QACHECK: A Demonstration System for Question-Guided Multi-Hop Fact-Checking

Liangming Pan[1,2], Xinyuan Lu[3], Min-Yen Kan[3], Preslav Nakov[1]

[1] MBZUAI [2] University of California, Santa Barbara [3] National University of Singapore

liangmingpan@ucsb.edu, luxinyuan@u.nus.edu, kanmy@comp.nus.edu.sg, preslav.nakov@mbzuai.ac.ae

Introduction

Motivation

Given a claim made by a claimant, the goal of fact-checking is to find a collection of evidence and provide a verdict about the claim's veracity label based on the evidence.

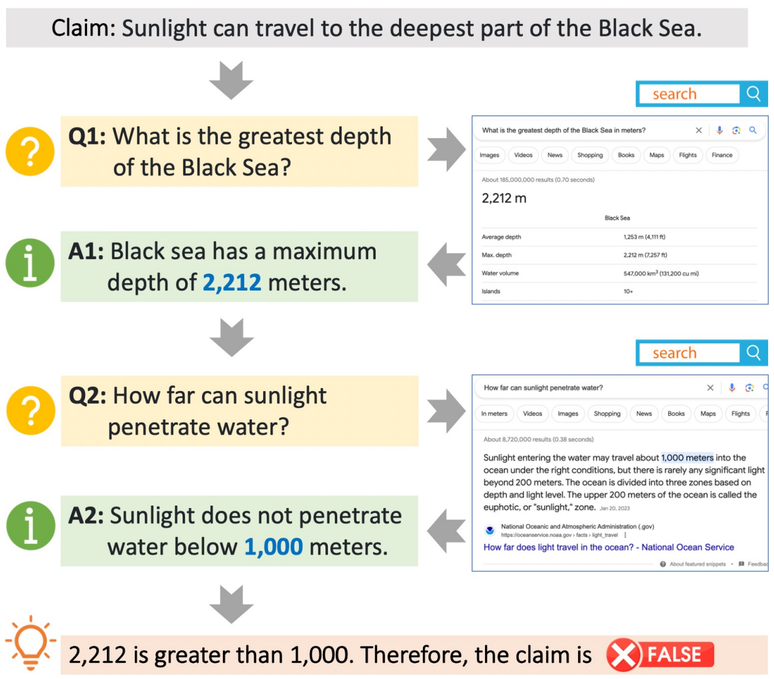
Real-world claims often require complex and multi-step reasoning to solve.

A human fact-checker needs to decompose the claim, gather multiple pieces of evidence, and perform step-by-step reasoning.

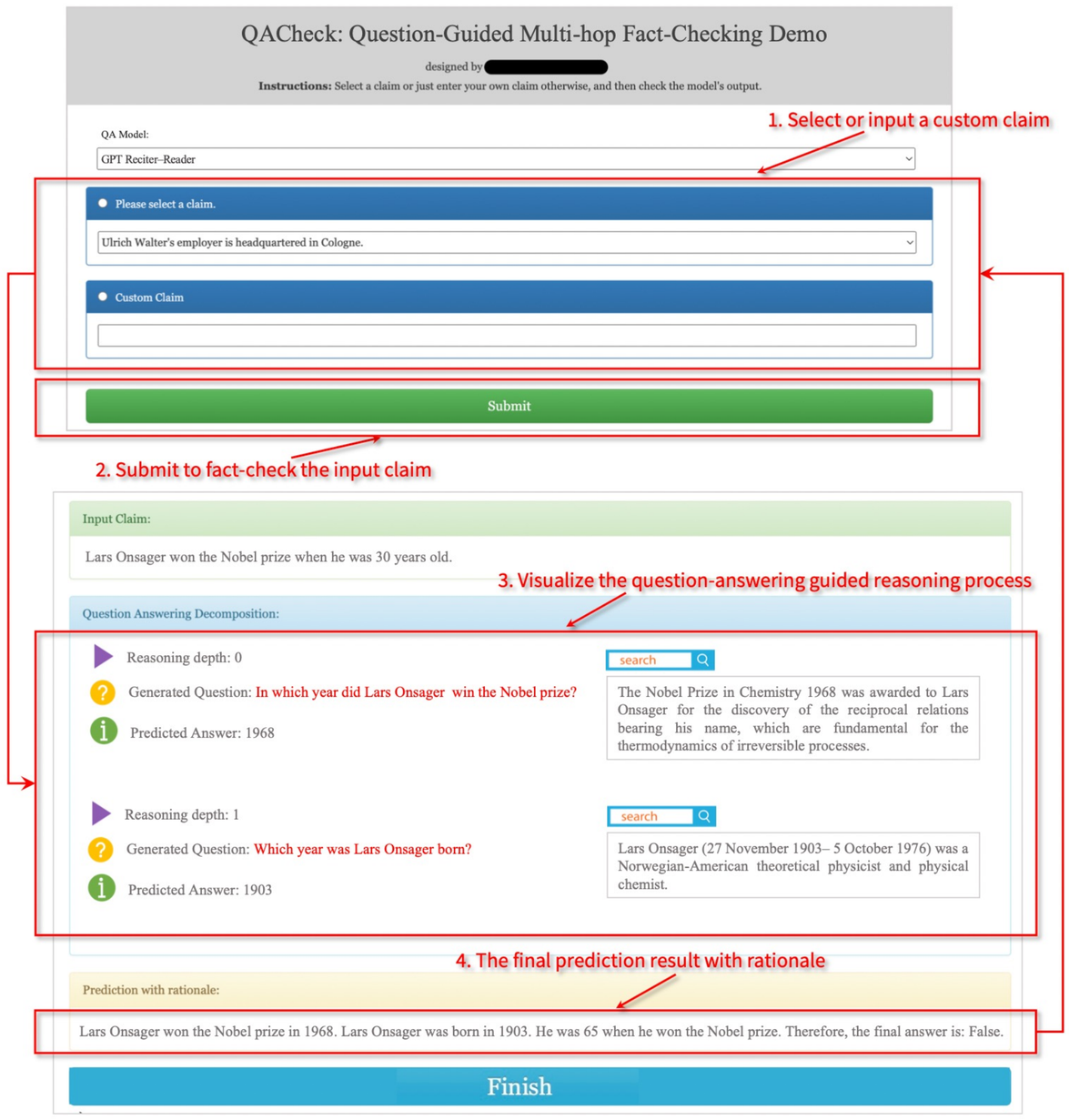
QACheck

We introduce the Question-Guided Multi-hop Fact-Checking (QACHECK) system, which addresses the aforementioned issues by generating multi-step explanations via question-guided reasoning.

The verification of the claim is guided by asking and answering a series of relevant questions.

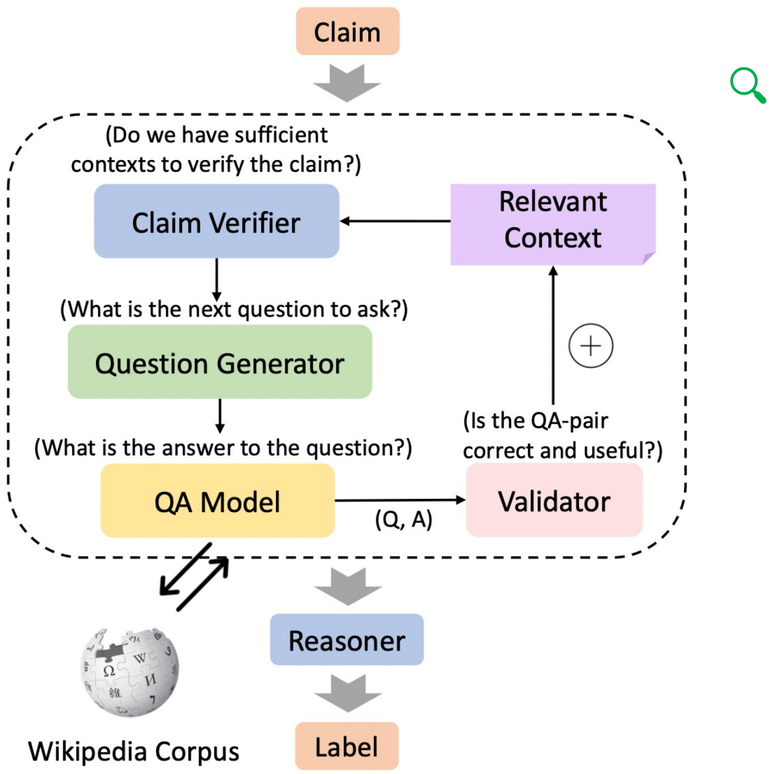


System Interface



System Architecture

- Claim Verifier $\mathcal{D}$: determine the sufficiency of the existing context to validate the claim, i.e., $\mathcal{D}(c, C) \rightarrow \{True, False\}$
- Question Generator $\mathcal{Q}$: generate the next question that is necessary for verifying the claim, i.e., $\mathcal{Q}(c, C) \rightarrow q$
- Question-Answering Model $\mathcal{A}$: answer the question and provide the supported evidence, i.e., $\mathcal{A}(q) \rightarrow a, e$
- Validator $\mathcal{V}$: validate the usefulness of the newly-generated (Q, A) pair based on the existing context and the claim, i.e., $\mathcal{V}(c, \{q, a\}, C) \rightarrow \{True, False\}$
- Reasoner $\mathcal{R}$: utilize the relevant context to justify the veracity of the claim and outputs the final label, i.e., $\mathcal{R}(c, C) \rightarrow \{Supported, Refuted\}$



Datasets and Experimental Results

HOVER (Jiang et al., 2020)
- 1,126 two-hop claims
- 1,835 three-hop claims
- 1,039 four-hop claims

FEVEROUS (Aly et al., 2021)
- We selected 2,962 claims that require exclusively textual evidence.

QACHECK has better improvement over the end-to-end models on claims with high reasoning depth.

This indicates that decomposing a complex claim into simpler steps with question-guided reasoning can facilitate more accurate reasoning.

Model	HOVER 2-hop	HOVER 3-hop	HOVER 4-hop	FEVEROUS
InstructGPT				
- Direct	56.51	51.75	49.68	60.13
- CoT	**57.20**	53.66	51.83	**61.05**
Codex	55.57	53.42	45.59	57.85
FLAN-T5	48.27	52.11	51.13	55.16
ProgramFC	54.27	54.18	**52.88**	59.66
QACheck	55.67	**54.67**	52.35	59.47

Table 1: Evaluation of F1 scores for different models. The bold text shows the best results for each setting.

Future Works

The reliance on external APIs tends to prolong the response time of our system.

We could integrate open-source, locally-run large language models like LLaMA.

The current scope of our QACheck is confined to evaluating True/False claims.

Extending QACheck to Not Enough Info (NEI) claims could be a future direction.

Contact & Links

@PanLiangming

liangmingpan@ucsb.edu

Paper

Video

Project