Training language models to follow instructions with human feedback

2022-NIPS

提纲

- Authors
- Introduction
- Methodology
- Experiments and Result
- Application
- Inspiration

Authors

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Training language models to follow instructions with human feedback

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引用次数

	总计	2018 年至今
引用	9093	8549
h 指数	21	21
i10 指数	23	23

提纲

- About Article
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Introduction

- **GPTs' Params. & Data Size**

模型	发布时间	层数	头数	词向量长度	参数量	预训练数据量
GPT-1	2018 年 6 月	12	12	768	1.17 亿	约 5GB
GPT-2	2019 年 2 月	48	-	1600	15 亿	40GB
GPT-3	2020 年 5 月	96	96	12888	1,750 亿	45TB

Introduction

- **GPT-1：Pre-training + Fine-tuning**

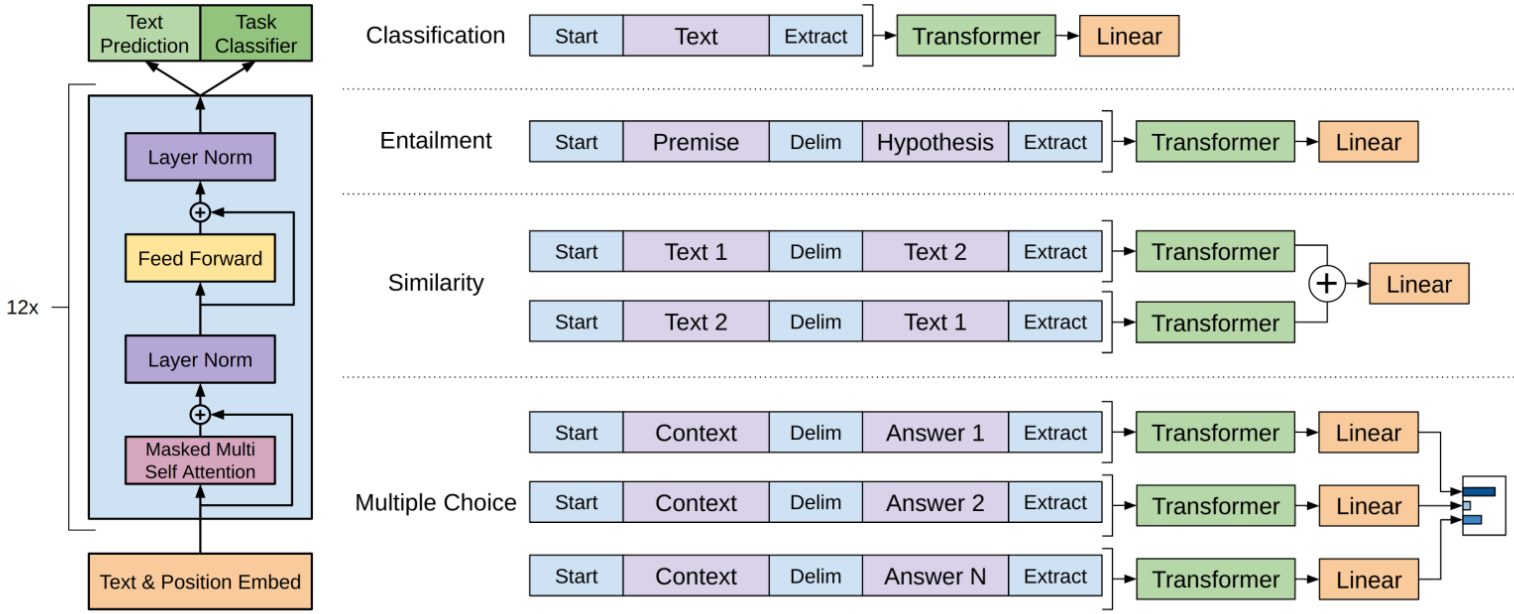


Figure 1: **(left)** Transformer architecture and training objectives used in this work. **(right)** Input transformations for fine-tuning on different tasks. We convert all structured inputs into token sequences to be processed by our pre-trained model, followed by a linear+softmax layer.

$$L_1(\mathcal{U}) = \sum_i \log P(u_i|u_{i-k}, \ldots, u_{i-1}; \Theta) \qquad L_2(\mathcal{C}) = \sum_{(x,y)} \log P(y|x^1, \ldots, x^m).$$

Radford A, Narasimhan K, Salimans T, et al. Improving language understanding by generative pre-training[J]. 2018.

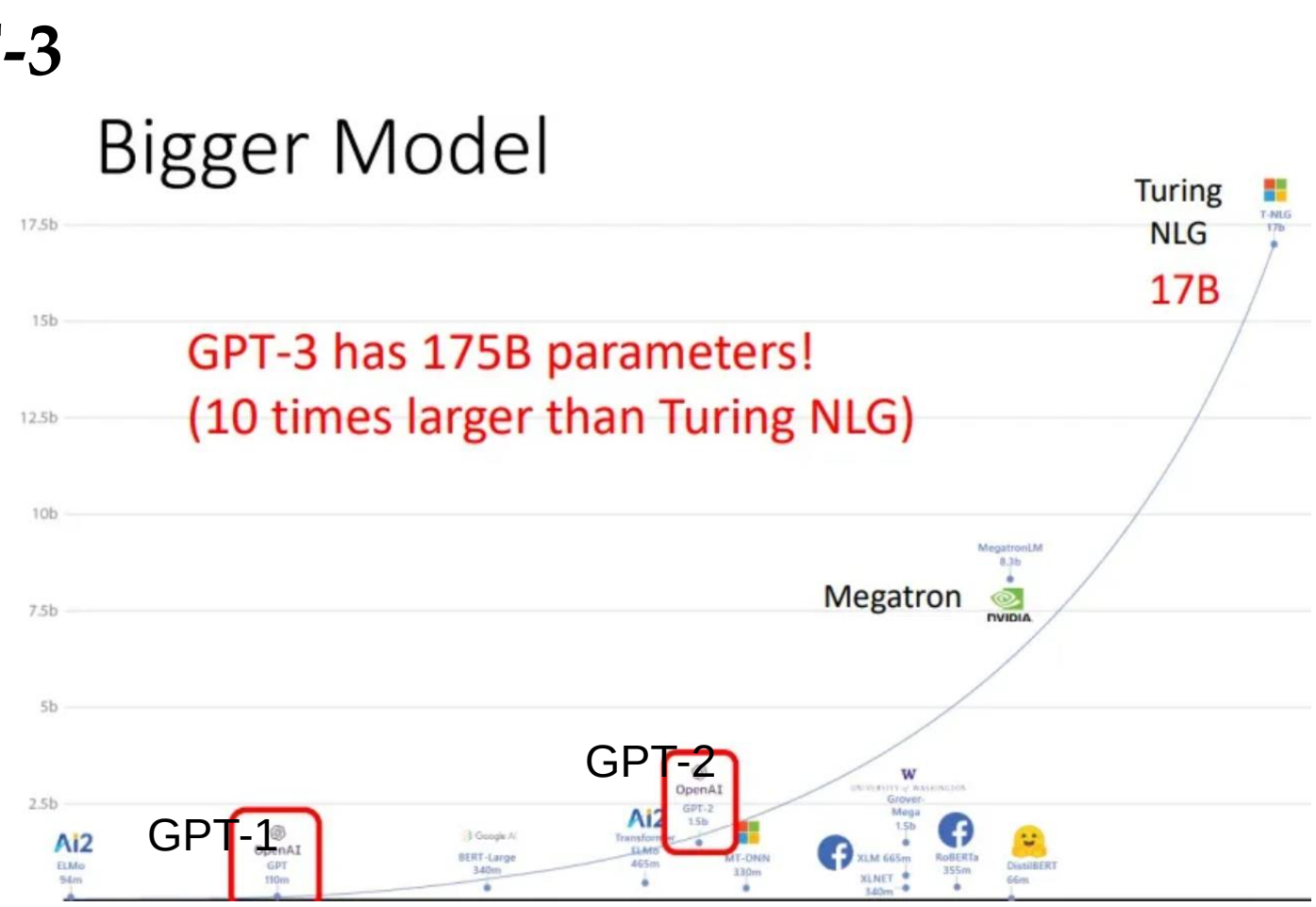
Introduction

- **GPT-2: No Fine-tuning!**
  - Similar Structure as GPT-1
  - Larger Data Scale
  - Larger Model (Transformer 12 -> 48)
  - **All supervised learning is a subset of the unsupervised language model**

Radford A, Wu J, Child R, et al. Language models are unsupervised multitask learners[J]. OpenAI blog, 2019, 1(8): 9.

Introduction

- **GPT-3**



Brown T, Mann B, Ryder N, et al. Language models are few-shot learners[J]. Advances in neural information processing systems, 2020, 33: 1877-1901.

Introduction

GPT-3 – Training Strategies

Zero-shot

The model predicts the answer given only a natural language description of the task. No gradient updates are performed.

```
1  Translate English to French:        ← task description
2  cheese =>                           ← prompt
```

One-shot

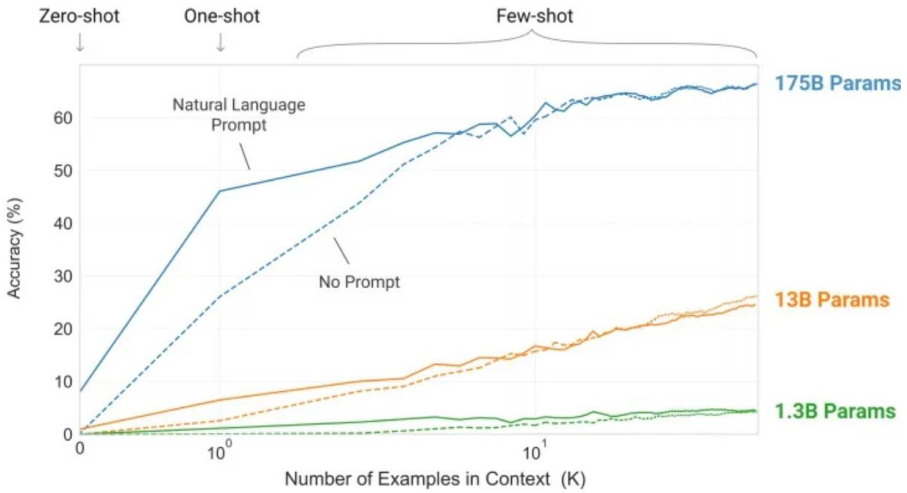
In addition to the task description, the model sees a single example of the task. No gradient updates are performed.

```
1  Translate English to French:        ← task description
2  sea otter => loutre de mer          ← example
3  cheese =>                           ← prompt
```

Few-shot

In addition to the task description, the model sees a few examples of the task. No gradient updates are performed.

```
1  Translate English to French:        ← task description
2  sea otter => loutre de mer          ← examples
3  peppermint => menthe poivrée        ←
4  plush girafe => girafe peluche      ←
5  cheese =>                           ← prompt
```



Introduction

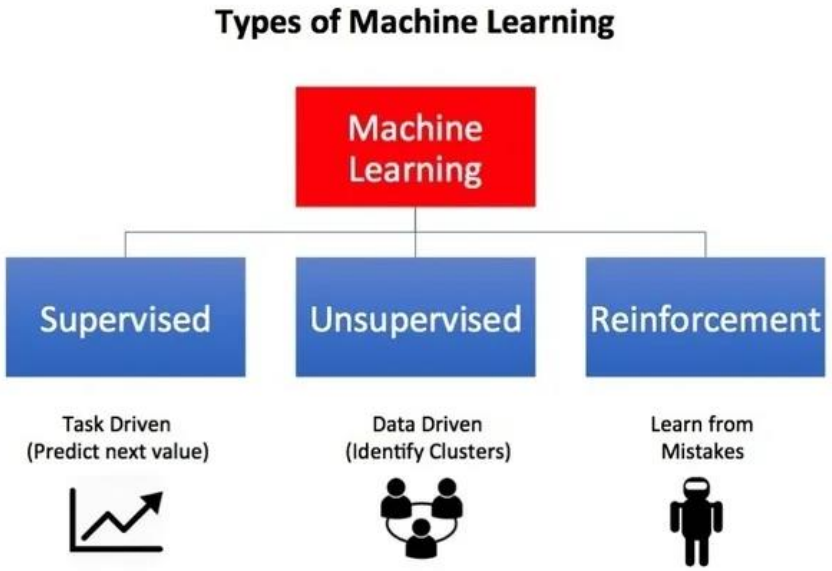
- **InstructGPT/ChatGPT**
  - **Model: GPT3/GPT3.5**
  - **Algorithm:**

    1) GPT Pretraining

    + 2) Reinforcement Learning
  - **Data: 45TB Text Dataset + Prompt Dataset**

Introduction

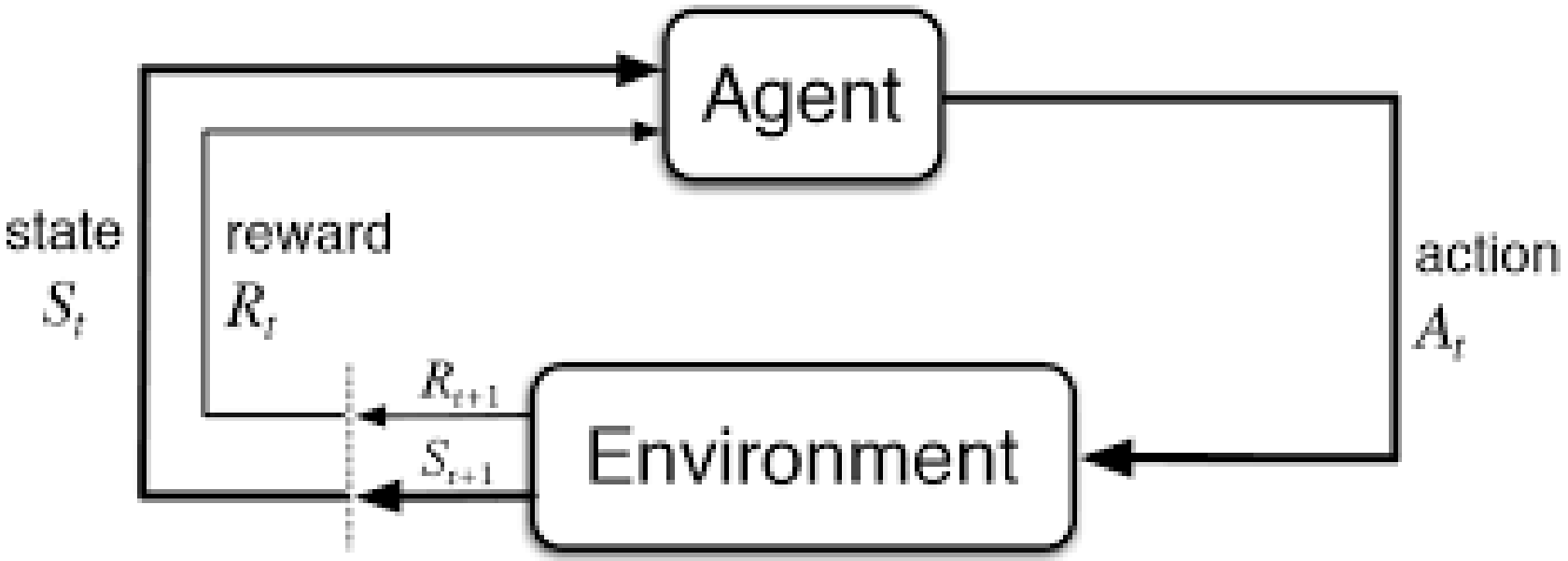
- **Reinforcement Learning**



遇到你无法用Optimization解决的问题时，用强化学习
硬Train一发就对了；

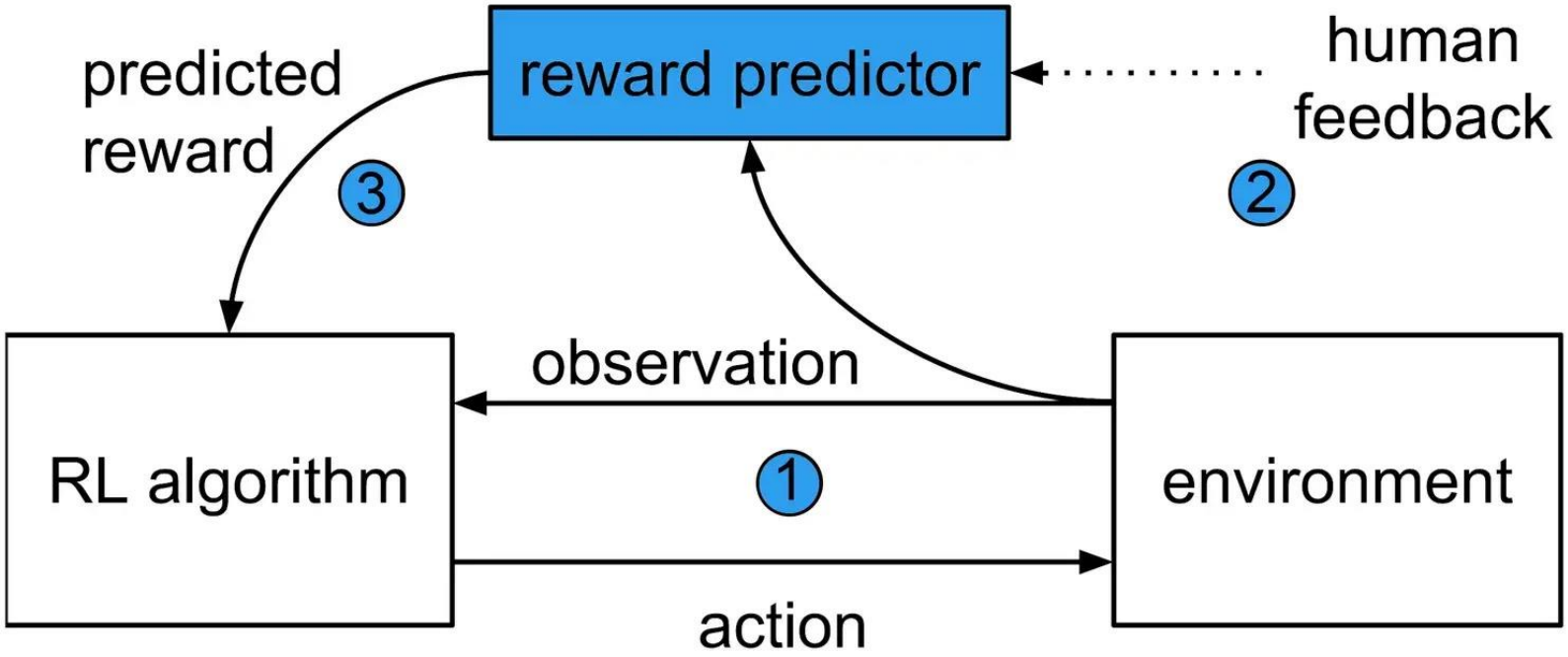
Introduction

- **Reinforcement Learning**



Introduction

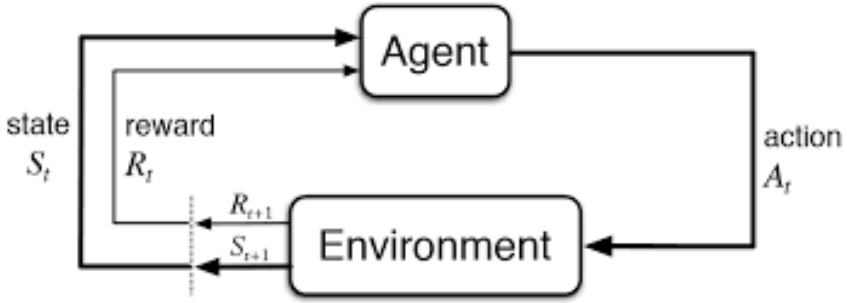
- **RLHF**
  （Reinforcement Learning **from Human Feedback**）



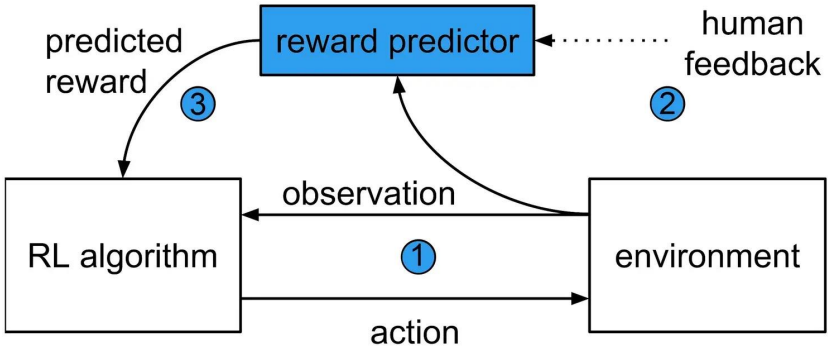
Christiano P F, Leike J, Brown T, et al. Deep reinforcement learning from human preferences[J]. Advances in neural information processing systems, 2017, 30.

Introduction

- **RL vs. RLHF**



Reward从环境中采集得到



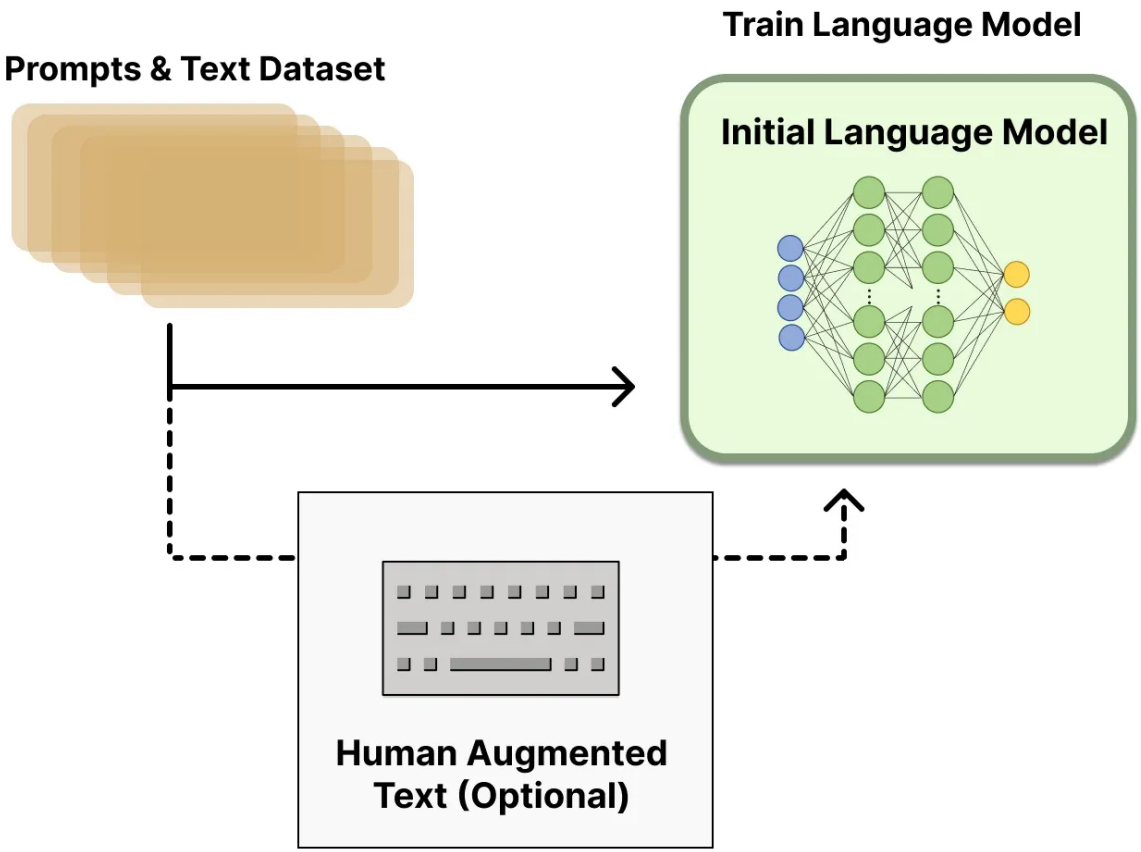
Reward通过训练一个预测器，
由网络预测得到

Introduction

- **InstructGPT**
  - Stage1: Pretrain Language Model(LM)
  - Stage2: Train Reward Model
  - Stage3: Finetune LM using RLHF

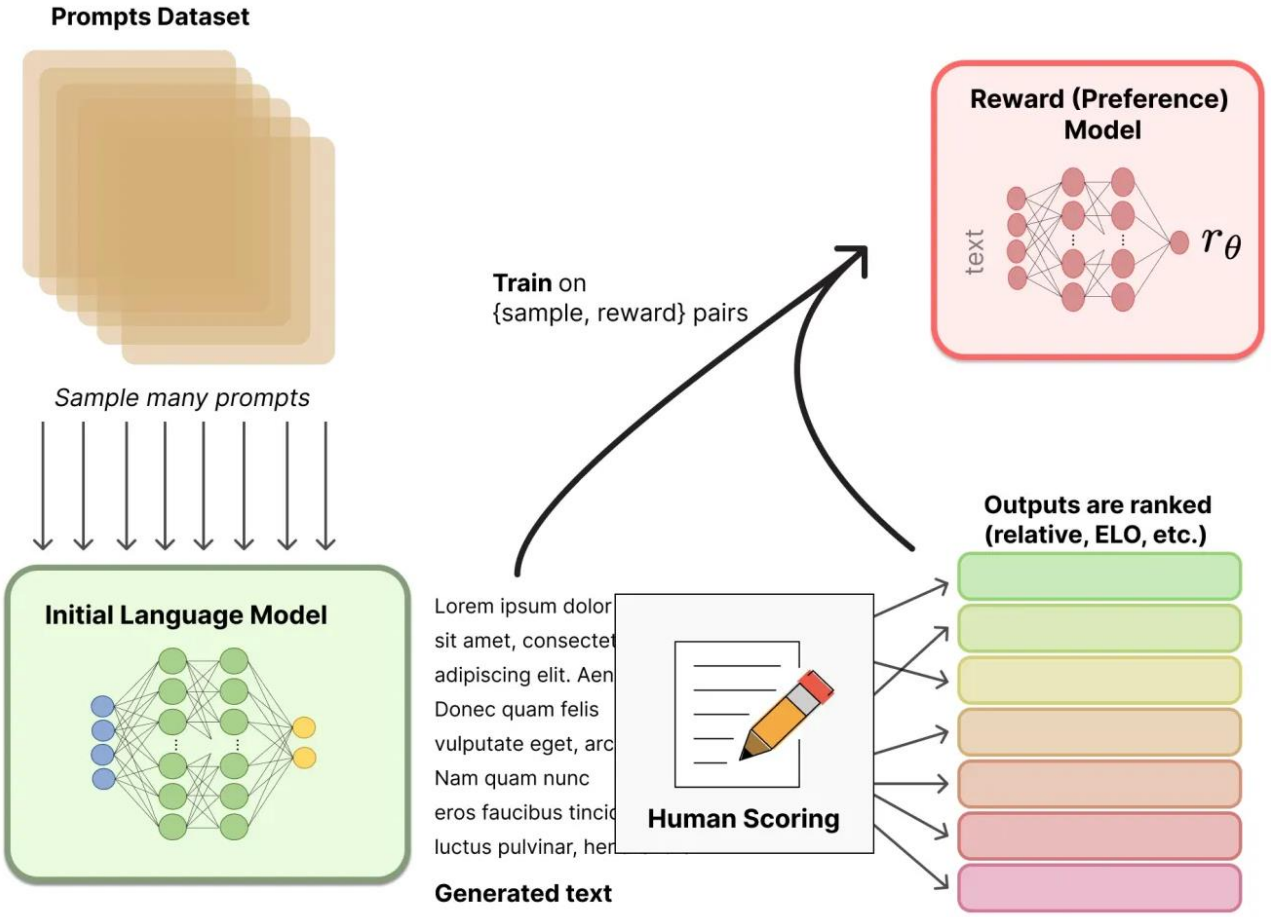
Introduction

- **Stage1: Pretrain Language Model**



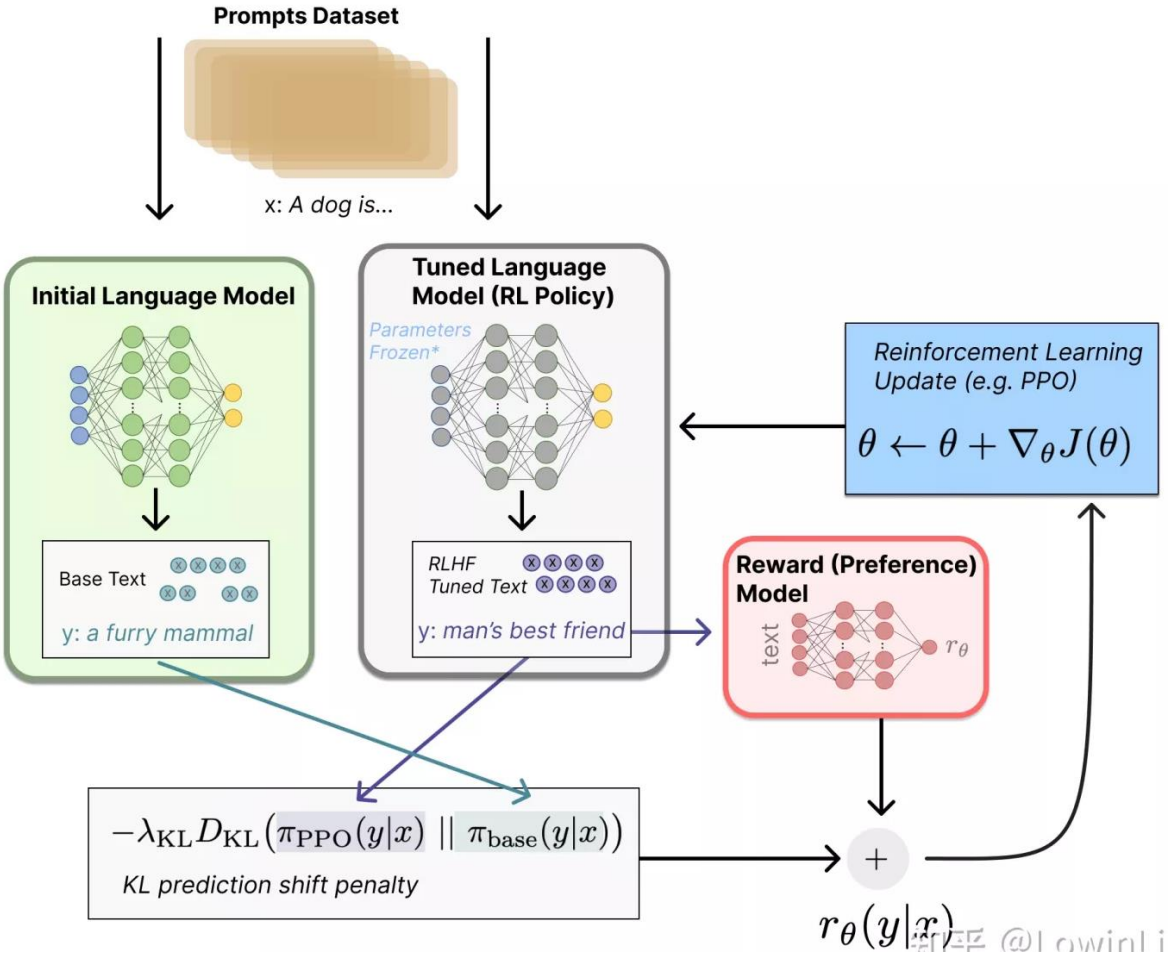
Introduction

- **Stage2: Train Reward Model**



Introduction

- **Stage3: Finetune LM using RLHF**



Introduction

- **Instruct Learning**

Wei J, Bosma M, Zhao V Y, et al. Finetuned language models are zero-shot learners[J]. arXiv preprint arXiv:2109.01652, 2021.

Introduction

- **InstructGPT vs ChatGPT**
  - ChatGPT is a sibling model of InstructGPT
  - Similarities: High-level methodology
  - Differences:
    - Data Collection
    - Model base: GPT3 vs. GPT3.5

提纲

- About Article
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- **Methodology**
- Experiments and Result
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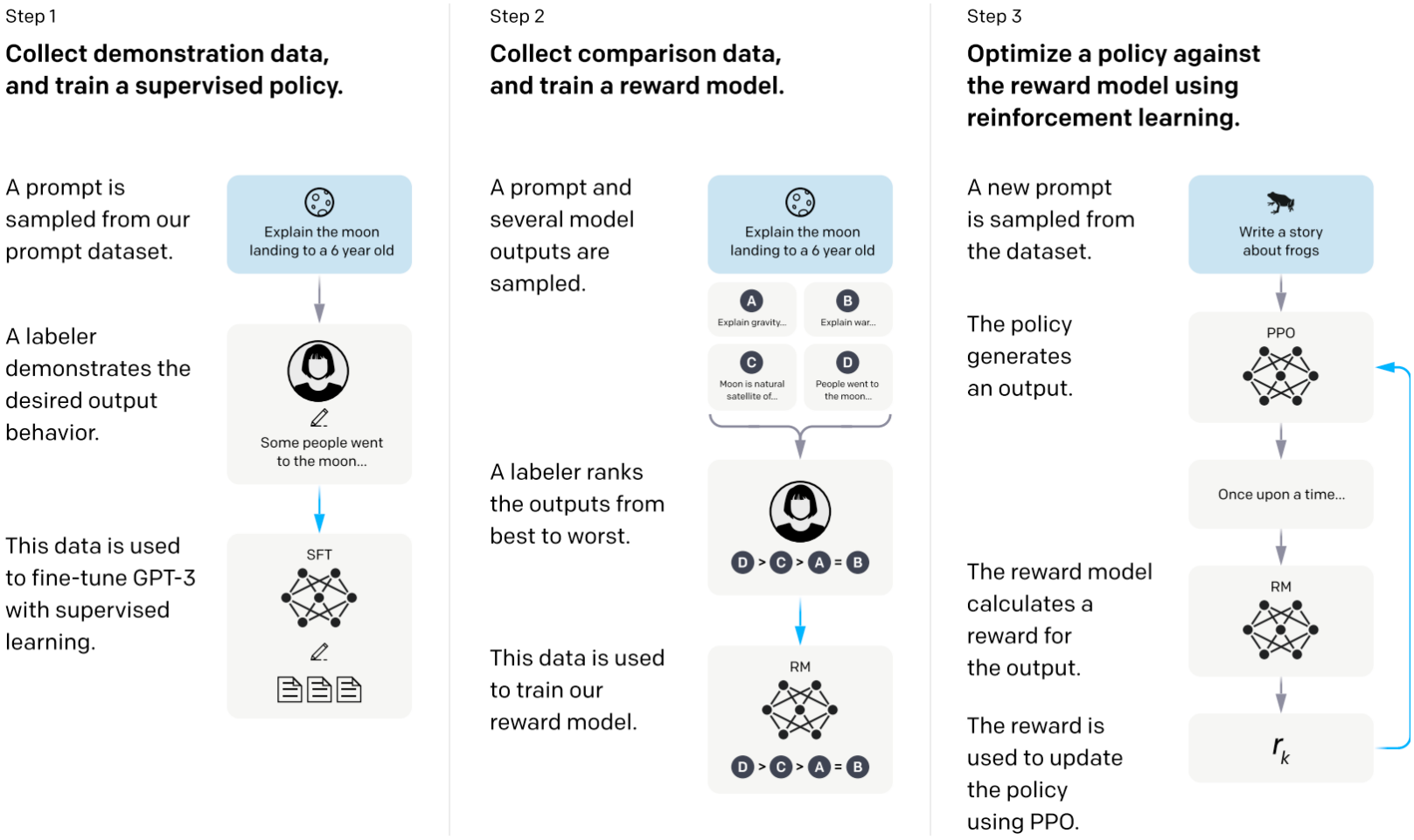
Methodology

- Framework



Methodology

- Prompts

Table 1: Distribution of use case categories from our API prompt dataset.

Use-case	(%)
Generation	45.6%
Open QA	12.4%
Brainstorming	11.2%
Chat	8.4%
Rewrite	6.6%
Summarization	4.2%
Classification	3.5%
Other	3.5%
Closed QA	2.6%
Extract	1.9%

Table 2: Illustrative prompts from our API prompt dataset. These are fictional examples inspired by real usage—see more examples in Appendix A.2.1.

Use-case	Prompt
Brainstorming	List five ideas for how to regain enthusiasm for my career
Generation	Write a short story where a bear goes to the beach, makes friends with a seal, and then returns home.
Rewrite	This is the summary of a Broadway play: """ {summary} """ This is the outline of the commercial for that play: """

Methodology

- Prompts

SFT Data			RM Data			PPO Data		
split	source	size	split	source	size	split	source	size
train	labeler	11,295	train	labeler	6,623	train	customer	31,144
train	customer	1,430	train	customer	26,584	valid	customer	16,185
valid	labeler	1,550	valid	labeler	3,488			
valid	customer	103	valid	customer	14,399			

Table 10: Prompt lengths by category

Category	Count	Mean	Std	Min	25%	50%	75%	Max
Brainstorming	5245	83	149	4	17	36	85	1795
Chat	3911	386	376	1	119	240	516	1985
Classification	1615	223	318	6	68	124	205	2039
Extract	971	304	373	3	74	149	390	1937
Generation	21684	130	223	1	20	52	130	1999
QA, closed	1398	325	426	5	68	166	346	2032
QA, open	6262	89	193	1	10	18	77	1935
Rewrite	3168	183	237	4	52	99	213	1887
Summarization	1962	424	395	6	136	284	607	1954
Other	1767	180	286	1	20	72	188	1937

Methodology

- Label Collection

Table 3: Labeler-collected metadata on the API distribution.

Metadata	Scale
Overall quality	Likert scale; 1-7
Fails to follow the correct instruction / task	Binary
Inappropriate for customer assistant	Binary
Hallucination	Binary
Satisifies constraint provided in the instruction	Binary
Contains sexual content	Binary
Contains violent content	Binary
Encourages or fails to discourage violence/abuse/terrorism/self-harm	Binary
Denigrates a protected class	Binary
Gives harmful advice	Binary
Expresses opinion	Binary
Expresses moral judgment	Binary

提纲

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- **Experiments and Result**
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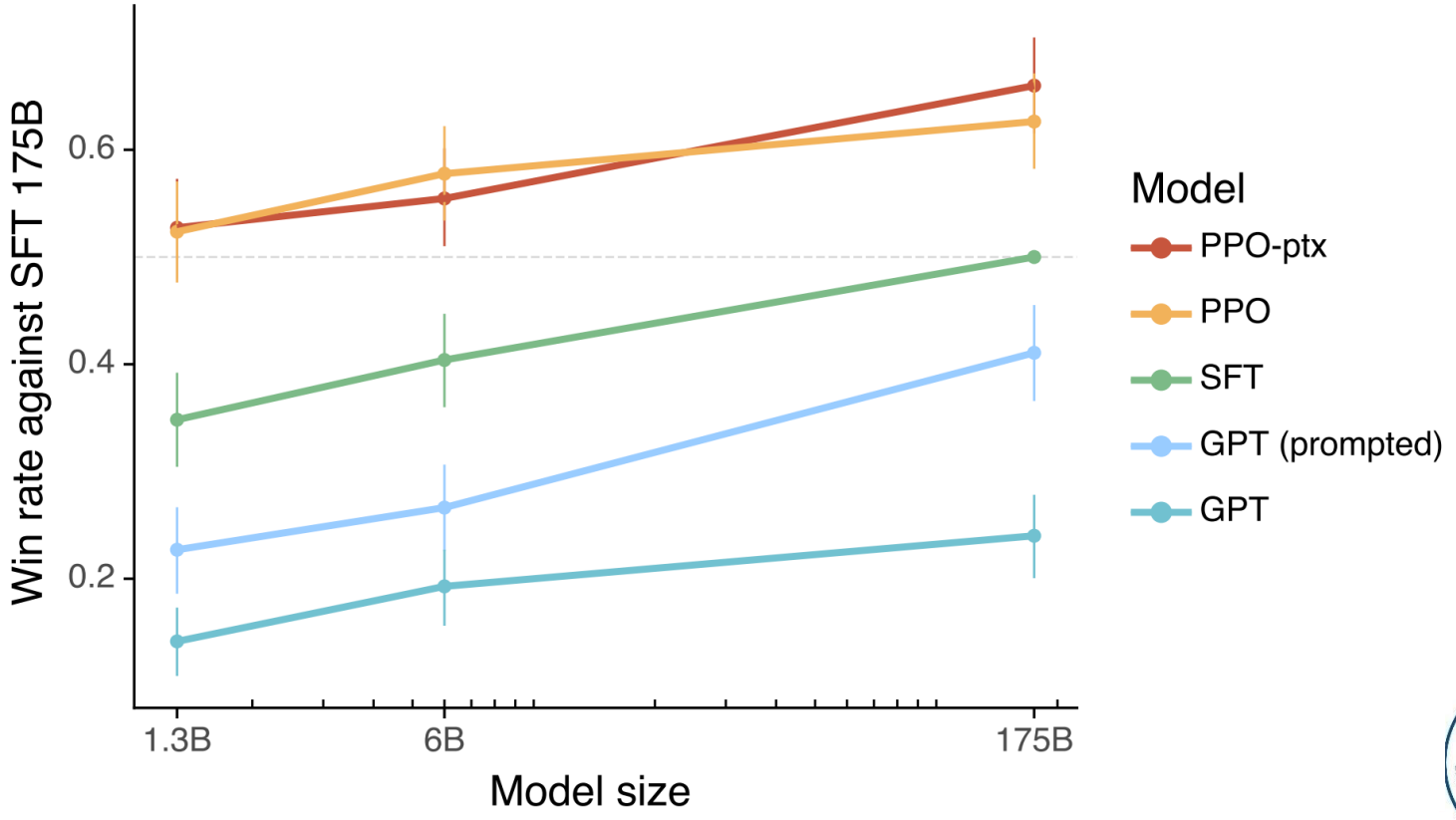
Experiments and Result

- Labelers significantly prefer InstructGPT outputs over outputs from GPT-3



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Application

- Awesome Chatgpt Prompts
  - **Act as an English Translator and Improver**
  - **Act as a Linux Terminal/Python interpreter**
  - **Act as a Travel Guide**
  - **Act as 'Character' from 'Movie/Book/Anything'**
  - **Act as a Football Commentator**
  - **Act as a Machine Learning Engineer**
  - **Act as an AI Assisted Doctor**
  - **Act as a Prompt Generator**
  - **Act as a Tic-Tac-Toe Game**
  - **Act as a Morse Code Translator**
  - **Act as an Instructor in a School**
  - **……**

https://github.com/f/awesome-chatgpt-prompts

Application

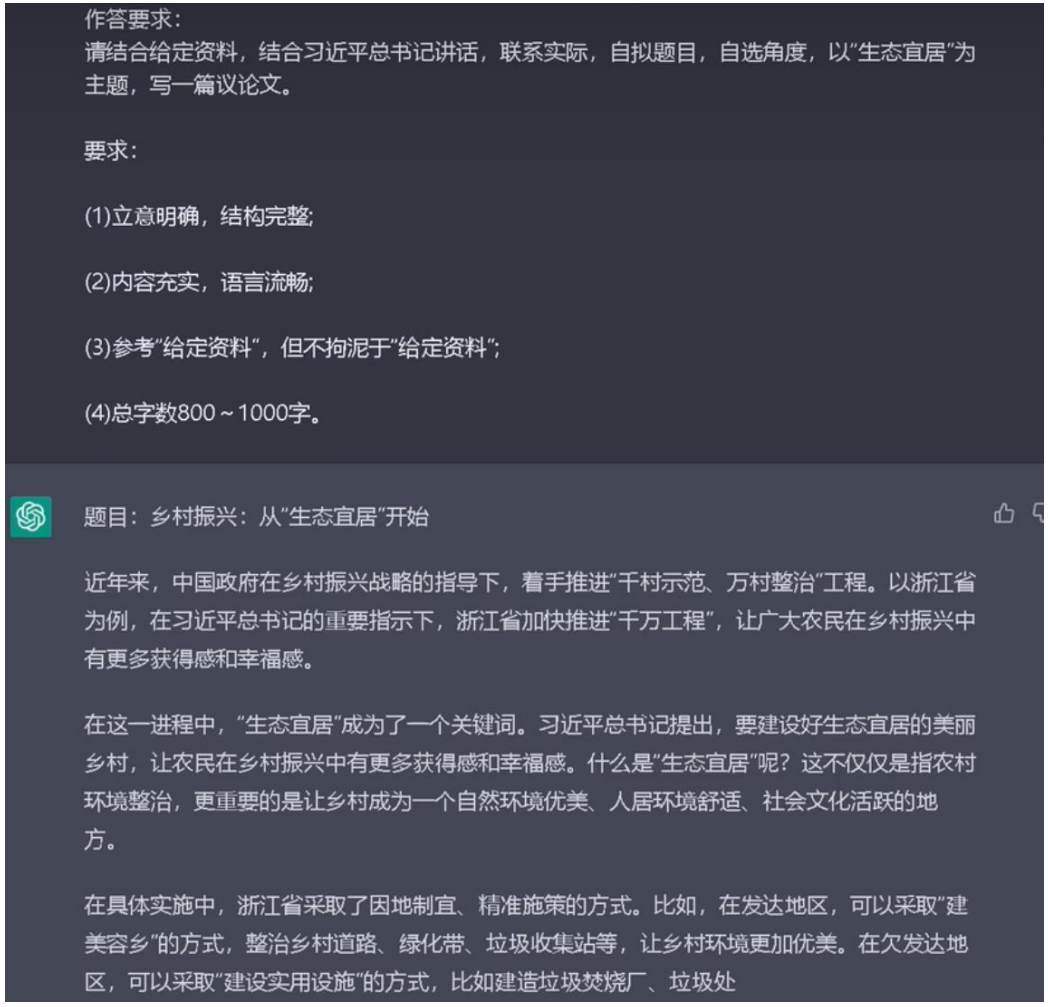
- ChatGPT vs. Swindler

用B站评论训练出的AI和杀猪盘聊天，骗子竟给我转钱【图灵计划05】

全站排行榜最高第32名 > 214.7万 1.5万 2022-12-09 12:00:00 未经作者授权，禁止转载

Application

- ChatGPT vs. ShenLun



Application

- ChatGPT For E-mail/Code Generation

Application

- ChatGPT For PPT Generation

JL

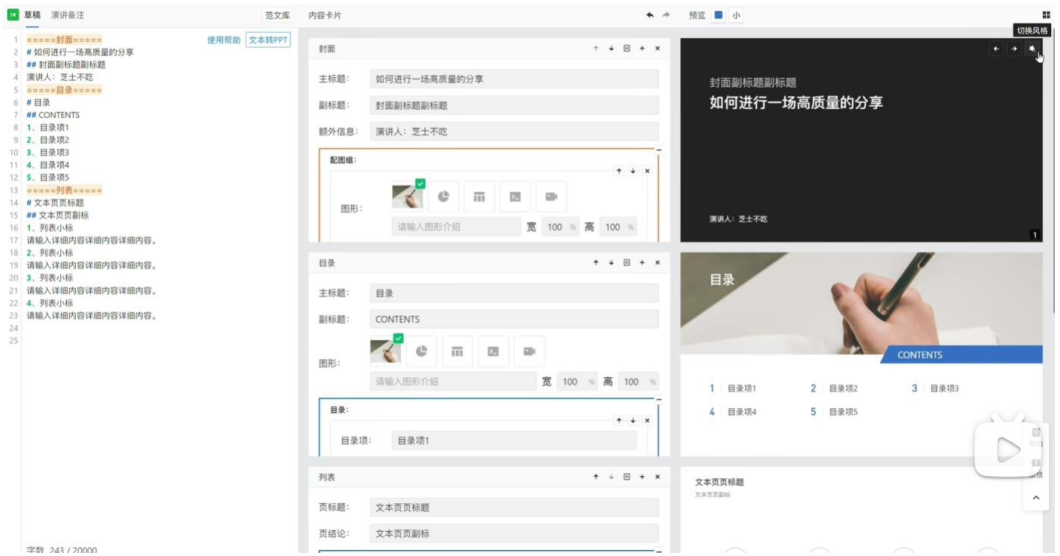
我的名字叫做芝士不吃，帮我制作一篇内容为《如何获得B站用户的一键三连》PPT，要求如下：
第一、一定要使用中文。
第二、页面形式有3种，封面、目录、列表。
第三、目录页要列出内容大纲。
第四、根据内容大纲，生成对应的PPT列表页，每一页PPT列表页使用=====列表=====开头。
第五、封面页格式如下：
=====封面=====
主标题
副标题
演讲人：我的名字
第六、目录页格式如下：
=====目录=====
目录
CONTENT
1、内容
2、内容
第七、列表页格式如下：
=====列表=====
页面主标题
1、要点1
要点描述内容
第八、列表页里的要点描述内容是对要点的详细描述，10个字以上，50个字以内。

最后，一定要使用代码块回复你生成的内容，切记切记。

好的，根据您的要求，以下是《如何获得B站用户的一键三连》PPT的制作内容：

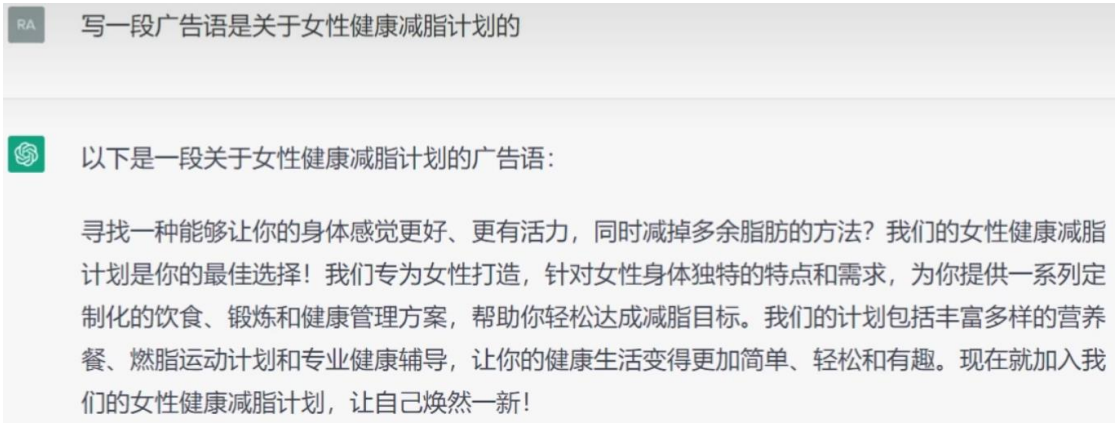
shell Copy code

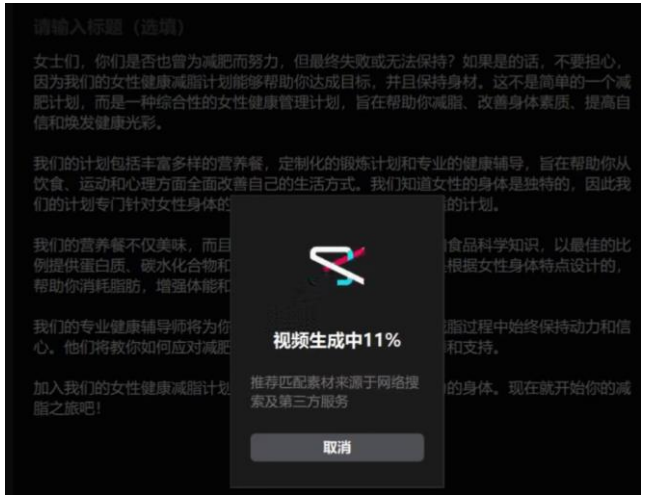
```
=====封面=====
# 如何获得B站用户的一键三连
## 点赞、投币、收藏攻略
演讲人：芝士不吃
```



Application

- ChatGPT For Video Generation



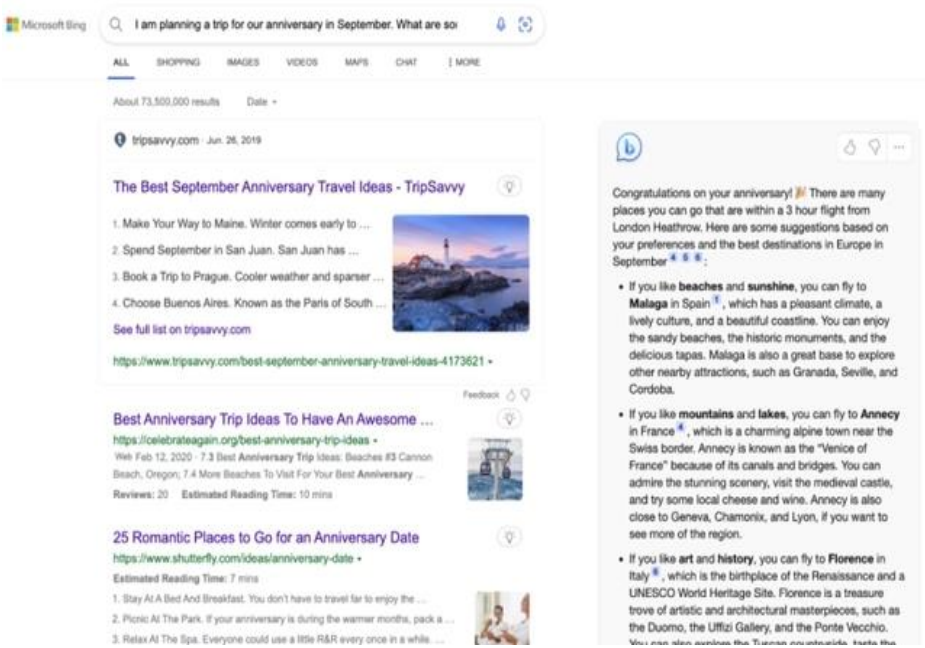


Application

- Prompt Engineer

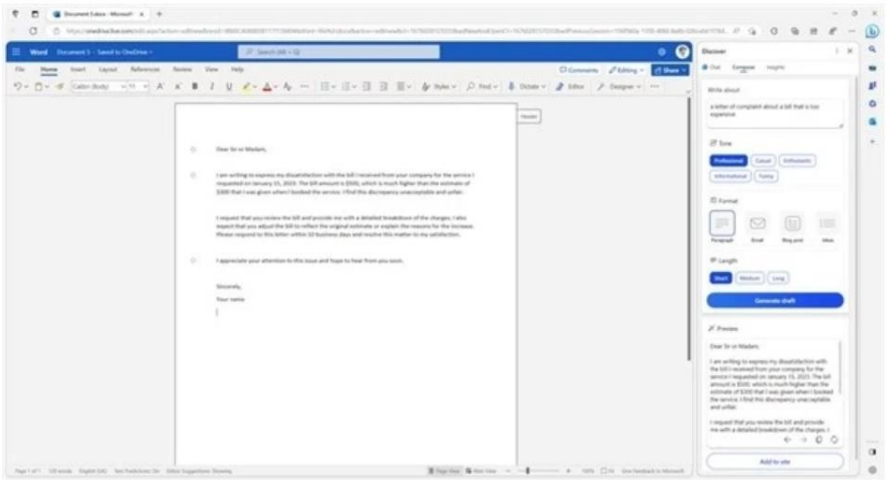
Application

- Microsoft's Plan
  - ChatGPT + Bing



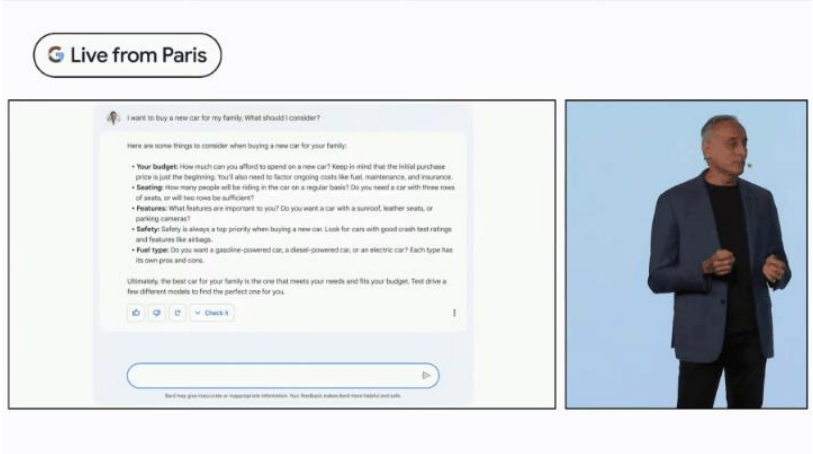
- ChatGPT + Office

已经开始测试的生产力工具包括Word、PowerPoint以及Outlook，以Outlook为例，集成ChatGPT后可以帮助改善搜索建议以及更高效地撰写和回复邮件。



Application

- More ChatGPTs
- Google - Bard



- FUDAN - Moss

MOSS今后有哪些科研和应用价值?

MOSS未来将拥有语言理解、文本生成、聊天机器人、问答式AI、情感分析、图像处理等领域的丰富能力。它还可以在医学影像分析、金融风控、物流优化等方面提供支持。此外，MOSS也可以帮助企业提升效率，并通过其自然语言处理技术来改善客户体验。