



Explaining Unverifiable Presuppositions

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Motivation

Presuppositions are implicit assumptions made in a statement or a question.

Unanswerable Question

Who is the current king of France?

Kim et. al (2021)

This question is unanswerable because we could not verify that the king of France exists.

Our Proposed System

This question is unanswerable because **France is a Republic**, not a monarchy. **Republics have presidents**, not kings. **The current president of France is Emmanuel Macron**.

Overall Pipeline

Explanations are a **synthesis** of multiple sentential **pieces of evidence** that may not always be present in the gold document.

Natural Question (Information-Seeking)

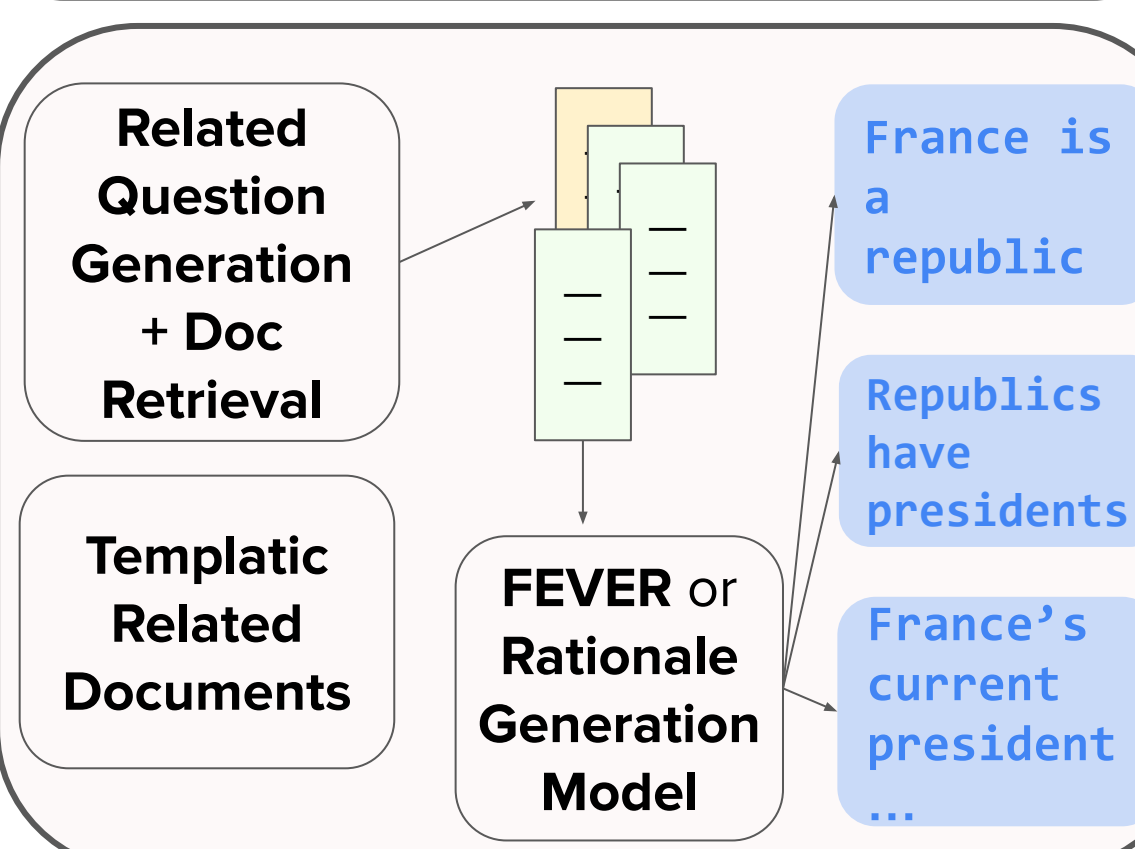
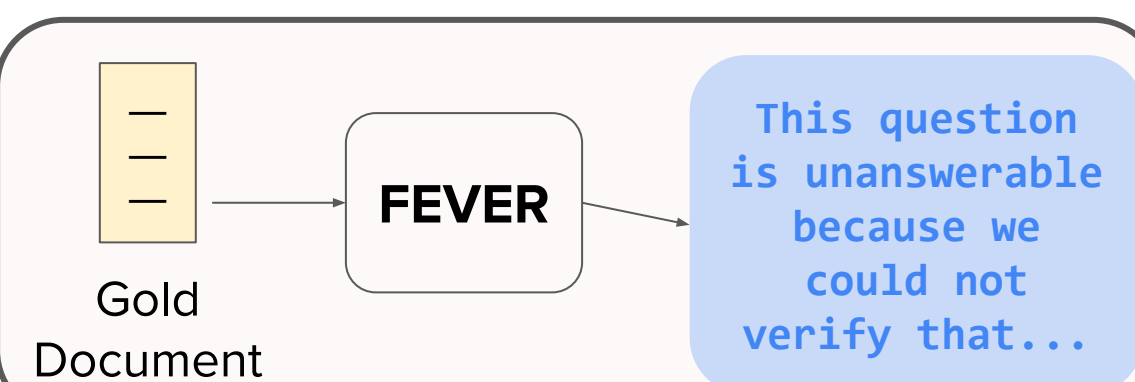
Potentially unanswerable due to presuppositional failure

Presupposition Extraction

Use presupposition trigger classes to template extract presuppositions

Presupposition Verification + Explanation

If unverifiable, gather evidence to support falsity



Presupposition Generation

Presuppositions are identified via lexical and syntactic **triggers**.

Utterance: “**Both** my dogs like peanut butter.”

Presupposition: There exist exactly two contextually salient dogs.

We use **templatic generation**.

which pyramid is a **larger** structure than the pyramid of giza?

Trigger Classes

Comparatives

Change of state verbs

Implicatives

Numeric Determiners

...

Template

X is a Y

Presup

The Pyramid of Giza is a large structure

Evidence Retrieval + Presup Verification

We repurpose a **FEVER (Fact extraction and VERification)** system.

Evidence Candidate Set

Sentences from Wiki docs (gold or retrieved)

Ranking

(Presupposition, Evidence)

(Presupposition, Evidence)

...

Score

Irrelevant

Relevant

Top 5 pairs as evidence set

Graph attention network on evidence nodes. Outputs whether evidence pieces **support**, **refute** or **do not give enough information** for the presupposition.

Question Generation

We **generate related questions** via templatic and neural methods to gather to retrieve documents to boost the explanation generation stage.

Template: Who X'ed Y? → Was Y X'ed?

Example: Who invented the lightbulb? → Was the lightbulb invented?

BIU's **Ro1eQG** [Pyatkin et. al. 2021] model, which asks about all possible semantic roles of an input's predicate.

The runner crossed the line.

→

Who crossed the line?

The runner crosses what?

Explanation Generation

We also test the viability of using **free-text rationale generation models** [Weigraffe et. al. 2021] as an automated way of explaining **how the evidence pieces negate the presupposition**.

Explanation Evaluation (Human)

We ask humans to **judge the evidence set** that form our explanations on a **Likert scale (1 – 5)** across multiple dimensions.

Completeness 3

Logical Coherence 5

Relevance 4

Utterance: What is the difference between hastings essential and hastings direct
Presupposition: there is some difference between hastings essential and hastings direct

1 Hastings Insurance is a UK personal lines insurance broker servicing customers online , by phone and by branch .

2 It is listed on the London Stock Exchange and is a constituent of the FTSE 250 Index .

3 The company provides car , bike , van and home insurance , as well as a range of ancillary products and services such as breakdown cover , personal accident , substitute vehicle and key and legal cover .