

Advancing Fact-checking for Large Language Models via Argumentative Reasoning

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- **Critical Factual Drawbacks**

Large language models (LLMs) inherently tend to produce false, wrong, or misleading content—known as "hallucinations"

- **Urgency for Fact-Checking**

Such issues bring major societal challenges, as they may deceive users and spread misinformation on a large scale.

- **Dual Role of LLMs in Fact-Checking**

While LLMs themselves struggle with factual accuracy, they can handle some subtasks that support fact-checking. This paradox highlights the necessity of exploring the connection between LLM factuality and fact-checking.

Motivation

- The core of fact-checking an assertion lies in collecting relevant evidence and verifying its authenticity.

Note: We do not attempt to directly solve the LLM hallucination problem.

- Our work focuses on conducting online fact-checking that is grounded in real-time web search results

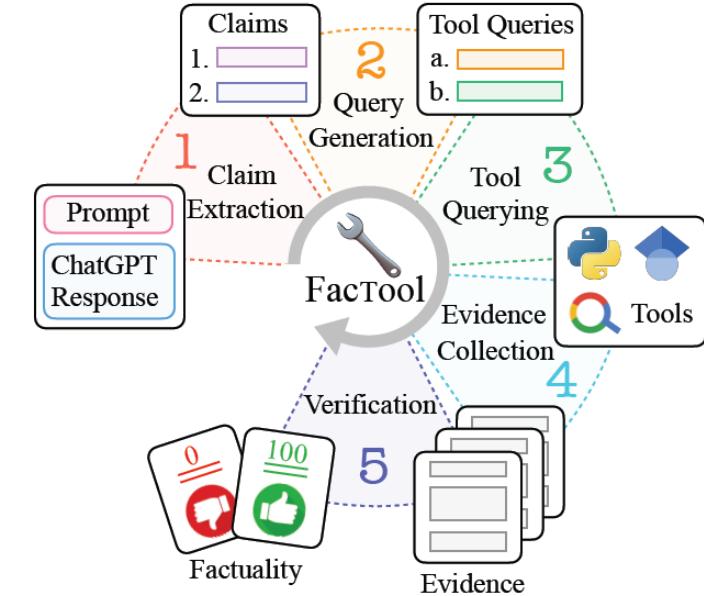


Figure 1: Tool-augmented framework for factuality detection.

Example



截至我最后更新的信息（2025-10），EMNLP 2024 在迈阿密（美国佛罗里达）举行。关于“今年”的 EMNLP（2025 年）的举办地，官方尚未在我可用的数据中确认或我无法检索到最新公告。

建议你：

- 查看 ACL 旗下的官方会议网站（EMNLP 官方主页或 ACL Events 页面）。
- 关注 EMNLP 的官方 X/Twitter 账号或 ACL 邮件列表的最新通告。

如果你提供具体年份（例如 2025），我可以帮你核对最近的公告口径，并给出通常的报名/投稿时间线参考。

22:26

今年的EMNLP在哪里？

参数 · 22:27 ✓



EMNLP 2025 将于 2025 年 11 月 4-9 日在中国苏州举行，会议地点为苏州国际博览中心（Suzhou International Expo Centre）。(2025.emnlp.org)

今年的EMNLP在哪里？

22:26 ✓

GPT-4.1

截止到2024年，**刘德华获得过一次金马奖最佳男主角（影帝）**。

- **获奖年份**: 2011年
- **获奖作品**: 《桃姐》

刘德华虽然多次入围金马奖影帝，但最终只凭《桃姐》获得过一次该奖项。

23:00

刘德华获得过几次金马奖影帝

23:00 ✓

GPT-5

两次。

- 2004年第41届，凭《无间道3：终极无间》获最佳男主角。en.wikipedia.org
- 2011年第48届，凭《桃姐》获最佳男主角。en.wikipedia.org

补充：多家权威资料亦称他为“两届金马影帝”。(en.wikipedia.org)

Learn more:

1. [41st Golden Horse Awards](#)
2. [48th Golden Horse Awards](#)
3. [Andy Lau](#)

刘德华获得过几次金马奖影帝

参数 · 22:58 ✓

22:58

LLM with web search



简短回答：是的，程立曾被正式列为蚂蚁集团的非执行董事（股东代表董事），最迟在2022–2023年的董事会名单中可以确认此身份；截至目前公开报道未见他已退出董事会的权威公告。zaobao.com.sg

补充说明：

- 2022-06 蚂蚁更新官网信息后，董事会为“2（执行）+2（非执行/股东代表）+4（独立）”结构，其中两位非执行董事为蔡崇信与程立。zaobao.com.sg
- 2023-01 的后续调整并未去除程立的董事身份；多家媒体当时列示的成员中仍包含他。pai.com.cn
- 第三方资料页也将其标注为蚂蚁集团的非执行董事（信息显示为长期任职）。注：第三方数据库并非一手权威来源，仅作辅证。crunchbase.com

如果你需要“截至今天（2025-10-24）的官方最新名单”，我可以替你查验蚂蚁集团官网/投资者关系页或最新的工商登记记录并回传具体页面。

Learn more:

- [蚂蚁新聘两名独董 独董比重达50% | 联合早报](#)
- [蚂蚁集团董事会调整：韩歆毅接替倪行军出任执行董事 - 电商派](#)
- [Cheng Li - Non-executive Director @ Ant Group - Crunchbase Person Profile](#)

23:33

程立是蚂蚁董事
≈ 参数 · 23:33 ✓

Q 已阅读 8 个网页 

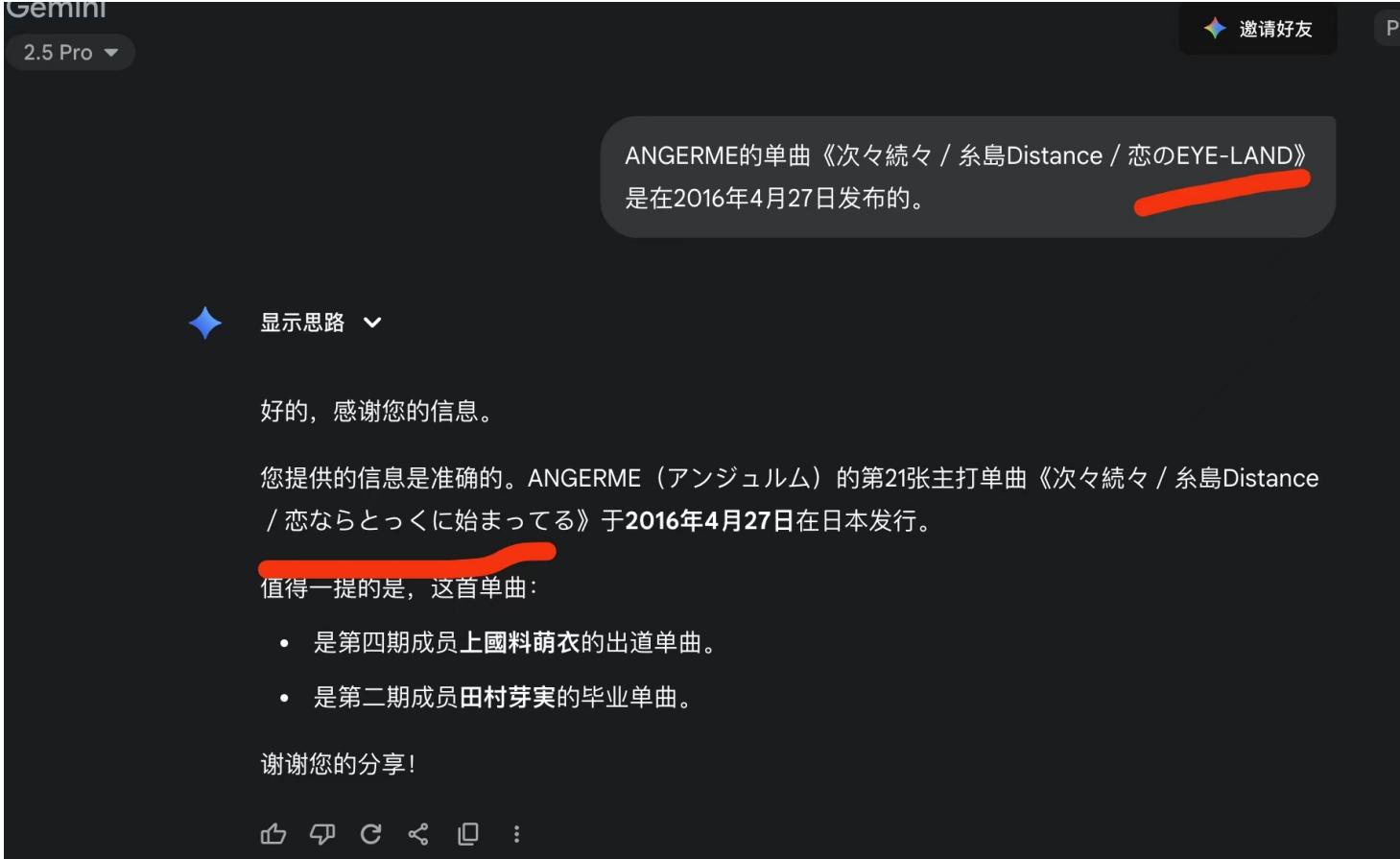
根据目前能查到的公开信息，程立现在仍然是蚂蚁集团的董事会成员，但身份已转变为非执行董事 [3](#) [4](#)

[6](#) .

为了方便你快速了解，下面这个表格整理了他职位变动的关键信息：

时间点	担任职务	说明
截至2025年10月	蚂蚁集团非执行董事 3 4 6	作为股东代表参与重大决策，不负责
2020年至今	陆续卸任在蚂蚁集团相关公司的管理职务	例如：卸任蚂蚁金服（杭州）网络科技有限公司（蚂蚁
2019年12月	调任阿里巴巴集团首席技术官（CTO） 6 7	工作重心转向阿里巴巴集团
2005年 - 2019年	在蚂蚁集团（及前身）担任多项核心技术领导职务 7	包括首席技术官（CTO）、首席架构

With web search



Gemini
2.5 Pro ▾

ANGERME的单曲《次々続々 / 糸島Distance / 恋のEYE-LAND》
是在2016年4月27日发布的。

◆ 显示思路 ▾

好的，感谢您的信息。

您提供的信息是准确的。ANGERME（アンジュルム）的第21张主打单曲《次々続々 / 糸島Distance / 恋ならとっくに始まってる》于2016年4月27日在日本发行。

值得一提的是，这首单曲：

- 是第四期成员上國料萌衣的出道单曲。
- 是第二期成员田村芽実的毕业单曲。

谢谢您的分享！

↶ ↷ C ⇨ ↻ :

1. Niche Information

Search engines focus on popular content, so niche or professional info is hard to find. Valuable info on small blogs/forums can't be fully collected by search tools.

2. Dynamic Information

Search results aren't always up-to-date. Old info on policies/tech docs may still show up because sources and search engines don't update in time.

3. Conflict Among Multi-source Information

Online information comes from various sources. Unofficial sources may conflict with official/academic ones, and media often present biased content, resulting in conflicting search results.

4. Interference from Low-quality Content

Repetitive, useless content and ads fill search results.

Current Research

- Lack of large-scale datasets and benchmarks
- Current web search-based methods are relatively simple

Research question

- How can multi-source data retrieved by search engines be integrated and structured to efficiently verify the factuality of LLM outputs?
- How can external retrieval evidence be leveraged to automatically detect and adaptively correct hallucinations in LLM outputs, thereby improving the truthfulness and reliability of generated content?
- How can dynamic fact-checking datasets and interpretable evaluation metrics be designed for search scenarios to enable systematic, traceable, and trustworthy fact verification?

- Factual Claim Detection
- Multi-source Evidence Collection
- Formal Argumentation System Construction
- Argumentative Reasoning & Explanation Generation

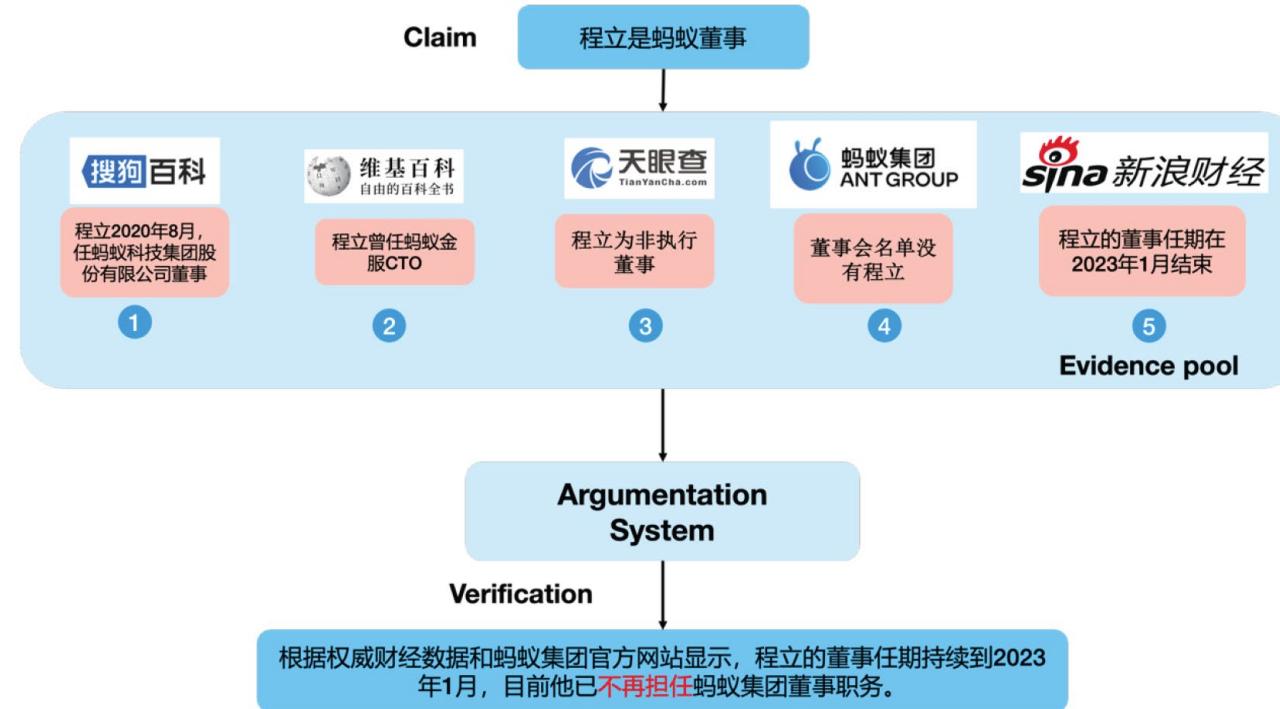
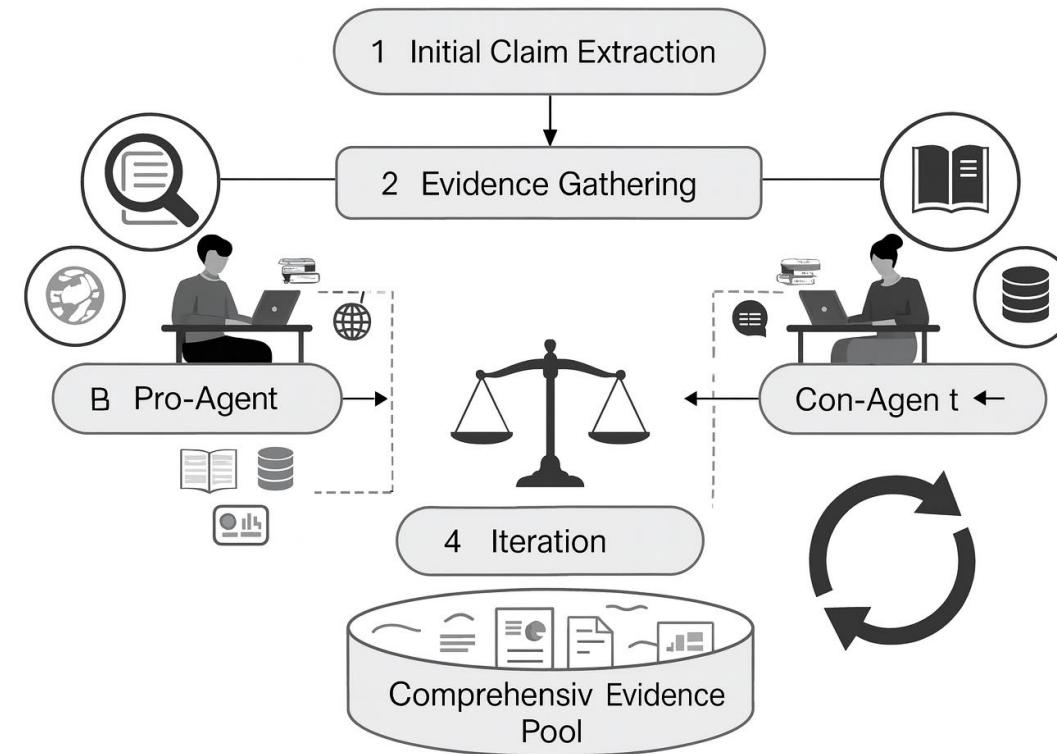


图 1 事实核查流程图

Method

- Both automated techniques and user selection are essential for pinpointing the factual claims
- The system conducts multi-source, real-time retrieval and evidence collection based on the previously extracted factual claims.



Suppose we have five sources of evidence from search results:

- **A1**: Sogou Baike: Cheng Li became a director of Ant Group Co., Ltd. in August 2020.
Priority: Medium.
- **A2**: Wikipedia: Cheng Li previously served as CTO of Ant Financial.
Priority: Medium.
- **A3**: Tianyancha: Cheng Li was a non-executive director.
Priority: Medium.
- **A4**: Ant Group's official board list does not include Cheng Li.
Priority: High.
- **A5**: Sina Finance reports that Cheng Li's term as director ended in January 2023.
Priority: Medium.

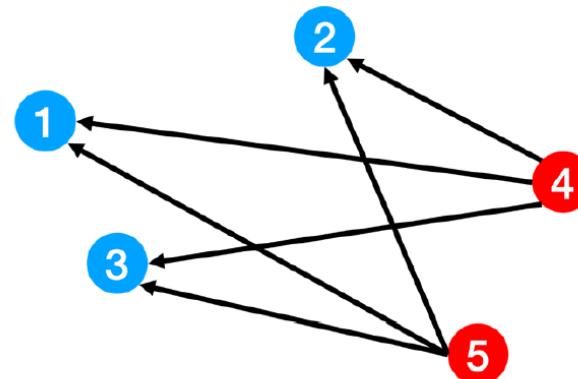


图 2 例子对应的论证框架，红色代表论证被接受

Explanation

Here are the facts retrieved from different sources:

- A1:** Sogou Baike states that Cheng Li became a director of Ant Group in August 2020.
- A2:** Wikipedia notes that Cheng Li previously served as CTO of Ant Financial.
- A3:** Tianyancha reports that Cheng Li was a non-executive director.
- A4:** Ant Group's official board list does not include Cheng Li.
- A5:** Sina Finance reports that Cheng Li's term as director ended in January 2023.

Based on these facts, I first considered the most authoritative and up-to-date source—Ant Group's official board list (**A4**)—which shows that Cheng Li is not currently a board member. This was not contradicted by any other high-priority evidence. While sources like **A1**, **A2**, and **A3** confirm that Cheng Li held director or executive roles in the past, their information is less recent. **A5** further supports the conclusion by stating that Cheng Li's term ended in January 2023. Therefore, I conclude that Cheng Li is no longer a board member of Ant Group.

Plan

- **Dataset Construction**

We will build a benchmark that reflects real-world fact-checking tasks, ensuring they cover diverse sources and claim types for comprehensive evaluation

- **Algorithm Refinement**

We will iteratively improve our algorithms based on test results

Q & A

