

自然语言生成论坛

语言生成中的语义性、一致性和逻辑性

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Conditional Text Generation

- **Free Text to Text**
 - Dialogue Generation
 - Story Generation
 - Abstractive Summarization
- **Structured Data to Text**
- **Category to Text**
 - Emotion/Sentiment Generation
- **Keywords to Text**
 - Poetry Generation
 - Essay/Narrative/Story Generation

Xiaoice: Most Successful Chatbot

语义理解的问题 Semantic understanding

User: 你家多大? How large is your house?

小冰: 这么快就要爆年龄了?

So soon to reveal my age?

User: 你是素食主义者还是吃肉啊?

Are you vegan or meatatarian?

小冰: 怎么减肥

How can I lose weight?

上下文理解的问题 Context issue

User: 早饭不好吃

小冰: 那明早一起吃

User: 行, 你推荐的应该不错

小冰: 是吗?

User: 哈哈, 我相信你

小冰: 呃呃

微软
小冰



个性身份一致性问题

Inconsistency in personality

User: 你几岁了?

小冰: 我啊。。。反正是九零后!

User: 那你是几几年出生的?

小冰: 错, **75**年阳历一月出生。

User: 你是九零后, 怎么会75年出生?

小冰: 生在九零后, 在深圳只能被当做八零后了。

Bad Semantics (AI Ethics)



Picture from Prof. Frank Rudzicz, University of Toronto

Bad Semantics & Logic

User: 回北京了！很冷很高兴！

Back to Beijing now. So cold so happy!

Machine: 什么时候来北京啊？

When will you come to Beijing?

User: 会做饭的男人是最性感的男人。

Mans who can cook are the most sexy.

Machine: 会做饭的男人是最性感的女人

Mans who can cook are the most sexy women.

User: 我来自上海。

I come from Shanghai.

Machine: 真巧，我来自海南，老乡啊

So cool, I am from Hainan, the same province!

Inconsistency

General seq2seq model

User: Are you a boy or a girl?

Chatbot: I am a boy.

User: Are you a girl?

Chatbot: Yes, I am a girl.

User: 你几岁了?

小冰: 我啊。。。反正是九零后!

User: 那你是几几年出生的?

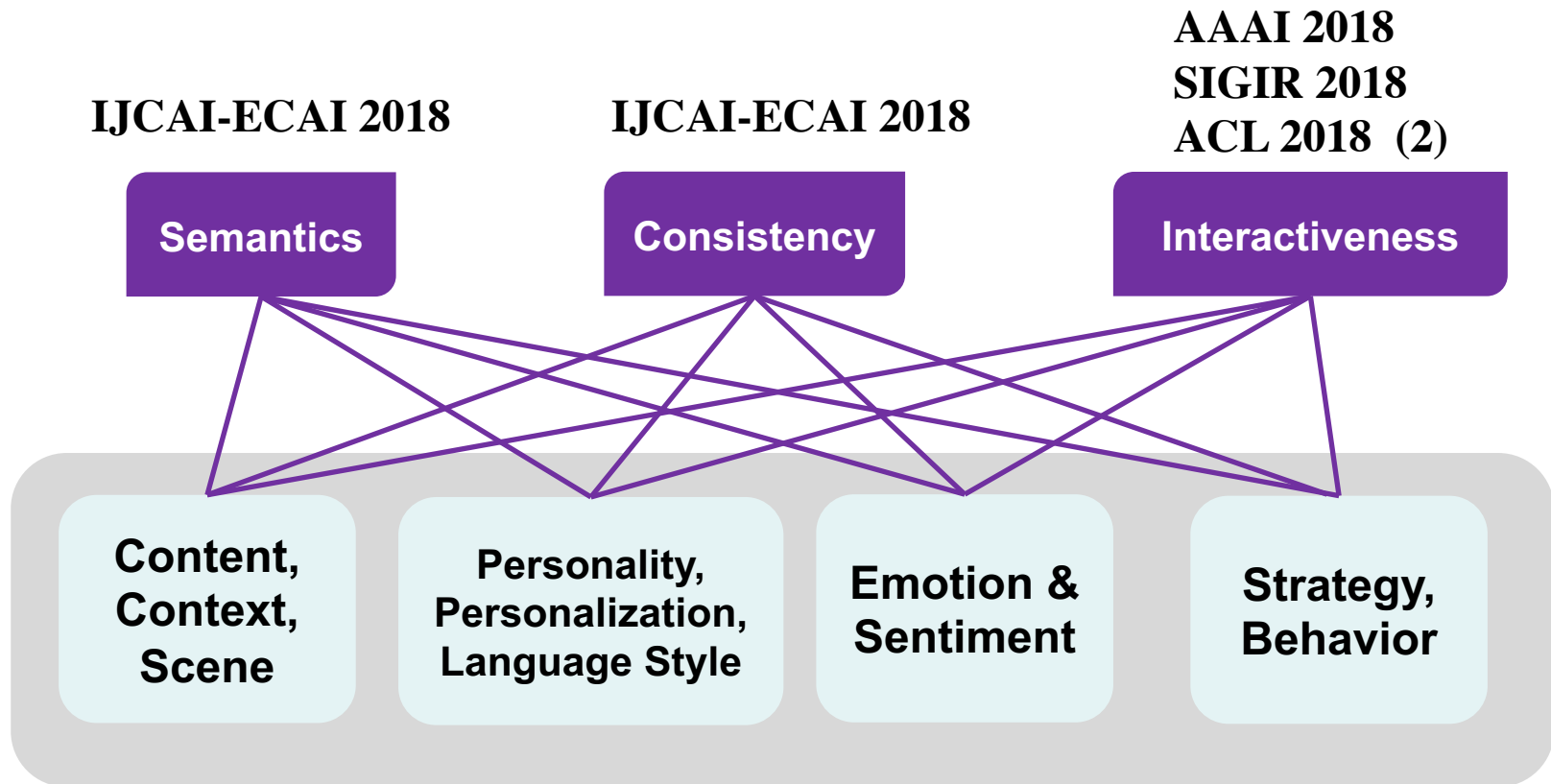
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Open-domain Dialog Generation



Open-domain Dialog Generation

- Behaving more interactively:
 - Perceiving and Expressing **Emotions** (**AAAI 2018**)
 - Proactive Behavior by **Asking Good Questions** (**ACL 2018**)
 - Controlling **sentence function** (**ACL 2018**)
 - Topic change (**SIGIR 2018**)
- Behaving more consistently:
 - **Explicit Personality** Assignment (**IJCAI-ECAI 2018**)
- Behaving more intelligently with semantics:
 - Better Understanding and Generation Using **Commonsense Knowledge** (**IJCAI-ECAI 2018 distinguished paper**)

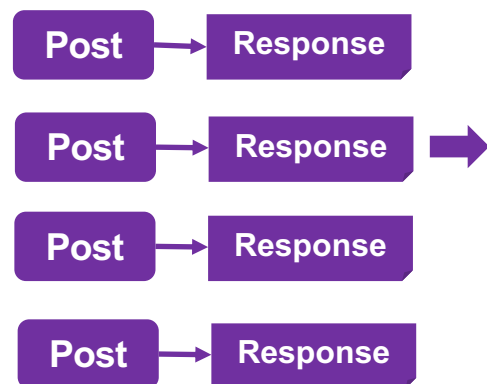
References:

- ① Emotional Chatting Machine: Emotional Conversation Generation with Internal and External Memory. **AAAI 2018**.
- ② Assigning personality/identity to a chatting machine for coherent conversation generation. **IJCAI-ECAI 2018**.
- ③ Commonsense Knowledge Aware Conversation Generation with Graph Attention. **IJCAI-ECAI 2018**.
- ④ Learning to Ask Questions in Open-domain Conversational Systems with Typed Decoders. **ACL 2018**.
- ⑤ Generating Informative Responses with Controlled Sentence Function. **ACL 2018**.
- ⑥ Chat more: deepening and widening the chatting topic via a deep model. **SIGIR 2018**.

Emotional Chatting Machine

Perceiving and Expressing emotion by machine
Closer to human-level intelligence

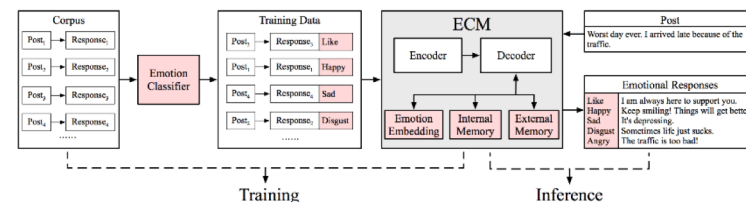
Social Interaction Data



Emotion
Tagged
data

今天领导前来视察工作！
Happy: 哈哈，领导视察工作辛苦了
Like: 这是一个很有特色的领导人
Sad: 我想知道，谁来帮我干活？
Angry: 这是要干什么？领导？

Emotional Chatting
Machine



Our work was reported by **MIT Technology Review, the Guardian, Cankao News, Xinhua News Agency etc.**

Prof Björn Schuller: “**an important step**” towards personal assistants that could read the emotional undercurrent of a conversation and respond with something akin to empathy.

Hao Zhou, **Minlie Huang**, Xiaoyan Zhu, Bing Liu. Emotional Chatting Machine: Emotional Conversation Generation with Internal and External Memory. **AAAI 2018**.

ECM~ Making Empathic Chatbot

机器人小智为您服务!

小智:

您好, 我是清华大学COAI机器人小智, 我可以陪你共情(empathy)的聊天, 还可以通过回复 like/happy/sad/disgust/angry 切换不同情绪哟:

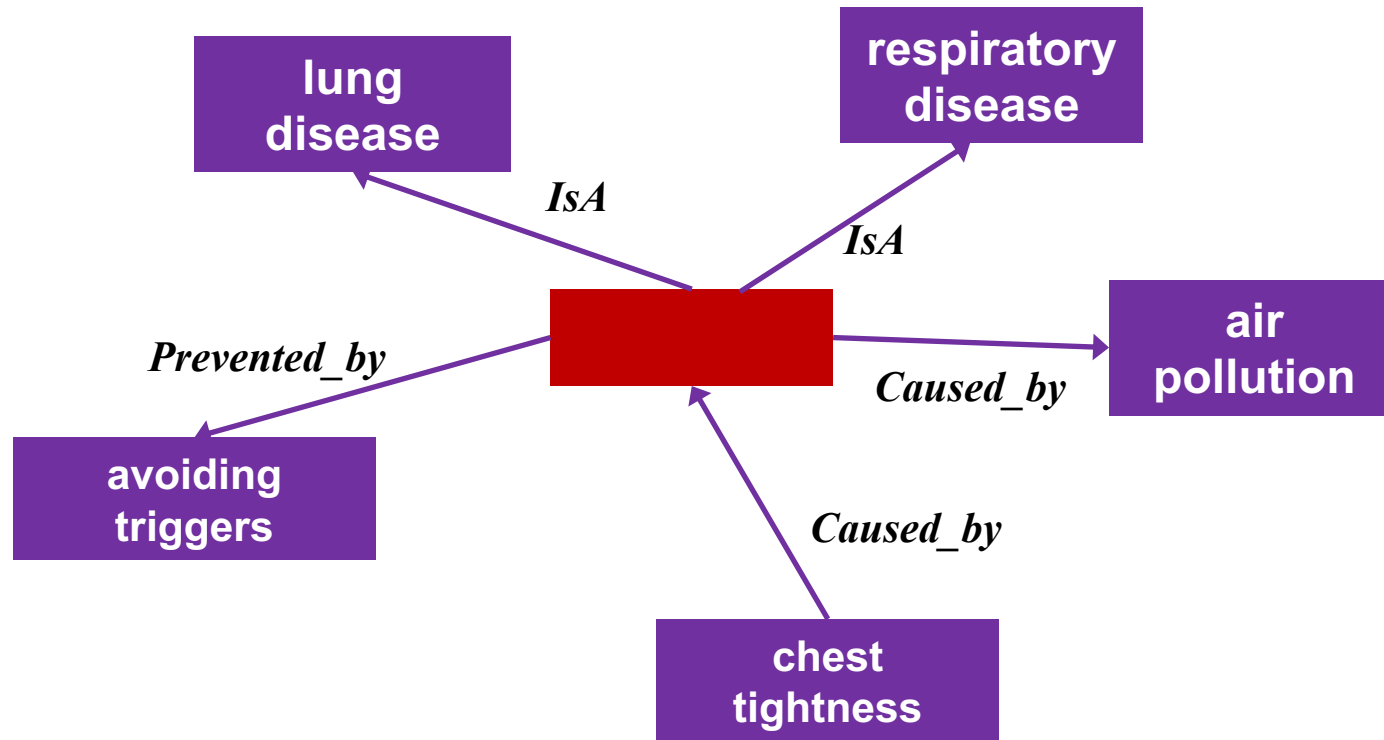
用户输入

发送

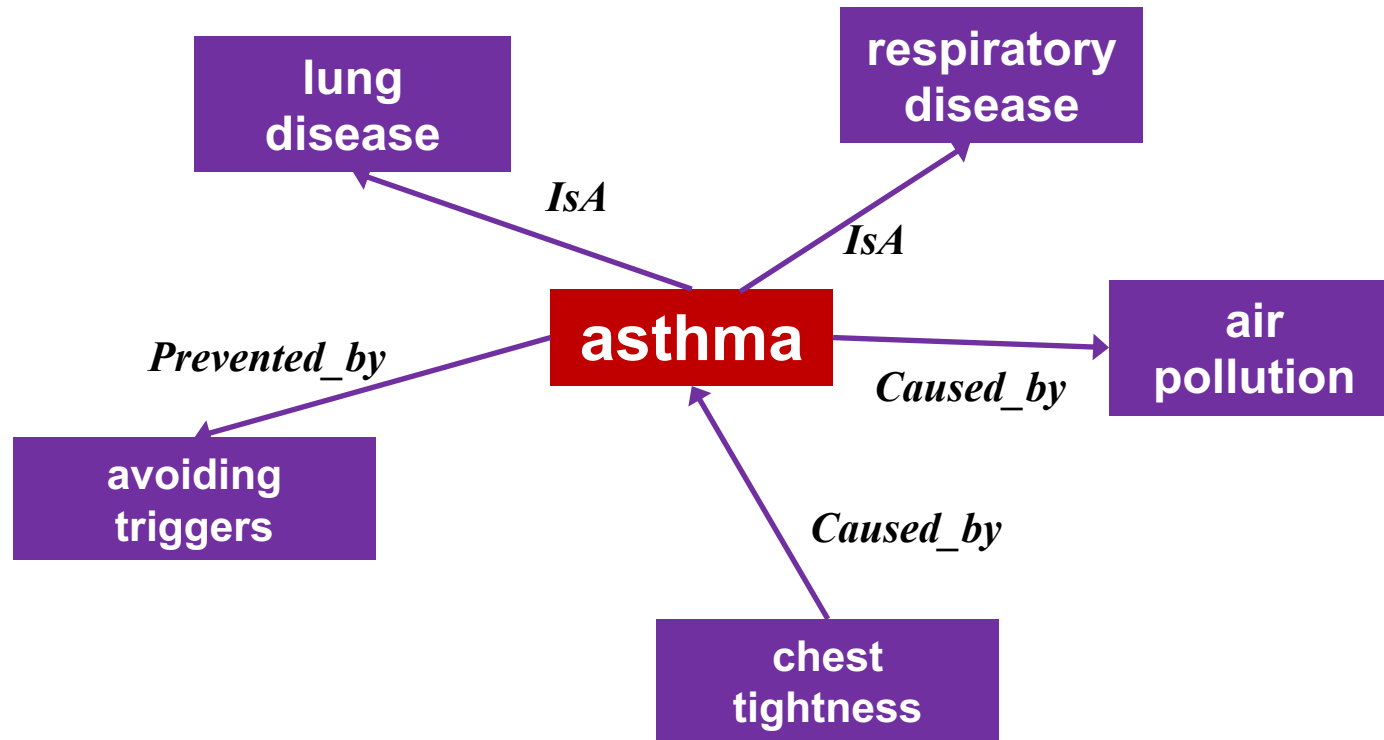
清空

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Improving Semantics

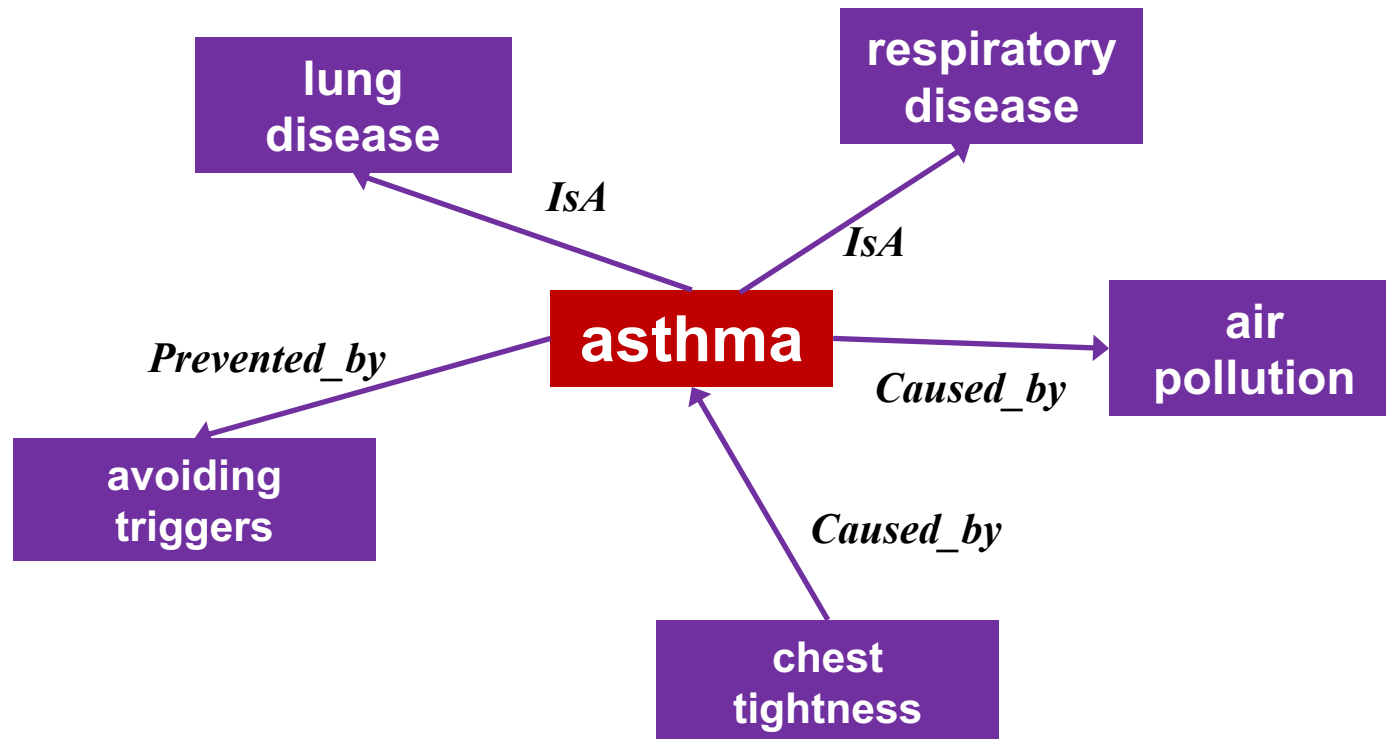


Improving Semantics



Improving Semantics

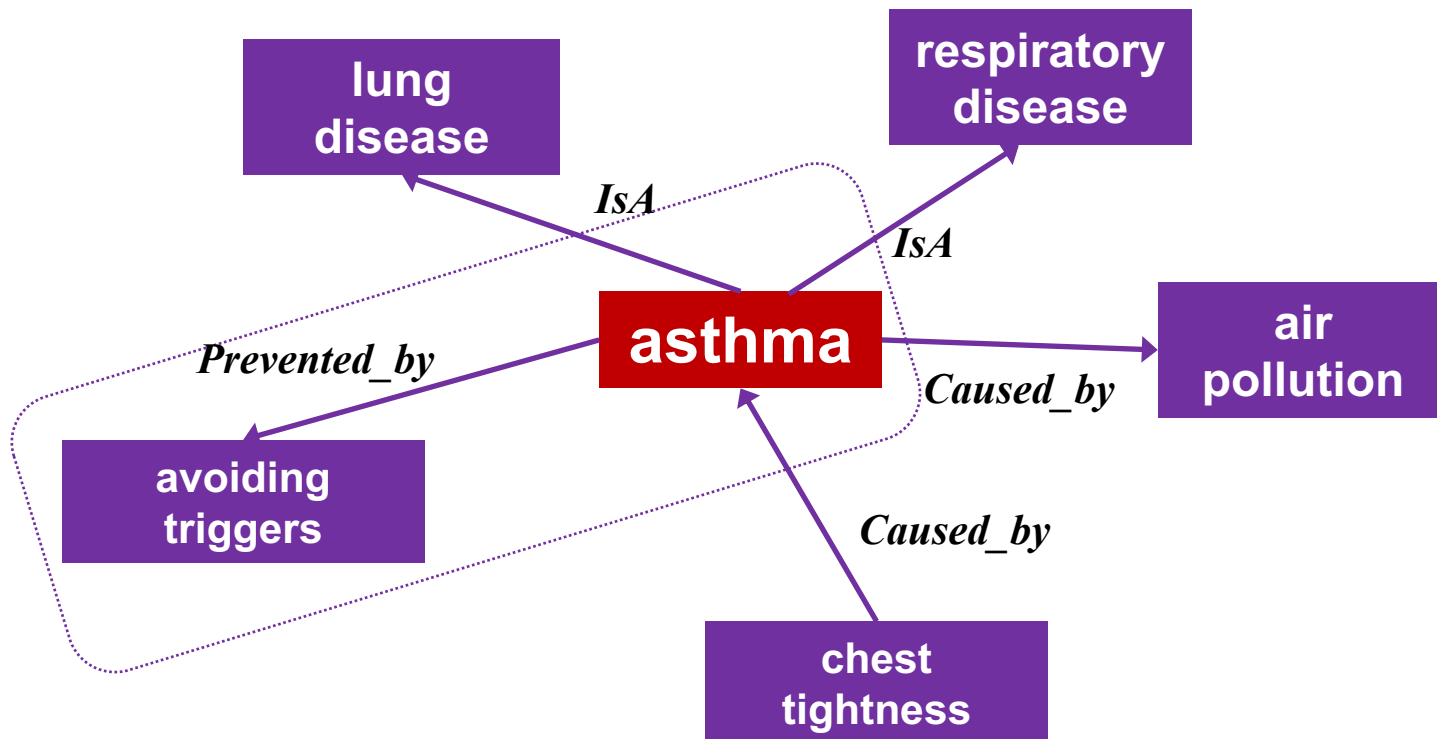
Post: I have an **asthma** since three years old.



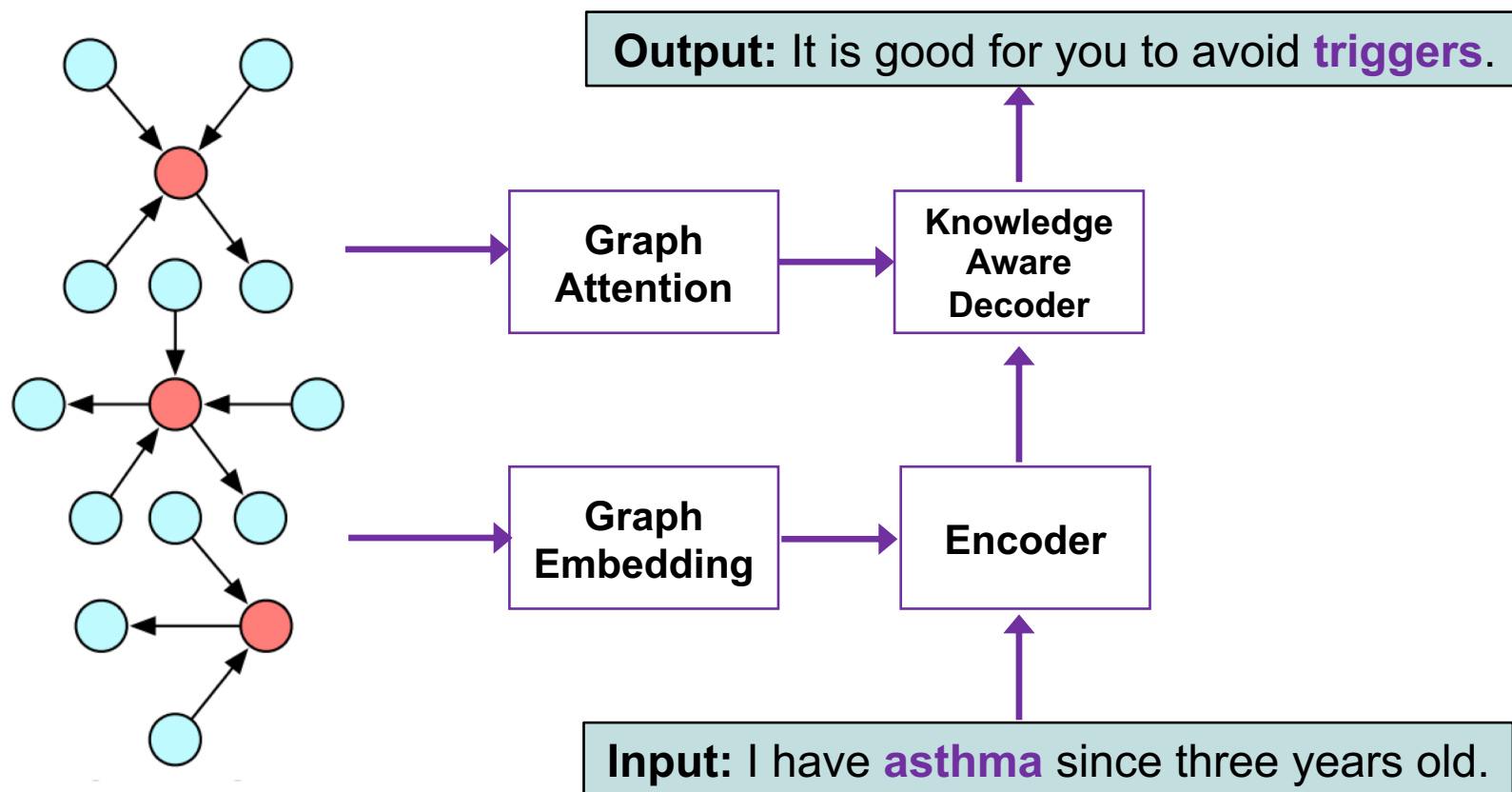
Improving Semantics

Post: I have an **asthma** since three years old.

Response: I am sorry to hear that. Maybe **avoiding triggers** can prevent **asthma** attacks.



Commonsense-aware Dialog Generation

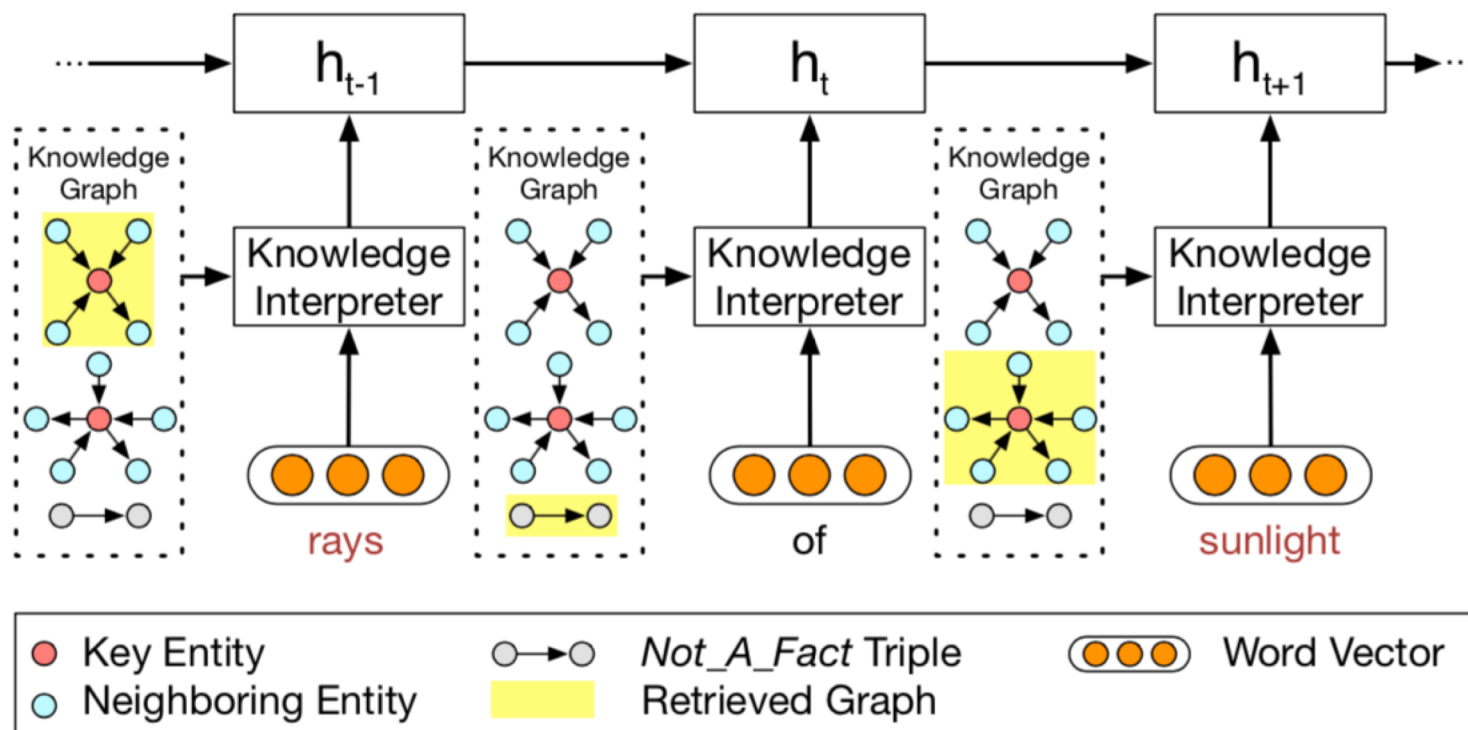


IJCAI 2018 Distinguished Paper: “Commonsense knowledge aware conversation generation” (selected from 710 accepted papers, 3470 submissions)

By Hao Zhou, Tom Young, Minlie Huang, Xiaoyan Zhu.

Commonsense-aware Dialog Generation

Static graph attention: encoding semantics in graph,
Feeding knowledge-enhanced info. into the encoder

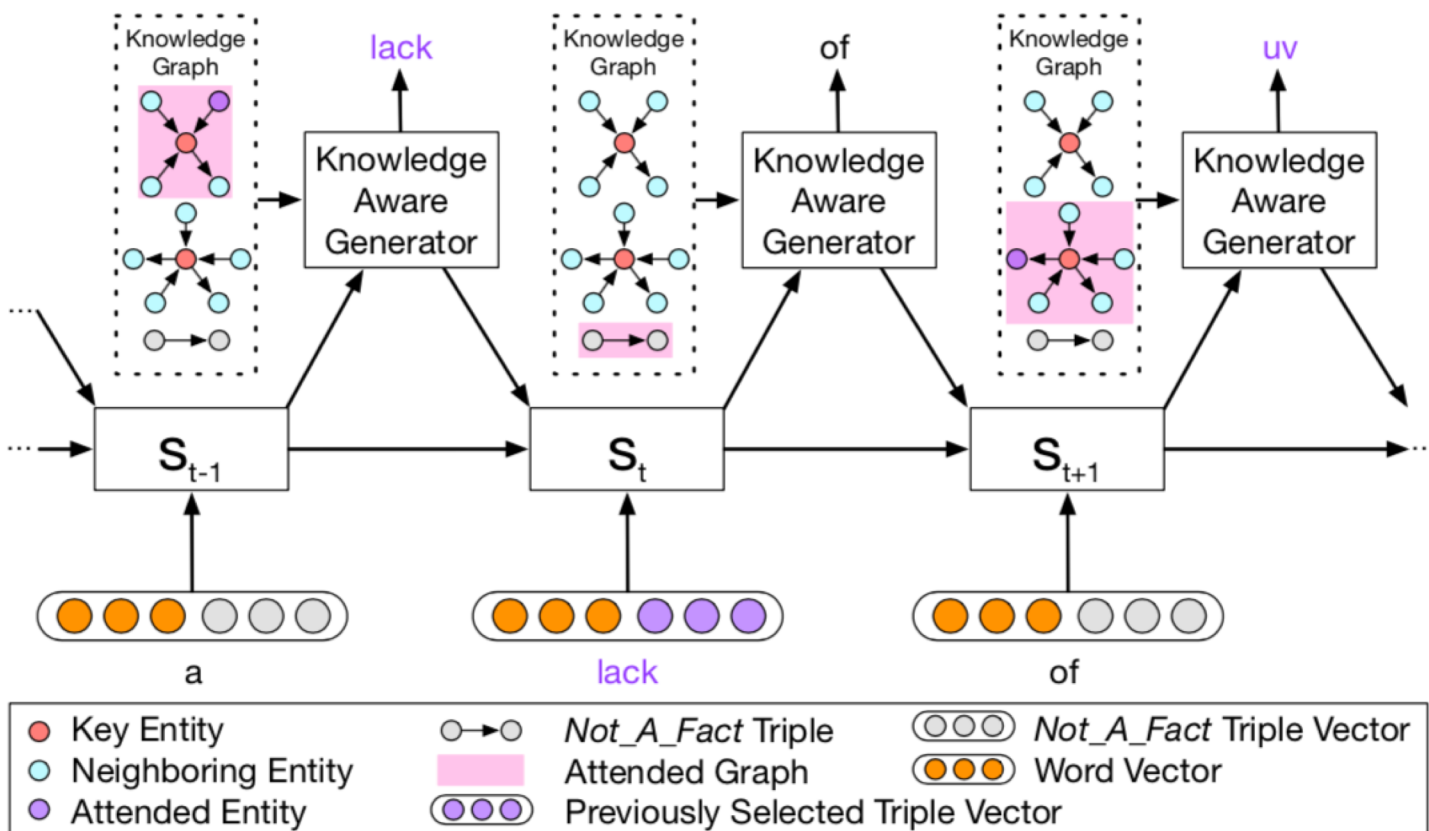


Hao Zhou, Tom Yang, Minlie Huang, Haizhou Zhao, Jingfang Xu, Xiaoyan Zhu.

Commonsense Knowledge Aware Conversation Generation with Graph Attention. IJCAI-ECAI 2018

Commonsense-aware Dialog Generation

Dynamic graph attention: first attend a graph, then to a triple within that graph, finally generate with the words in a graph



Logic: Story Ending Generation

Find context clues: plan the order of events and entities.

Today is **Halloween** .

Jack is so excited to go **trick or treating** tonight .

He is going to **dress up** like a **monster** .

The **costume** is real **scary** .



He hopes to get a lot of **candy** .



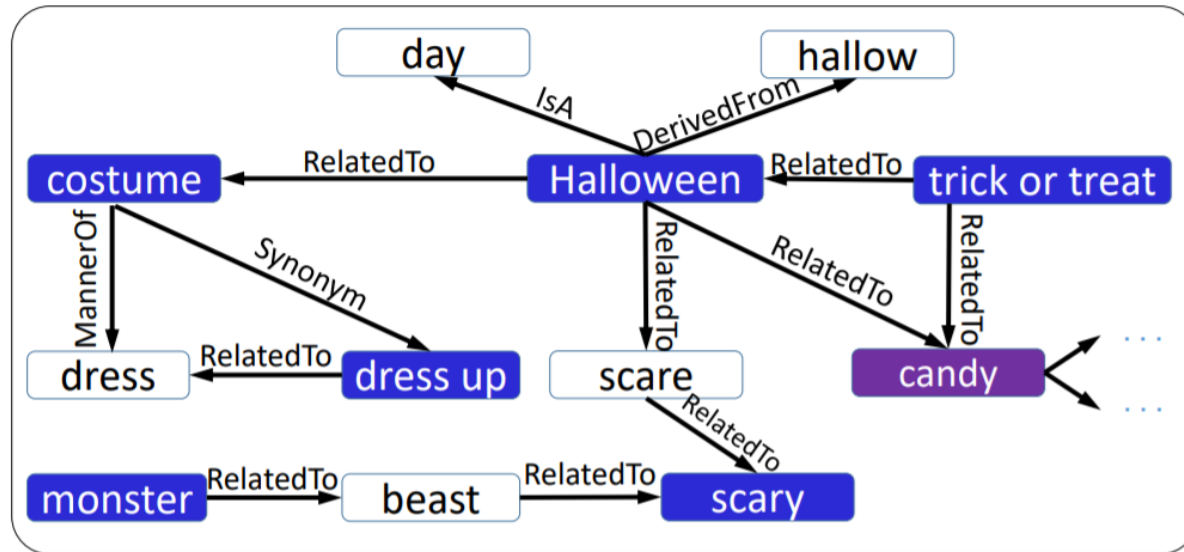
Logic: Story Ending Generation

Commonsense knowledge

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The **costume** is real **scary** .



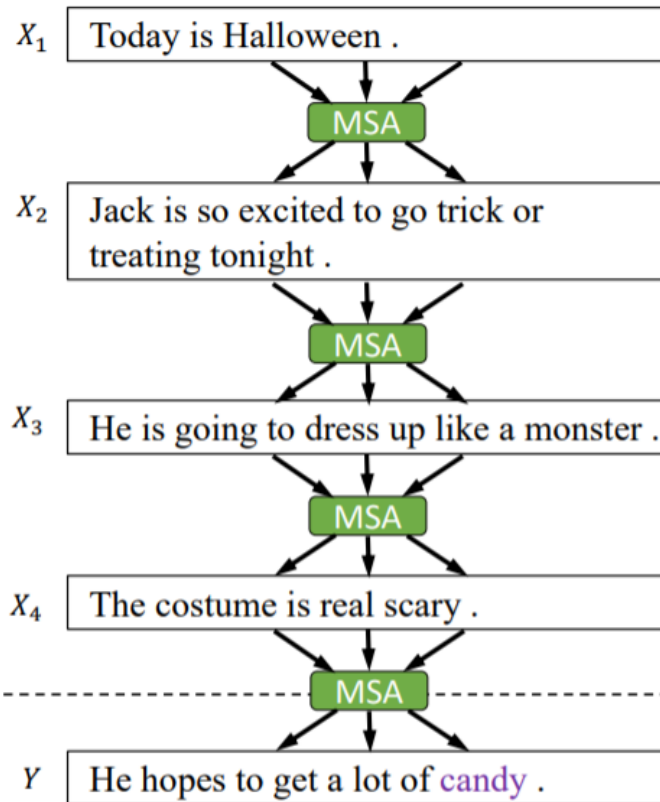
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Logic: Story Ending Generation

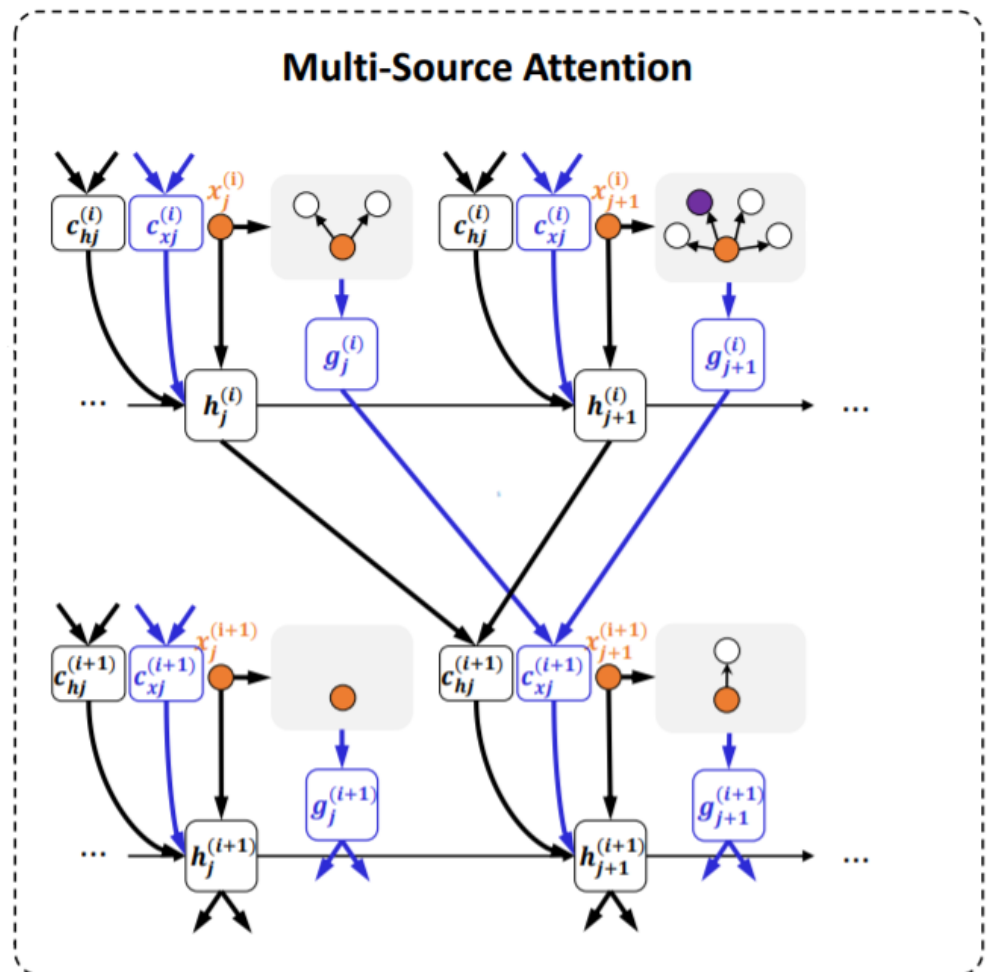
Incremental Encoding

Incremental Encoding



Multi-Source Attention

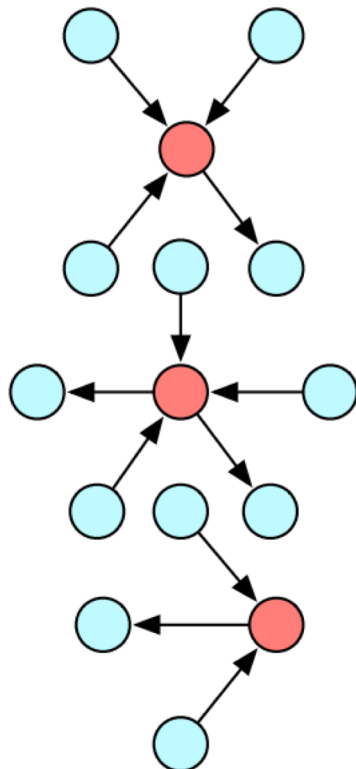
Multi-Source Attention



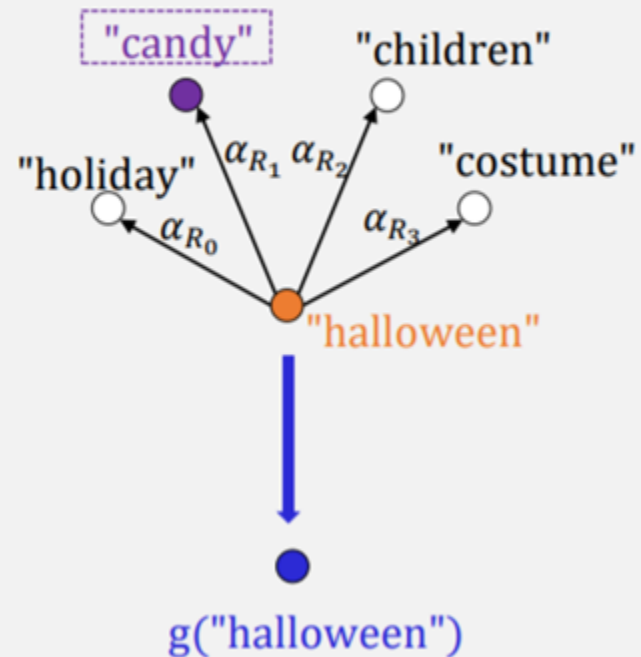
Logic: Story Ending Generation

Attention to the knowledge base: static graph attention

Graph attention



Knowledge Graph Representation



Logic: Story Ending Generation

Story 1:

Context:

Taj has never drank an espresso drink.

He ordered one while out with his friends.

The shot of espresso tasted terrible to him.

Taj found that he couldn't stop talking or moving.

Generated Ending:

He decided to never drink again.

Story 2:

Context:

Martha is cooking a special meal for her family.

She wants everything to be just right for when they eat.

Martha perfects everything and puts her dinner into the oven.

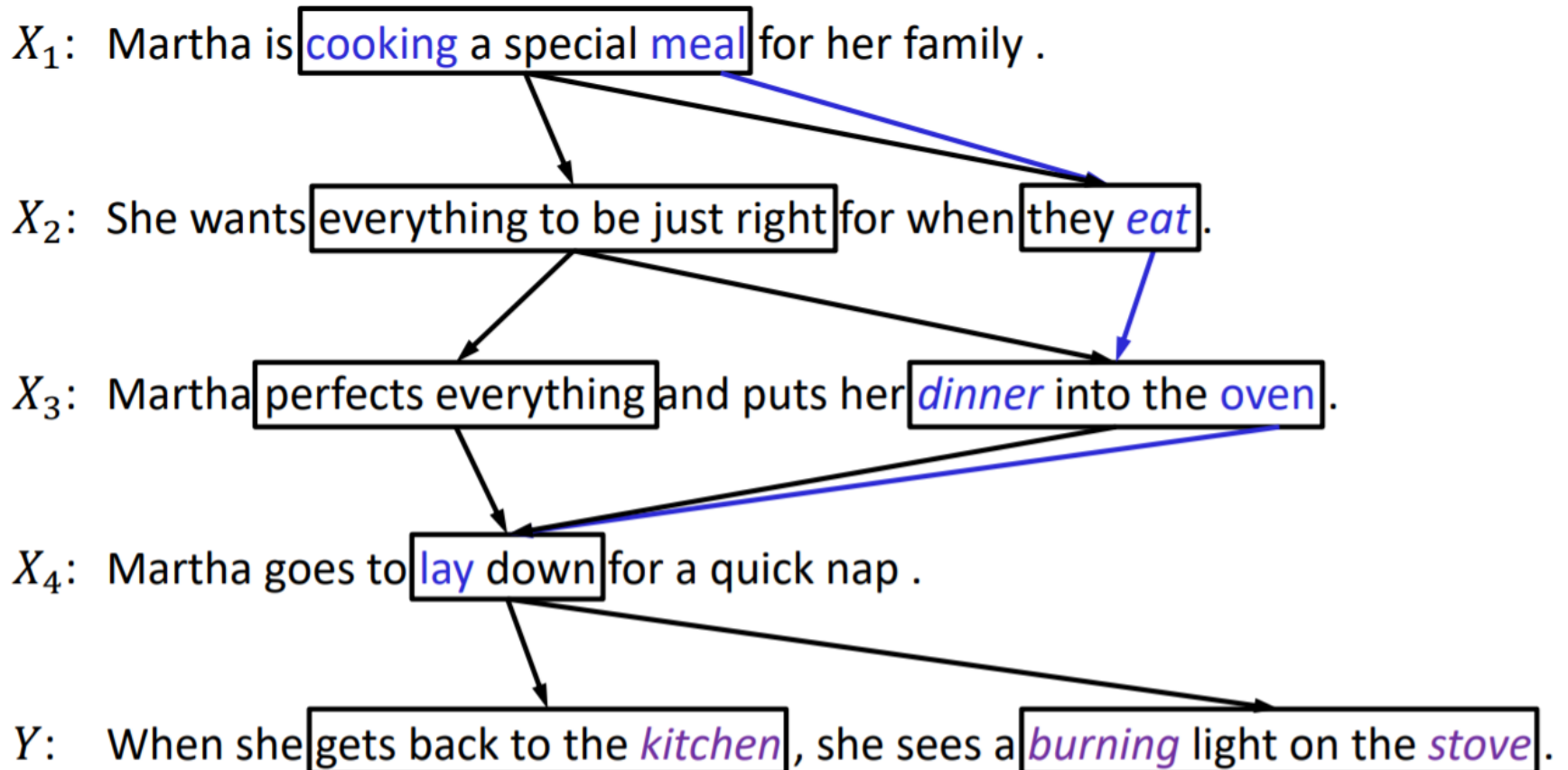
Martha goes to lay down for a quick nap.

Generated Ending:

When she gets back to the kitchen, she sees a burning light on the stove.

Logic: Story Ending Generation

Context clues find by our model.



Summary

- Semantics: world facts, commonsense
- Consistent, coherent, reasonable
- Logic and reasoning
- Long text generation
 - Planning & generation

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谢谢！