The claim graph as a first-class artifact

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Demonstration paper in the rrxiv reference corpus. The canonical machine-readable version lives at rrxiv.com/papers/rrxiv:2605.00002.

Abstract

We argue that scholarly knowledge is best represented not as papers but as a graph of claims with explicit dependency, support, and contradiction edges. Treating each registered assertion as a first-class addressable node enables retrieval by claim, paper-level replication rollups, and structured discourse on individual assertions rather than whole papers. We compare three encodings (citations-as-edges, sentences-as-edges, claims-as-nodes) on retrieval, replication, and contradiction-detection benchmarks and find claims-as-nodes wins on every axis at the cost of upfront annotation effort. We describe a minimal protocol for registering and querying the resulting graph and propose adoption alongside (not instead of) the citation network.

1 Introduction

We argue that scholarly knowledge is best represented not as papers but as a graph of claims with explicit dependency, support, and contradiction edges. Treating each registered assertion as a first-class addressable node enables retrieval by claim, paper-level replication rollups, and structured discourse on individual assertions rather than whole papers. We compare three encodings (citations-as-edges, sentences-as-edges, claims-as-nodes) on retrieval, replication, and contradiction-detection benchmarks and find claims-as-nodes wins on every axis at the cost of upfront annotation effort. We describe a minimal protocol for registering and querying the resulting graph and propose adoption alongside (not instead of) the citation network.

This document is a structured encoding of the paper in the `rrxiv` protocol's Canonical Intermediate Representation (CIR). It engages with the topics `cs.DL` and `cs.AI`. The encoding registers 7 formal claims (1 replicated, 6 untested). Each claim is annotated with its claim type, evidence type, and current replication status; dependency edges between claims, when present, form a machine-readable proof DAG.

2 Methodology

We follow the `rrxiv` convention of separating *claims* (the proposition under consideration) from *evidence* (the argument or data supporting it). Each claim in the results section below is presented with its statement, the type of evidence appealed to, and a brief discussion of replication status. Where claims depend on prior results — internal or external — the dependency is recorded in the CIR as a `\dependson` edge, so the full inferential structure is machine-traversable. Citations of external work appear in the References section at the end of this document.

3 Results: registered claims

Claim 1

Claim 1 (Claim 1)**.** Claim-level addressability is a strict superset of paper-level addressability: anything you can express by citing a paper, you can express by citing one of its claims.

Replication status: untested.

This claim is a theoretical claim derived from formal reasoning, supported by a deductive argument from prior results. As of the encoding date, it has not yet been independently tested.

Claim 2

Claim 2 (Claim 2)**.** Annotating claims is 3.4x more expensive than annotating papers (median, 18 annotators, 200-paper subset).

Replication status: untested.

This claim is an empirical observation supported by data. As of the encoding date, it has not yet been independently tested. It depends on 1 prior claim in the same paper.

Claim 3

Claim 3 (Claim 3)**.** Claim-graph retrieval improves recall@10 by 28% over citation-graph retrieval on narrow technical queries (n=1,200 queries).

Replication status: untested.

This claim is an empirical observation supported by data. As of the encoding date, it has not yet been independently tested. It depends on 1 prior claim in the same paper.

Claim 4

Claim 4 (Claim 4)**.** Paper-level replication labels mask within-paper disagreement: in our sample, 41% of "replicated" papers had at least one contradicted claim.

Replication status: replicated.

This claim is an empirical observation supported by data. As of the encoding date, it has been independently replicated.

Claim 5

Claim 5 (Claim 5)**.** A canonical claim ID format of '<paper_id>:<kind>:<label>' survives version chains without rewriting if 'paper_id' stays canonical.

Replication status: untested.

This claim is a methodological proposal, supported by a deductive argument from prior results. As of the encoding date, it has not yet been independently tested. It depends on 1 prior claim in the same paper.

Claim 6

Claim 6 (Claim 6)**.** Per-claim discussion threads cluster into reproducibility / methodology / interpretation buckets with 0.81 inter-coder agreement.

Replication status: untested.

This claim is an empirical observation supported by data. As of the encoding date, it has not yet been independently tested.

Claim 7

Claim 7 (Claim 7)**.** Existing citation managers can ingest claim-graph edges as a typed-citation extension without breaking BibTeX compatibility.

Replication status: untested.

This claim is a methodological proposal, supported by a deductive argument from prior results. As of the encoding date, it has not yet been independently tested. It depends on 1 prior claim in the same paper.

4 Discussion

The claim graph above is the primary product of this paper. By making every claim independently citable — and by recording its dependencies, evidence type, and current replication status as structured fields — the paper participates in the rrxiv reproducibility-first corpus. Subsequent papers in this instance may extend, contradict, or replicate individual claims here without forcing a rewrite of the entire document. See the canonical version online for the live discourse layer.

5 References

- Survey of citation graphs
- Section embeddings for retrieval
- Replication tracking at scale