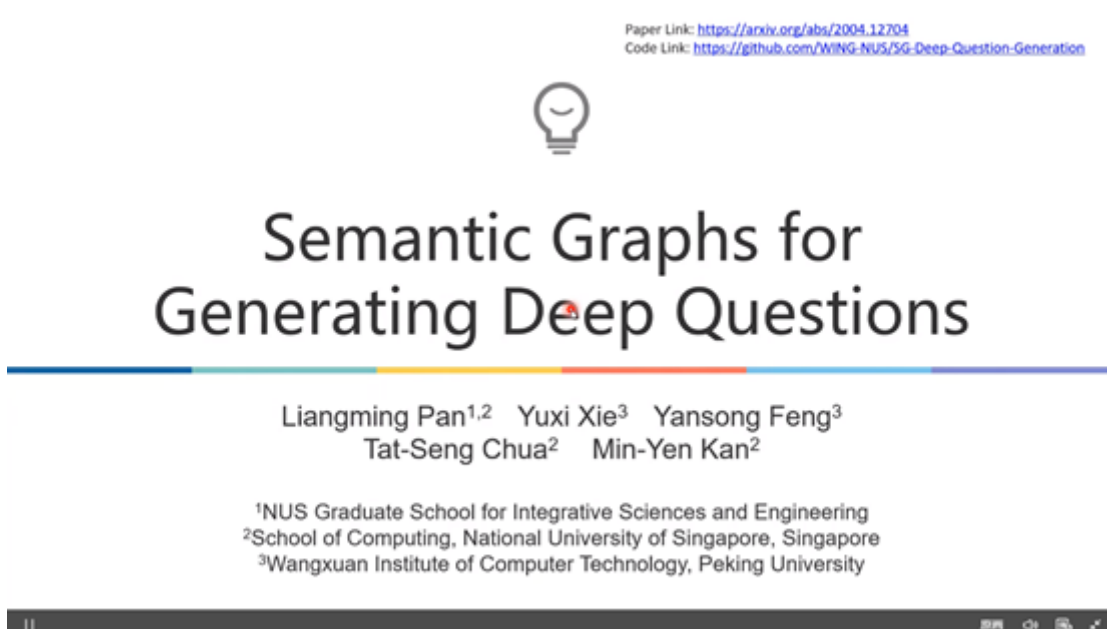
The screenshot shows a presentation slide with a white background and black text. The title 'ISCAS Conclusion' is at the top left, with 'ISCAS' in orange and 'Conclusion' in black. Below the title, there are two main bullet points. The first bullet point is 'A hierarchical matching network (HierMatcher) for heterogeneous ER:', followed by two sub-bullets: '✓ Schema heterogeneity problem' and '✓ Dirty data problem: *misplaced, noisy, redundant*'. The second main bullet point is 'Applies to multiple types of entity resolution scenarios', followed by three sub-bullets: '✓ Homogeneous schema', '✓ Heterogeneous schema', and '✓ Dirty'. At the bottom right, the number '24' is visible. At the bottom left, there are several small, faint icons.

ISCAS Conclusion

- A hierarchical matching network (HierMatcher) for heterogeneous ER:
  - ✓ Schema heterogeneity problem
  - ✓ Dirty data problem: *misplaced, noisy, redundant*
- Applies to multiple types of entity resolution scenarios
  - ✓ Homogeneous schema
  - ✓ Heterogeneous schema
  - ✓ Dirty

24

参考 北京大学 谢雨汐 PPT



The screenshot shows a presentation slide with a white background. At the top right, there are two lines of text: 'Paper Link: <https://arxiv.org/abs/2004.12704>' and 'Code Link: <https://github.com/WING-NUS/SG-Deep-Question-Generation>'. In the center, there is a lightbulb icon. Below the icon, the title 'Semantic Graphs for Generating Deep Questions' is written in a large, bold, black font. A horizontal bar with a gradient of colors (blue, green, yellow, orange, red) is positioned below the title. Below the bar, the authors' names are listed: 'Liangming Pan<sup>1,2</sup> Yuxi Xie<sup>3</sup> Yansong Feng<sup>3</sup> Tat-Seng Chua<sup>2</sup> Min-Yen Kan<sup>2</sup>'. At the bottom, there are three footnotes: '<sup>1</sup>NUS Graduate School for Integrative Sciences and Engineering', '<sup>2</sup>School of Computing, National University of Singapore, Singapore', and '<sup>3</sup>Wangxuan Institute of Computer Technology, Peking University'. At the bottom left, there is a small icon of a person. At the bottom right, there are several small, faint icons.

Paper Link: <https://arxiv.org/abs/2004.12704>  
Code Link: <https://github.com/WING-NUS/SG-Deep-Question-Generation>

Lightbulb icon

# Semantic Graphs for Generating Deep Questions

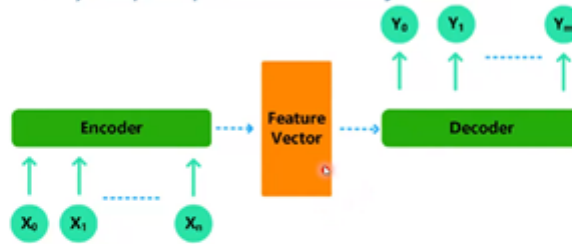
Liangming Pan<sup>1,2</sup> Yuxi Xie<sup>3</sup> Yansong Feng<sup>3</sup>  
Tat-Seng Chua<sup>2</sup> Min-Yen Kan<sup>2</sup>

<sup>1</sup>NUS Graduate School for Integrative Sciences and Engineering  
<sup>2</sup>School of Computing, National University of Singapore, Singapore  
<sup>3</sup>Wangxuan Institute of Computer Technology, Peking University

多种字体颜色的使用

## Motivation

Why Seq2Seq is not suitable for DQG?

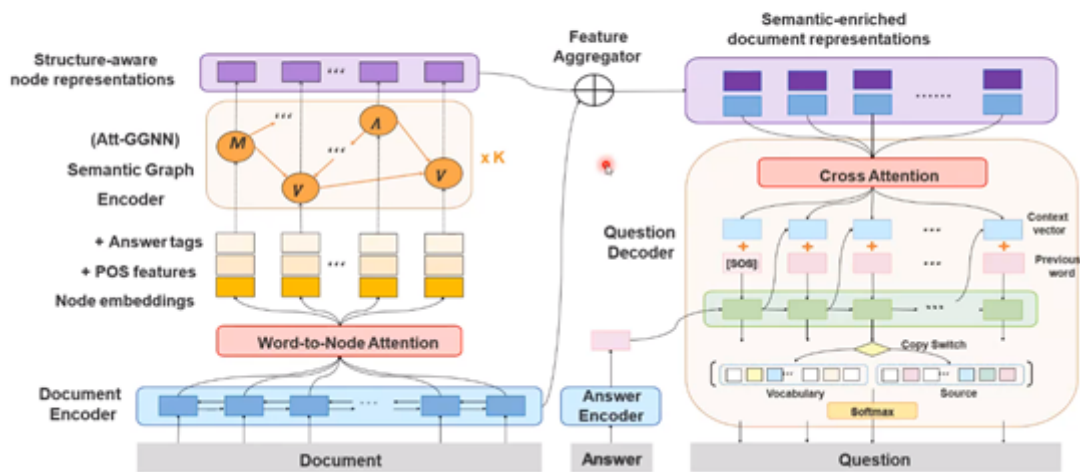


- Seq2Seq directly learns the mapping *from unstructured document to question*
  - for DQG, it's hard to directly learn this mapping
- Our model incorporate *structured semantic graph* to assist question generation
  - easier for *content selection* over graph nodes
  - easier to learn to *reason* over graph nodes
  - more *explainable*

## 彩色模型图绘制

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## Model Framework



## 图表结论展示



## Performance on Human Evaluation

- **Fluency** indicates whether the question follows the *grammar* and accords with the correct *logic*
- **Relevance** indicates whether the question is *answerable* and *relevant* to the passage
- **Complexity** indicates whether the question involves *reasoning* over multiple sentences from the document

| Model                   | Short Contexts |             |             | Medium Contexts |             |             | Long Contexts |             |             | Average     |             |             |
|-------------------------|----------------|-------------|-------------|-----------------|-------------|-------------|---------------|-------------|-------------|-------------|-------------|-------------|
|                         | Flu.           | Rel.        | Cpx.        | Flu.            | Rel.        | Cpx.        | Flu.          | Rel.        | Cpx.        | Flu.        | Rel.        | Cpx.        |
| B4. S2sa-at-mp-gsa      | 3.76           | 4.25        | 3.98        | 3.43            | 4.35        | 4.13        | 3.17          | 3.86        | 3.57        | 3.45        | 4.15        | 3.89        |
| B6. CGC-QG              | 3.91           | 4.43        | 3.60        | 3.63            | 4.17        | 4.10        | <b>3.69</b>   | 3.85        | <b>4.13</b> | 3.75        | 4.15        | 3.94        |
| A2. -w/o Semantic Graph | 4.01           | 4.43        | 4.15        | 3.65            | 4.41        | 4.12        | 3.54          | 3.88        | 3.55        | 3.73        | 4.24        | 3.94        |
| A4. -w/o Multi-Task     | 4.11           | 4.58        | 4.28        | 3.81            | 4.27        | <b>4.38</b> | 3.44          | 3.91        | 3.84        | 3.79        | 4.25        | 4.17        |
| P2. DP-Graph            | <b>4.34</b>    | <b>4.64</b> | <b>4.33</b> | <b>3.83</b>     | <b>4.51</b> | 4.28        | 3.55          | <b>4.08</b> | 4.04        | <b>3.91</b> | <b>4.41</b> | <b>4.22</b> |
| G1. Ground Truth        | 4.75           | 4.87        | 4.74        | 4.65            | 4.73        | 4.73        | 4.46          | 4.61        | 4.55        | 4.62        | 4.74        | 4.67        |

总结，不同字体颜色突出重点。

## Conclusion

- **Propose the problem of DQG**
  - to generate questions that requires *reasoning* over *multiple disjoint* pieces of information
- **Utilize semantic graphs**
  - reduce semantic errors significantly
  - help do *content selection* – by jointly training
    - facilitate the *reasoning* process
  - future direction: incorporation of *external* knowledge