



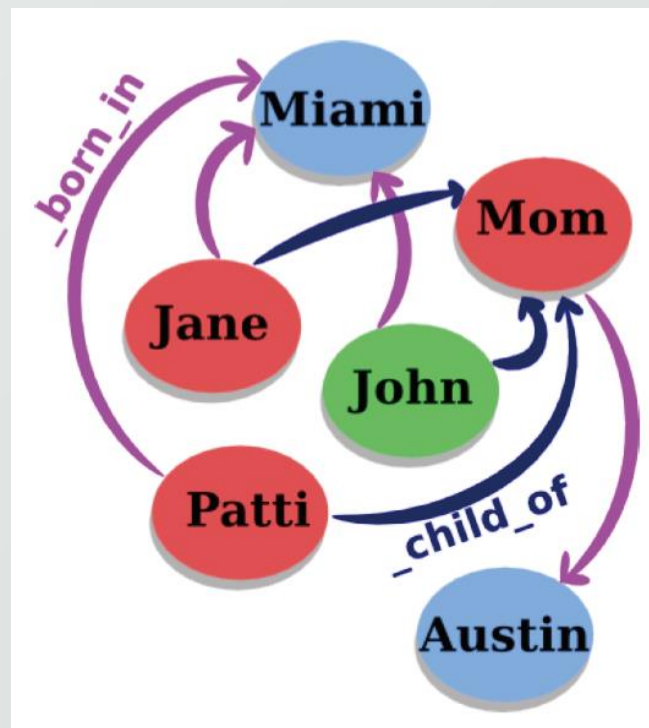
Knowledge Representation

汇报人：
黄婷

知识表示

- 知识表示面向知识库中的实体和关系进行表示学习，该技术可以在低维空间中高效计算实体和关系的语义联系，有效解决数据稀疏问题，使知识获取、融合和推理的性能得到显著提升。

- 知识被组织成为图的形式
- 节点代表实体，边代表实体之间的关系
- 三元组：（头实体，关系，尾实体）



知识表示

- 仅以知识图谱为基础，在结构上改进

- 从结构上改进。从TransE衍生出一系列模型，如TransR、TransH、TransD、STransE等。
- 从训练优化上改进。以GAN生成负采样、三元组置信度等。

- 融合外部知识，对知识图谱做补充

- 文本。如entity description、entity mention等。
- 实体类型。同类型实体在向量空间中离得近，不同类则离得远。
- 关系路径。父亲的父亲 = 祖父。
- 邻节点信息。通过知晓邻节点信息，为推理增加可信度。
- 联合模型。与关系抽取等任务联合，相互促进。



武汉大学

情感分析

报告人：黎芮彤



研究背景

情感分析现状及发展过程

◎ 提出

- ◆ 由Nasukawa等在2003年首次提出“情感分析”这一概念
- ◆ Pang与Turney等分别从监督学习和无监督学习两个角度实现了情感分类

◎ 思路与特点

- ◆ 预处理
- ◆ 过滤客观信息
- ◆ 特征识别，提取，分类



研究背景

情感分析的层次

- ◎ 篇章级
- ◎ 语句级
- ◎ 实体与方面级——→ “iPhone 6s的通话性能很好， 但电池寿命太短”

情感分析的主要方法

- ◎ 基于语义的情感词典方法
- ◎ 基于机器学习/深度学习的方法



研究背景

◎ 展望与困境

- ◆ 中文情感词资源不足及效果一般
- ◆ 领域依赖问题
- ◆ aspect_based问题

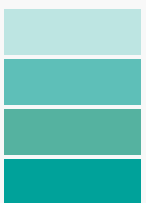
◎ 相关比赛

- ◆ SemEval-2016 Task 5 Aspect-Based Sentiment Analysis

<http://alt.qcri.org/semeval2016/task5/>

- ◆ AI Challenger 2018 细粒度用户评论情感分析竞赛

https://challenger.ai/news/ai_challenger



谢谢！





半监督深度 生成模型

谢倩倩



提纲

现状

问题



现状

- 深度生成模型：深度生成模型是无监督学习方法，侧重于数据的表达学习和生成
- 半监督学习+深度生成模型：使用半监督学习改进深度生成模型的判别能力，不损失其生成能力
- 半监督深度生成模型主要包括：生成数据的深度生成模型和半监督深度分类器
- 已有方法：大部分基于GAN改进，GAN的判别器同时作为分类器，在分类器损失函数上加各种利用无标注数据的正则项损失函数，将模型从无监督变为半监督，改进半监督分类效果。
- 在图像领域仅用很少的标注数据取得很好的分类效果



问题

- 大部分都是基于GAN的改进方法，可以考虑结合别的深度生成模型，如变分自编码器，深度置信网络
- 将深度生成模型用于文本领域的半监督学习几乎没有，有很大的研究空间



THANK YOU

A string of eight colorful paper tags, each with a letter, hanging from a light brown twine string. The tags are held in place by eight small wooden clothespins. The letters are arranged to read 'THANK YOU'. The colors of the tags are: orange for 'T', light orange for 'H', blue for 'A', red for 'N', yellow for 'K', pink for 'Y', light blue for 'O', and yellow for 'U'. The background is plain white.

对话管理

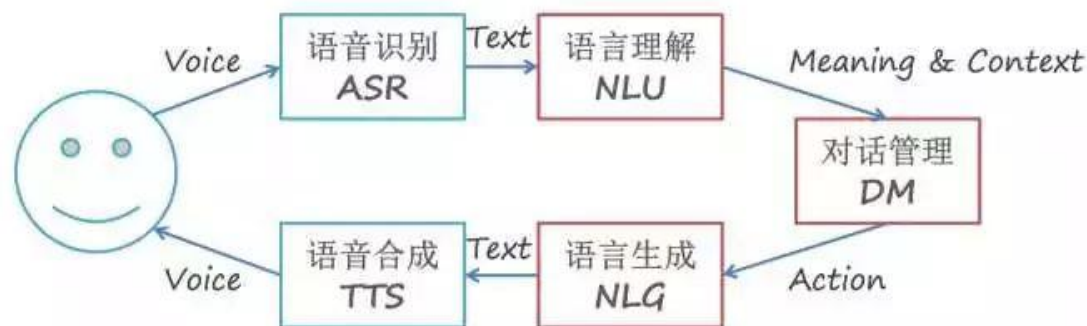
高望

2018-9-19

问题描述

对话管理 Dialog Management

- 定义：对话管理是任务型人机对话系统的核心组成部分，用来控制整个对话的逻辑和进行对话动作决策
- 多轮语音对话流程图：



例：会议室预定的人机对话系统

- [illegible]

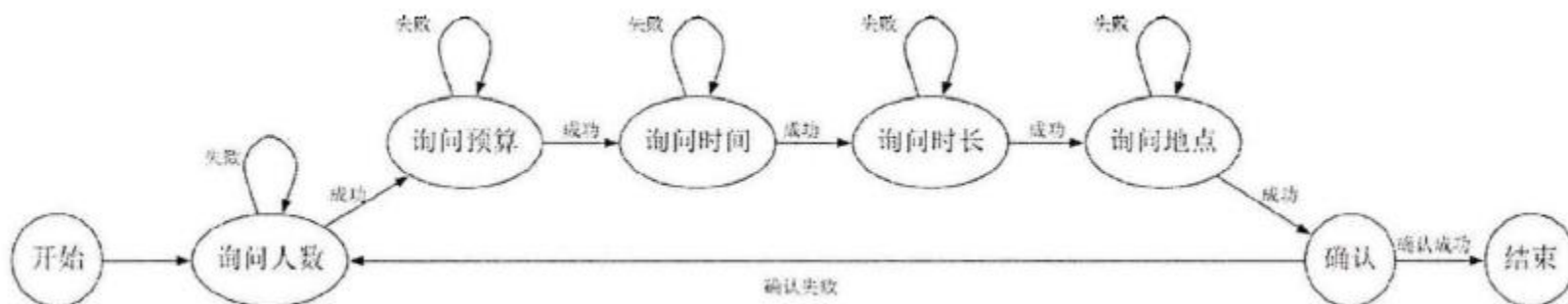
对话管理主要研究的内容

- 对话状态追踪 (Dialogue State Tracking, DST) 是指在人机交互过程中, 系统需要根据当前对话的上下文来更新内部对话状态的表示
- 对话动作选择 (Action Selection, AS) 是指系统根据对话状态追踪的结果, 来选择最佳的对话动作的过程

对话管理的研究现状

- 基于有限状态自动机的方法

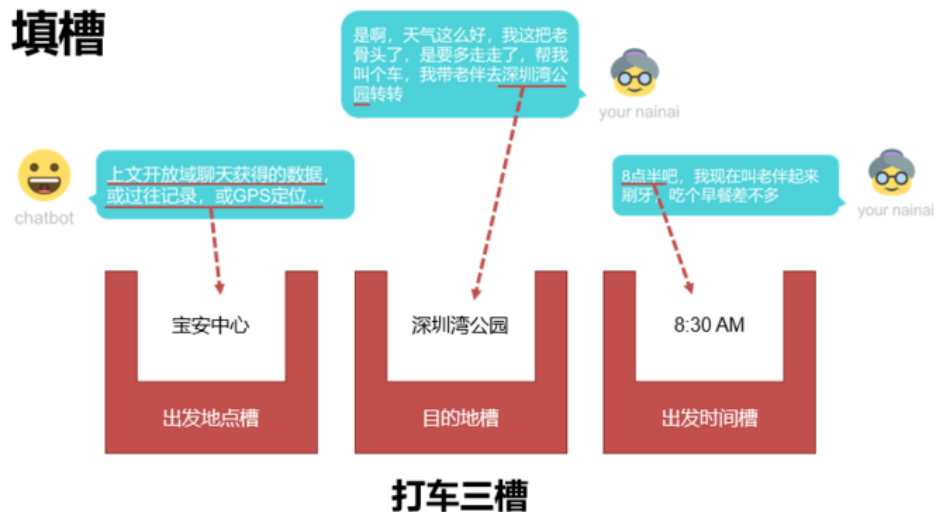
- 有限状态自动机可以用状态转移图来描述，图中的节点表示对话系统当前执行的对话动作，节点之间的边关系表示当前轮次对话用户的实际操作，在运行过程中，系统根据用户的输入，解析得到相应的转移方向，在整个转移图中进行传递，直到对话结束。每一次状态的转移，表示对话过程中的一轮交互



对话管理的研究现状

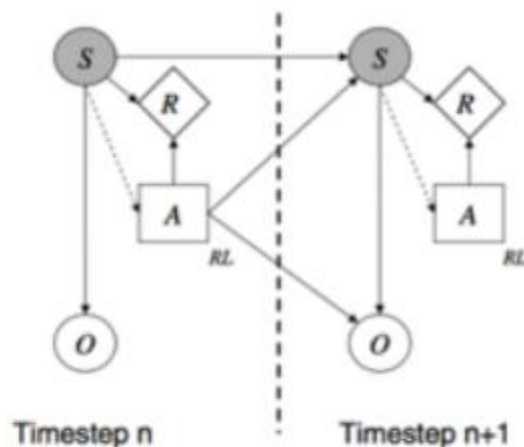
- 基于槽填充的方法
- 槽填充的对话管理利用类似占位符的一个多维向量来表示当前槽值的填充情况，根据交互中用户给予的相关信息来修改对应位置的值，从而达到记录对话状态的目的
- 基于槽填充的对话管理比基于有限状态自动机的对话管理更加灵活，在槽信息获取上没有顺序限制

填槽



对话管理的研究现状

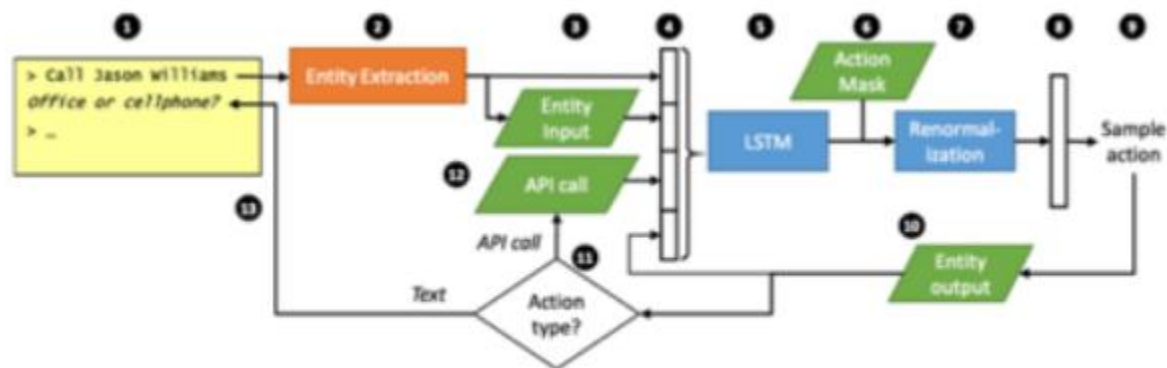
- 基于概率模型的方法
- 概率模型将对话表示成一个部分可见的马尔可夫决策过程，在训练过程中对已有的对话进行分析和学习，得到一个对话决策规则，通过大量的历史数据学习得到的对话策略，比人工定义的对话规则要更加全面



[Williams and Young, 2006]

对话管理的研究现状

- 基于神经网络的方法
- 直接使用神经网络去学习动作选择的策略，即将NLU的输出等其他特征都作为神经网络的输入，将动作选择作为神经网络的输出。这样做的好处是，对话状态直接被神经网络的隐向量所表征，不再需要人工去显式的定义对话状态



对话管理的研究趋势

- 利用深度强化学习等提高模型性能
- 融入情感信息，形成情感理解与反馈模型
- 针对复杂实际对话任务，设计高效的混合对话管理模型等

关系抽取

Relation Extraction

Hu Weilong 2018.9.19
huweilong@whu.edu.cn





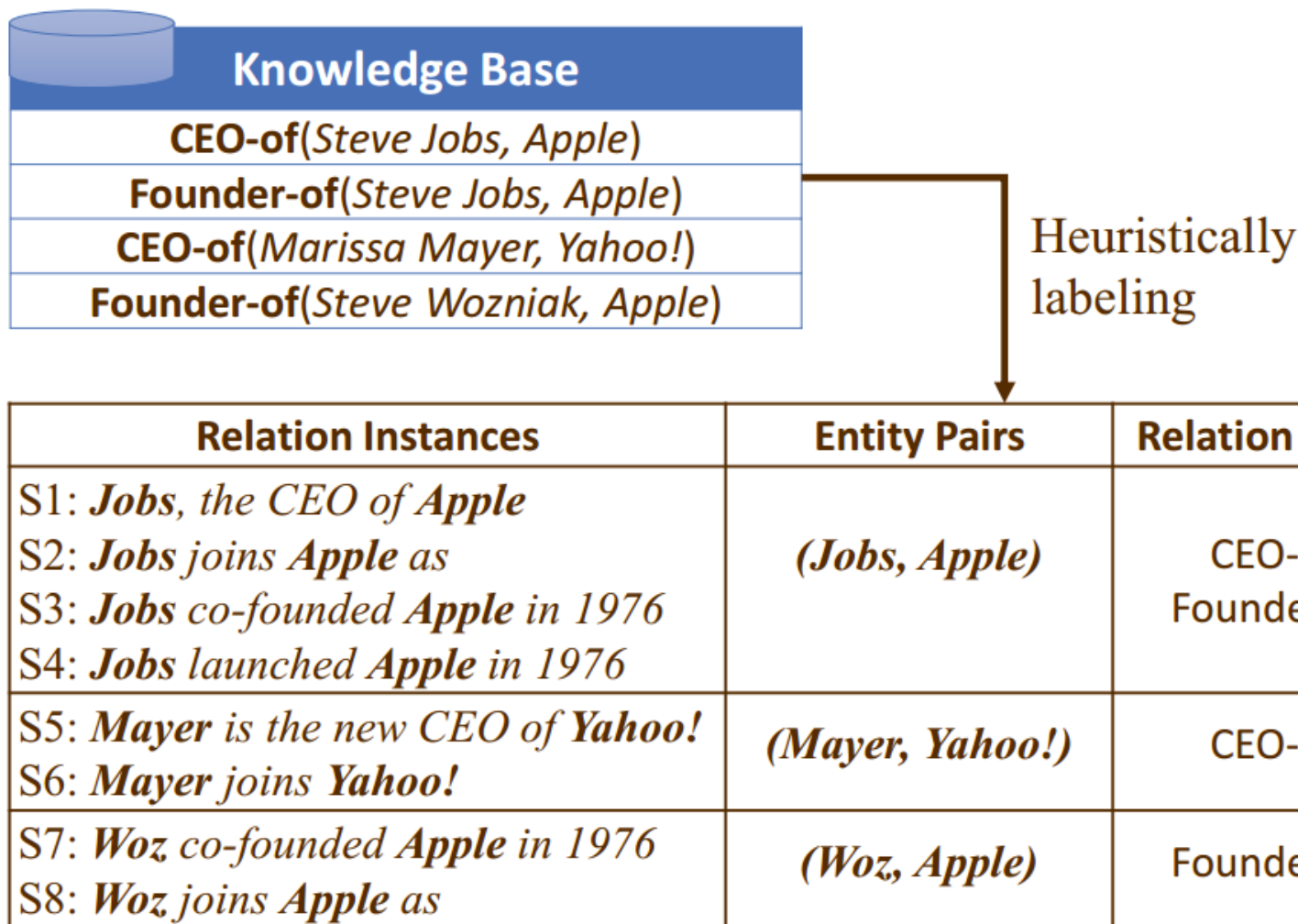
PART 01

研究现状



任务定义

PROBLEM DEFINE





研究现状

Approaches

关于预定义关系的多分类问题

- 需要大量的标注数据
- 基于特征的方法、基于核的方法

使用外部知识库或少量标注数据

- 远程监督、弱监督
- Bootstrapping方法、主动学习、标签传播方法

有监督方法

Supervised Approaches

联合抽取

Joint Extraction

半监督方法

Semi-supervised
Approaches

无监督方法

Unsupervised
Approaches

同时识别实体类型和实体间关系

- 克服流水线方法的错误传播
- 整数线性规划方法、基于图模型的方法、基于卡联合、结构预测方法

不需要任何标注数据

- 基于聚类的方法、其它方法



PART 02

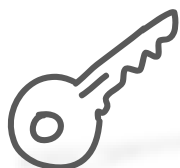
研究方向



不同领域的关系抽取

DIFFERENT DOMAINS

开放域关系抽取



Open Domain



950,20k

- 如何消除弱监督关系抽取中的噪音
- 无监督关系抽取

特定领域关系抽取



Specific Domain



200,05k

- 生物医学领域
- 法律领域
- 事件抽取

多领域迁移学习



Transform Learning



350,11k

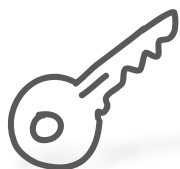
- 模型迁移
- 数据迁移 (ACE迁移到NYT数据集)



远程监督，消除噪音数据的影响

DISTANT SUPERVISION

强化学习、对抗生成网络



RL & GAN



950,20k

- 利用强化学习选择实例
- 利用对抗生成网络选择实例

Attention机制



Attention



200,05k

- 为各实例分配权重
- 引入外部描述信息等

噪音建模



Noise Modeling



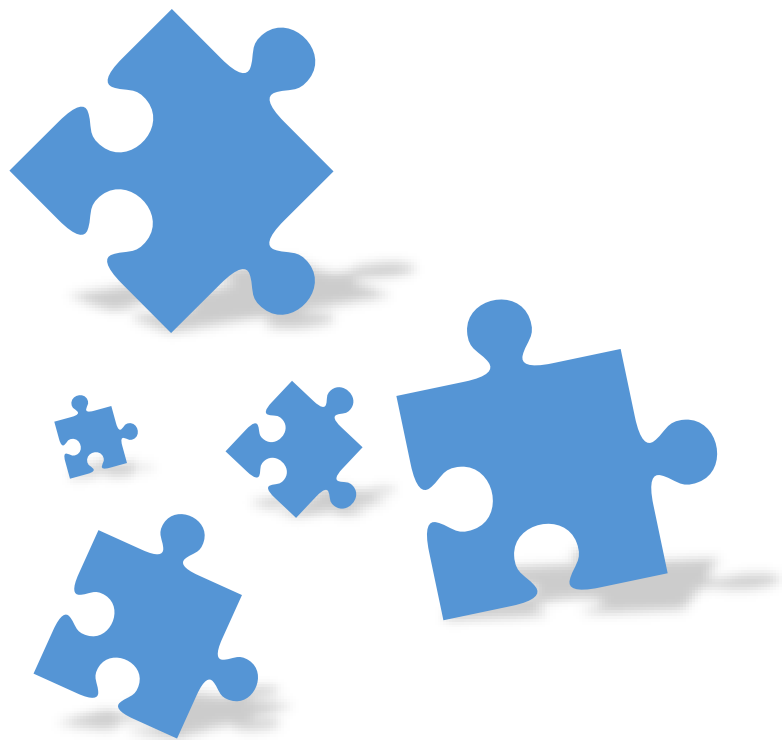
350,11k

- 显式建模噪音产生过程



其它研究点

Recent ADVANCES



□ 主动学习

标注少量数据集提高整体性能

□ N-ary关系抽取

多实体间的复杂、多维关系

□ 跨语句关系抽取

多个句子间、段落、篇章间的关系抽取

□ 句子级别关系抽取

每个句子(mention)单独抽取关系

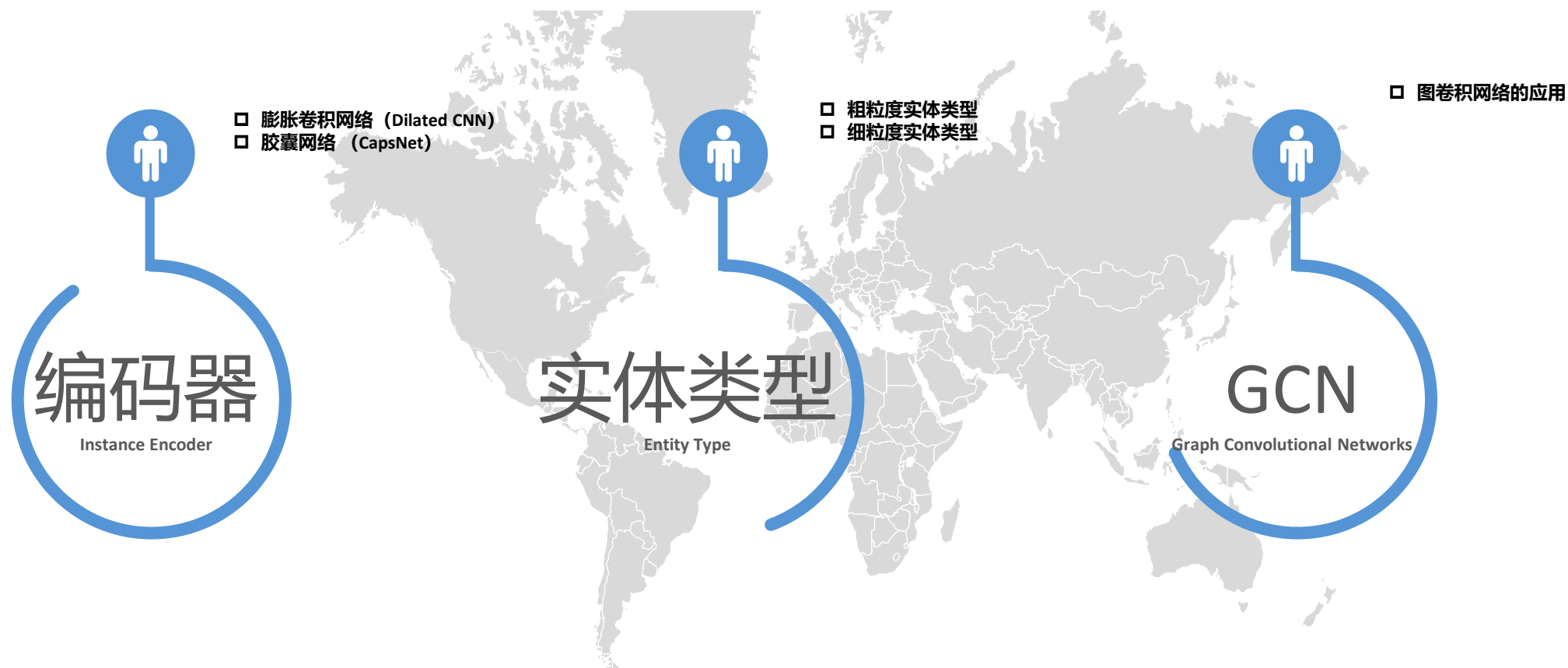
□ 联合抽取

同时进行命名实体识别和关系抽取



具体研究点

SPECIFIC DIRECTION



机器阅读理解

韩玮光

2018/9/19

阅读理解发展历程

- 2013: 选择题: MCTest
- 2015:
 - 完型填空: CNN/Daily Mail、THE CHILDREN'S BOOK TEST
 - 推理: bAbI
- 2016:
 - 从单篇文章中抽取答案: SQuAD 1.0
- 2017:
 - 从单篇文章中抽取答案: NewsQA、TriviaQA
 - 从多篇文章中抽取答案: DuReader、MS MARCO
- 2018: SQuAD 2.0

CNN/Daily Mail

| Original Version | Anonymised Version |
|---|---|
| Context <p>The BBC producer allegedly struck by Jeremy Clarkson will not press charges against the “Top Gear” host, his lawyer said Friday. Clarkson, who hosted one of the most-watched television shows in the world, was dropped by the BBC Wednesday after an internal investigation by the British broadcaster found he had subjected producer Oisin Tymon “to an unprovoked physical and verbal attack.” ...</p> | <p>the <i>ent381</i> producer allegedly struck by <i>ent212</i> will not press charges against the “<i>ent153</i>” host , his lawyer said friday . <i>ent212</i> , who hosted one of the most - watched television shows in the world , was dropped by the <i>ent381</i> wednesday after an internal investigation by the <i>ent180</i> broadcaster found he had subjected producer <i>ent193</i> “ to an unprovoked physical and verbal attack . ” ...</p> |
| Query <p>Producer X will not press charges against Jeremy Clarkson, his lawyer says.</p> | <p>producer X will not press charges against <i>ent212</i> , his lawyer says .</p> |
| Answer <p>Oisin Tymon</p> | <p><i>ent193</i></p> |

THE CHILDREN'S BOOK TEST

"Well, Miss Maxwell, I think it only fair to tell you that you may have trouble with those boys when they do come. Forewarned is forearmed, you know. Mr. Cropper was opposed to our hiring you. Not, of course, that he had any personal objection to you, but he is set against female teachers, and when a Cropper is set there is nothing on earth can change him. He says female teachers can't keep order. He 's started in with a spite at you on general principles, and the boys know it. They know he'll back them up in secret, no matter what they do, just to prove his opinions. Cropper is sly and slippery, and it is hard to corner him."

"Are the boys big ?" queried Esther anxiously.

"Yes. Thirteen and fourteen and big for their age. You can't whip 'em -- that is the trouble. A man might, but they'd twist you around their fingers. You'll have your hands full, I'm afraid. But maybe they'll behave all right after all."

Mr. Baxter privately had no hope that they would, but Esther hoped for the best. She could not believe that Mr. Cropper would carry his prejudices into a personal application. This conviction was strengthened when he overtook her walking from school the next day and drove her home. He was a big, handsome man with a very suave, polite manner. He asked interestedly about her school and her work, hoped she was getting on well, and said he had two young rascals of his own to send soon. Esther felt relieved. She thought that Mr. Baxter had exaggerated matters a little.

S: 1 Mr. Cropper was opposed to our hiring you .
2 Not , of course , that he had any personal objection to you , but he is set against female teachers , and when a Cropper is set there is nothing on earth can change him .
3 He says female teachers ca n't keep order .
4 He 's started in with a spite at you on general principles , and the boys know it .
5 They know he 'll back them up in secret , no matter what they do , just to prove his opinions .
6 Cropper is sly and slippery , and it is hard to corner him . ''
7 `` Are the boys big ? ''
8 queried Esther anxiously .
9 `` Yes .
10 Thirteen and fourteen and big for their age .
11 You ca n't whip 'em -- that is the trouble .
12 A man might , but they 'd twist you around their fingers .
13 You 'll have your hands full , I 'm afraid .
14 But maybe they 'll behave all right after all . ''
15 Mr. Baxter privately had no hope that they would , but Esther hoped for the best.
16 She could not believe that Mr. Cropper would carry his prejudices into a personal application .
17 This conviction was strengthened when he overtook her walking from school the next day and drove her home .
18 He was a big , handsome man with a very suave , polite manner .
19 He asked interestedly about her school and her work , hoped she was getting on well , and said he had two young rascals of his own to send soon .
20 Esther felt relieved .
Q: She thought that Mr. _____ had exaggerated matters a little .
C: Baxter, Cropper, Esther, course, fingers, manner, objection, opinion, right, spite.
a: Baxter

Figure 1: A Named Entity question from the CBT (right), created from a book passage (left, in blue). In this case, the candidate answers *C* are both entities and common nouns, since fewer than ten named entities are found in the context.

bAbI

Task 1: Single Supporting Fact

Mary went to the bathroom.
John moved to the hallway.
Mary travelled to the office.
Where is Mary? A: office

Task 2: Two Supporting Facts

John is in the playground.
John picked up the football.
Bob went to the kitchen.
Where is the football? A: playground

Task 3: Three Supporting Facts

John picked up the apple.
John went to the office.
John went to the kitchen.
John dropped the apple.
Where was the apple before the kitchen? A: office

Task 4: Two Argument Relations

The office is north of the bedroom.
The bedroom is north of the bathroom.
The kitchen is west of the garden.
What is north of the bedroom? A: office
What is the bedroom north of? A: bathroom

Task 5: Three Argument Relations

Mary gave the cake to Fred.
Fred gave the cake to Bill.
Jeff was given the milk by Bill.
Who gave the cake to Fred? A: Mary
Who did Fred give the cake to? A: Bill

Task 6: Yes/No Questions

John moved to the playground.
Daniel went to the bathroom.
John went back to the hallway.
Is John in the playground? A: no
Is Daniel in the bathroom? A: yes

Task 7: Counting

Daniel picked up the football.
Daniel dropped the football.
Daniel got the milk.
Daniel took the apple.
How many objects is Daniel holding? A: two

Task 8: Lists/Sets

Daniel picks up the football.
Daniel drops the newspaper.
Daniel picks up the milk.
John took the apple.
What is Daniel holding? milk, football

Task 9: Simple Negation

Sandra travelled to the office.
Fred is no longer in the office.
Is Fred in the office? A: no
Is Sandra in the office? A: yes

Task 10: Indefinite Knowledge

John is either in the classroom or the playground.
Sandra is in the garden.
Is John in the classroom? A: maybe
Is John in the office? A: no

bAbI

Task 11: Basic Coreference

Daniel was in the kitchen.
Then he went to the studio.
Sandra was in the office.
Where is Daniel? A: studio

Task 12: Conjunction

Mary and Jeff went to the kitchen.
Then Jeff went to the park.
Where is Mary? A: kitchen
Where is Jeff? A: park

Task 13: Compound Coreference

Daniel and Sandra journeyed to the office.
Then they went to the garden.
Sandra and John travelled to the kitchen.
After that they moved to the hallway.
Where is Daniel? A: garden

Task 14: Time Reasoning

In the afternoon Julie went to the park.
Yesterday Julie was at school.
Julie went to the cinema this evening.
Where did Julie go after the park? A: cinema
Where was Julie before the park? A: school

Task 15: Basic Deduction

Sheep are afraid of wolves.
Cats are afraid of dogs.
Mice are afraid of cats.
Gertrude is a sheep.
What is Gertrude afraid of? A: wolves

Task 16: Basic Induction

Lily is a swan.
Lily is white.
Bernhard is green.
Greg is a swan.
What color is Greg? A: white

Task 17: Positional Reasoning

The triangle is to the right of the blue square.
The red square is on top of the blue square.
The red sphere is to the right of the blue square.
Is the red sphere to the right of the blue square? A: yes
Is the red square to the left of the triangle? A: yes

Task 18: Size Reasoning

The football fits in the suitcase.
The suitcase fits in the cupboard.
The box is smaller than the football.
Will the box fit in the suitcase? A: yes
Will the cupboard fit in the box? A: no

Task 19: Path Finding

The kitchen is north of the hallway.
The bathroom is west of the bedroom.
The den is east of the hallway.
The office is south of the bedroom.
How do you go from den to kitchen? A: west, north
How do you go from office to bathroom? A: north, west

Task 20: Agent's Motivations

John is hungry.
John goes to the kitchen.
John grabbed the apple there.
Daniel is hungry.
Where does Daniel go? A: kitchen
Why did John go to the kitchen? A: hungry

SQuAD 1.0

In meteorology, precipitation is any product of the condensation of atmospheric water vapor that falls under **gravity**. The main forms of precipitation include drizzle, rain, sleet, snow, **graupel** and hail... Precipitation forms as smaller droplets coalesce via collision with other rain drops or ice crystals **within a cloud**. Short, intense periods of rain in scattered locations are called “showers”.

What causes precipitation to fall?

gravity

What is another main form of precipitation besides drizzle, rain, snow, sleet and hail?

graupel

Where do water droplets collide with ice crystals to form precipitation?

within a cloud

NewsQA

Immigration Groups to Challenge New Law

(CNN) – **Four** groups that advocate for immigrant rights said Thursday they will challenge Arizona's new immigration law, which allows police to ask anyone for proof of legal U.S. residency.

The Mexican American Legal Defense and Educational Fund, the American Civil Liberties Union, the ACLU of Arizona and the National Immigration Law Center held a news conference Thursday in Phoenix to announce the legal challenge.

"The Arizona community can be assured that a vigorous and sophisticated legal challenge will be mounted, in advance of SB1070's implementation, seeking to prevent this unconstitutional and discriminatory law from ever taking effect," said Thomas A. Saenz, president of the Mexican American Legal Defense and Educational Fund, known as MALDEF.

"This law will only make the rampant racial profiling of Latinos that is already going on in Arizona much worse," said Alessandra Soler Meetze, executive director of the ACLU of Arizona. "If this law were implemented, citizens would effectively have to carry 'their papers' at all times to avoid arrest. It is a low point in modern America when a state law requires police to demand documents from people on the street."

Republican Arizona Gov. Jan Brewer signed the law last week. It goes into effect 90 days after the close of the legislative session, which has not been determined.

Brewer and others who support the law say it does not involve racial profiling or any other illegal acts.

Are there any groups that support the law?

Answer 1: Brewer and others

Answer 2: Four

What do supporters say?

Answer 1: it does not involve racial profiling or any other illegal acts.

Which law are the groups challenging?

Answer 1: new immigration

Answer 2: allows police to ask anyone for proof of legal U.S. residency.

Who slammed the law?

Answer 1: groups that advocate for immigrant rights

Answer 2: The Mexican American Legal Defense and Educational Fund, the American Civil Liberties Union, the ACLU of Arizona

SQuAD 2.0

Article: Endangered Species Act

Paragraph: “ ... Other legislation followed, including the Migratory Bird Conservation Act of 1929, a 1937 treaty prohibiting the hunting of right and gray whales, and the Bald Eagle Protection Act of 1940. These later laws had a low cost to society—the species were relatively rare—and little opposition was raised.”

Question 1: “Which laws faced significant opposition?”

Plausible Answer: later laws

Question 2: “What was the name of the 1937 treaty?”

Plausible Answer: Bald Eagle Protection Act

Figure 1: Two unanswerable questions written by crowdworkers, along with plausible (but incorrect) answers. Relevant keywords are shown in blue.

SQuAD 2.0

| Reasoning | Description | Example | Percentage |
|----------------------|---|--|------------|
| Negation | Negation word inserted or removed. | Sentence: “ <i>Several hospital pharmacies have decided to outsource high risk preparations . . .</i> ” Question: “ <i>What types of pharmacy functions have never been outsourced?</i> ” | 9% |
| Antonym | Antonym used. | S: “ <i>the extinction of the dinosaurs. . . allowed the tropical rainforest to spread out across the continent.</i> ” Q: “ <i>The extinction of what led to the decline of rainforests?</i> ” | 20% |
| Entity Swap | Entity, number, or date replaced with other entity, number, or date. | S: “ <i>These values are much greater than the 9–88 cm as projected . . . in its Third Assessment Report.</i> ” Q: “ <i>What was the projection of sea level increases in the fourth assessment report?</i> ” | 21% |
| Mutual Exclusion | Word or phrase is mutually exclusive with something for which an answer is present. | S: “ <i>BSkyB. . . waiv[ed] the charge for subscribers whose package included two or more premium channels.</i> ” Q: “ <i>What service did BSkyB give away for free unconditionally?</i> ” | 15% |
| Impossible Condition | Asks for condition that is not satisfied by anything in the paragraph. | S: “ <i>Union forces left Jacksonville and confronted a Confederate Army at the Battle of Olustee. . . Union forces then retreated to Jacksonville and held the city for the remainder of the war.</i> ” Q: “ <i>After what battle did Union forces leave Jacksonville for good?</i> ” | 4% |
| Other Neutral | Other cases where the paragraph does not imply any answer. | S: “ <i>Schuenemann et al. concluded in 2011 that the Black Death. . . was caused by a variant of Y. pestis. . .</i> ” Q: “ <i>Who discovered Y. pestis?</i> ” | 24% |
| Answerable | Question is answerable (i.e. dataset noise). | | 7% |

MS MARCO

Question: What is the difference between a mixed and pure culture?

Passages:

[1] **A culture is a society's total way of living and a society is a group that live in a defined territory and participate in common culture.** While the answer given is in essence true, societies originally form for the express purpose to enhance ...

[2] ... There has been resurgence in the economic system known as capitalism during the past two decades. **4. The mixed economy is a balance between socialism and capitalism.** As a result, some institutions are owned and maintained by ...

[3] **A pure culture is one in which only one kind of microbial species is found whereas in mixed culture two or more microbial species formed colonies.** Culture on the other hand, is the lifestyle that the people in the country ...

[4] **Best Answer: A pure culture comprises a single species or strains. A mixed culture is taken from a source and may contain multiple strains or species.** A contaminated culture contains organisms that derived from some place ...

[5] ... It will be at that time when we can truly obtain a pure culture. **A pure culture is a culture consisting of only one strain.** You can obtain a pure culture by picking out a small portion of the mixed culture ...

[6] **A pure culture is one in which only one kind of microbial species is found whereas in mixed culture two or more microbial species formed colonies.** A pure culture is a culture consisting of only one strain. ...

... ..

Reference Answer: A pure culture is one in which only one kind of microbial species is found whereas in mixed culture two or more microbial species formed colonies.

Table 1: An example from MS-MARCO. The text in bold is the predicted answer candidate from each passage according to the boundary model. The candidate from [1] is chosen as the final answer by this model, while the correct answer is from [6] and can be verified by the answers from [3], [4], [5].

DuReader

| | |
|----------------------|---|
| Question | 学士服颜色/ What are the colors of academic dresses? |
| Question Type | <i>Entity-Fact</i> |
| Answer 1 | [绿色, 灰色, 黄色, 粉色]: 农学学士服绿色, 理学学士服灰色, 工学学士服黄色, 管理学学士服灰色, 法学学士服粉色, 文学学士服粉色, 经济学学士服灰色。/ [green, gray, yellow, pink] Green for Bachelor of Agriculture, gray for Bachelor of Science, yellow for Bachelor of Engineering, gray for Bachelor of Management, pink for Bachelor of Law, pink for Bachelor of Art, gray for Bachelor of Economics |
| Document 1 | 农学学士服绿色, 理学学士服灰色, ... , 确定为文、理、工、农、医、军事六大类, 与此相应的饰边颜色为粉、灰、黄、绿、白、红六种颜色。 |
| ... | |
| Document 5 | 学士服是学士学位获得者在学位授予仪式上穿戴的表示学位的正式礼服, ... , 男女生都应着深色皮鞋。 |
| Question | 智慧牙一定要拔吗/ Do I have to have my wisdom teeth removed |
| Question Type | <i>YesNo-Opinion</i> |
| Answer 1 | [Yes]因为智齿很难清洁的原因, 比一般的牙齿容易出现口腔问题, 所以医生会建议拔掉/ [Yes] The wisdom teeth are difficult to clean, and cause more dental problems than normal teeth do, so doctors usually suggest to remove them |
| Answer 2 | [Depend]智齿不一定非得拔掉, 一般只拔出有症状表现的智齿, 比如说经常引起发炎... / [Depend] Not always, only the bad wisdom teeth need to be removed, for example, the one often causes inflammation ... |
| Document 1 | 为什么要拔智齿? 智齿好好的医生为什么要建议我拔掉?主要还是因为智齿很难清洁... |
| ... | |
| Document 5 | 根据我多年的临床经验来说,智齿不一定非得拔掉.智齿阻生分好多种... |

Table 5: Examples from DuReader. Annotations for these questions include both the answers, as well as supporting sentences.

自动问答简介

自动问答领域研究现状

依数据来源区分

- **检索式问答：**

使用的技术主要是检索和匹配，回答问题类型大多是简单的实体或词语类问题，推理能力不强，还有很长的路要走。

- **社区问答：**

核心问题是从大规模历史问答对数据中查找，找出与用户提问问题语义相似的历史问题，将其答案返回提问用户。由于用户的问题相对较短，关键词匹配准确度低，存在“语义鸿沟”，因此很多工作在已有检索框架中引入单语言翻译概率模型，从一定程度上解决了问题。

- **知识库问答：**

使用知识图谱与知识库，在结构化数据上进行查询、匹配、推理等操作。核心问题是如何将用户的问句转换成结构化的查询语言。主流方法是通过语义分析，将用户的自然语言转化成结构化的语义表示。

自动问答领域研究现状

是否使用深度学习

- **传统问答：**

传统知识库问答采用浅层语义分析方法，将输入问句通过实体识别、关系分类、实体消歧等过程转换成结构化逻辑表达式，在知识库上进行查询获得问句的回答。

- **深度问答：**

深度学习在自动问答领域有两种主要方法，一种是在传统的语义分析过程中，将其中某几个阶段替换为深度学习模块，一种是使用端到端的深度学习模型，将问句映射到向量空间，与实体与关系向量共同进行运算得到答案。

自动问答领域研究问题

研究问题：

- **多领域、多语言自动问答：**

已有自动问答方法大多只能处理单一领域、某种语言的问答操作，尚缺乏对于多源、多语言知识库异构性和冗余性的有效处理机制。

- **面向问答的深度推理：**

传统基于符号逻辑的逻辑推理方法基于严格的符号匹配，过分依赖于推理规则的生成，因此具有领域适应性差、无法进行大规模推理的缺点。而深度学习基于分布式语义表示，利用语义空间中的数值模糊计算替代传统问答过程中的符号严格匹配，为解决上述问题提供了一种有效途径。

- **多轮对话：**

传统的自动问答都是采用一问一答的形式。然而在很多场景下，需要提问者和系统进行多轮对话交互，完成问答过程。