

Graph Based Document Intelligence

Connecting Information for Better Decisions

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Problem



Medical coverage policies are complex and difficult to compare manually



Comparing two payers requires reviewing multiple documents, codes, criteria, and exceptions



The same procedure code can be covered for one indication but not another



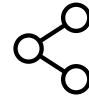
Recommendations must be traceable to source evidence.

Cost Today: ~3 days per cross-payer investigation

Data



• 100 medical coverage policies



• ~120K nodes + 280K relationships



• ~88K CPT and ICD-10 reference entities



• 60-question benchmark across 5 tiers

Objective

- 1 Transform complex documents into structured, connected knowledge.
- 2 Answer multi-step questions with citations and traceable reasoning.
- 3 Preserve the links between rules, exceptions, conditions, and supporting evidence.
- 4 Reuse the same core system across domains through configurable profiles.

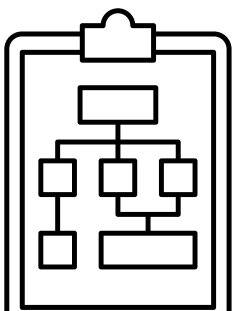
Approach



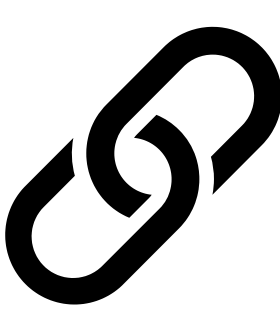
Policy PDFs



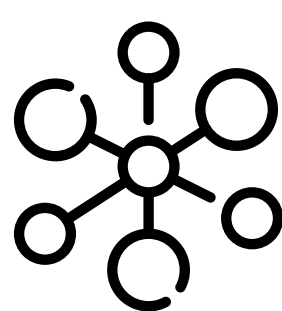
Azure Document Intelligence / Extraction



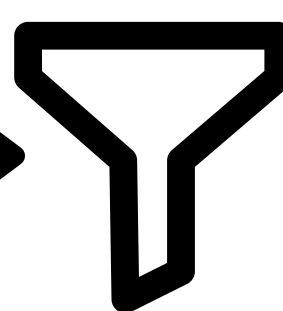
Schema-guided entity extraction



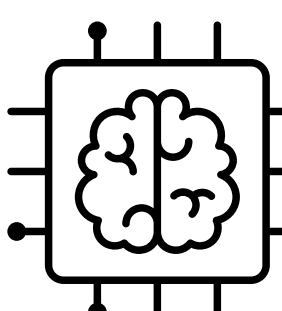
Entity resolution to CPT & ICD-10



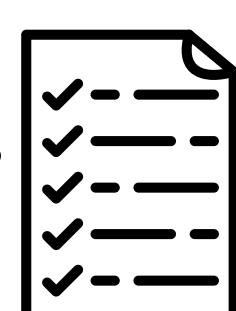
Neo4j Knowledge Graph



Partition-routed retrieval



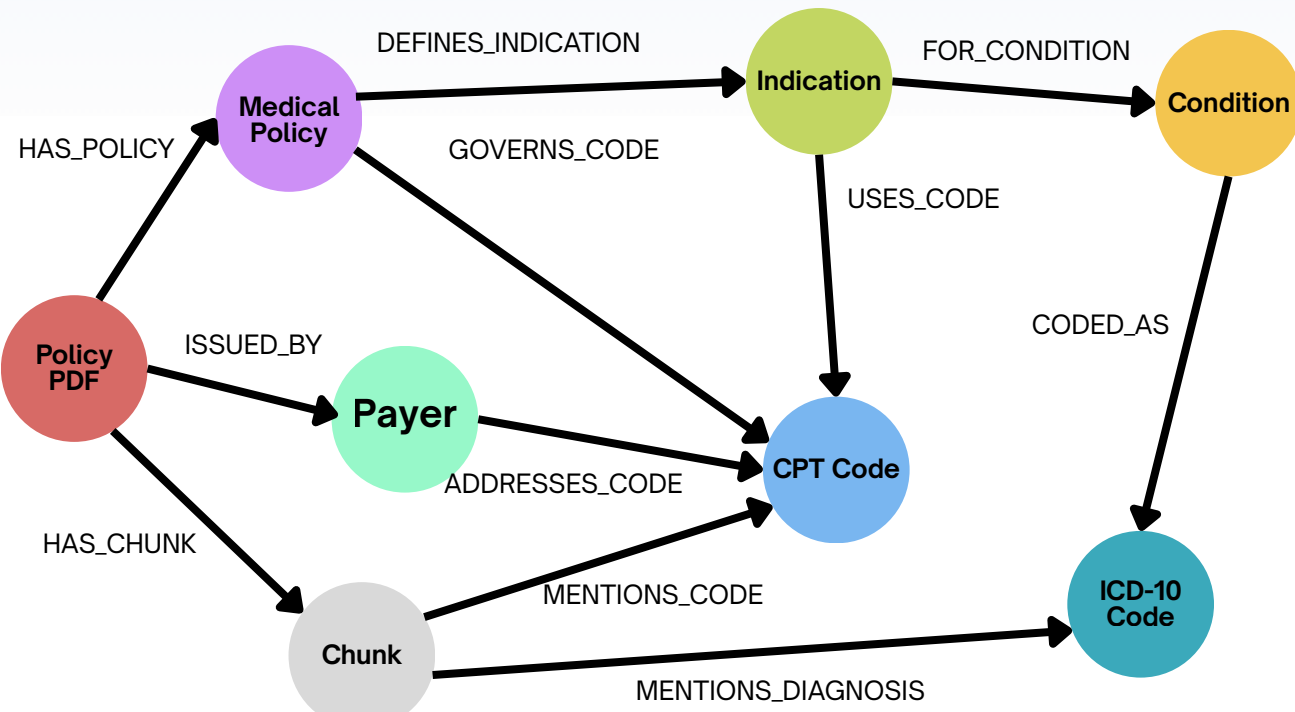
Cypher query agent



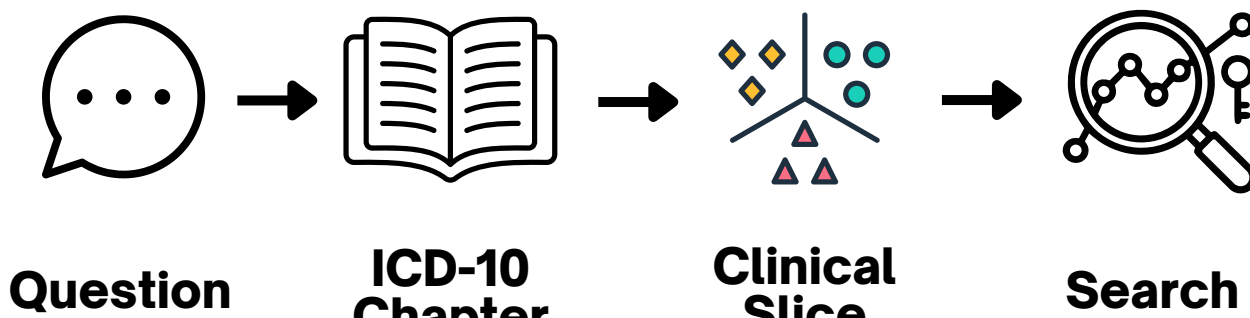
Grounded answer with citations

Key Design Choices

Knowledge Graph

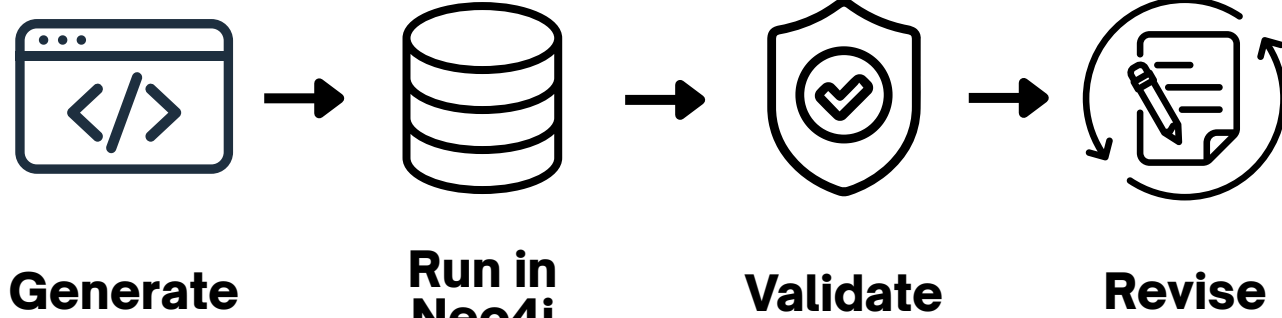


Partition Routing



Search only the relevant part of the graph

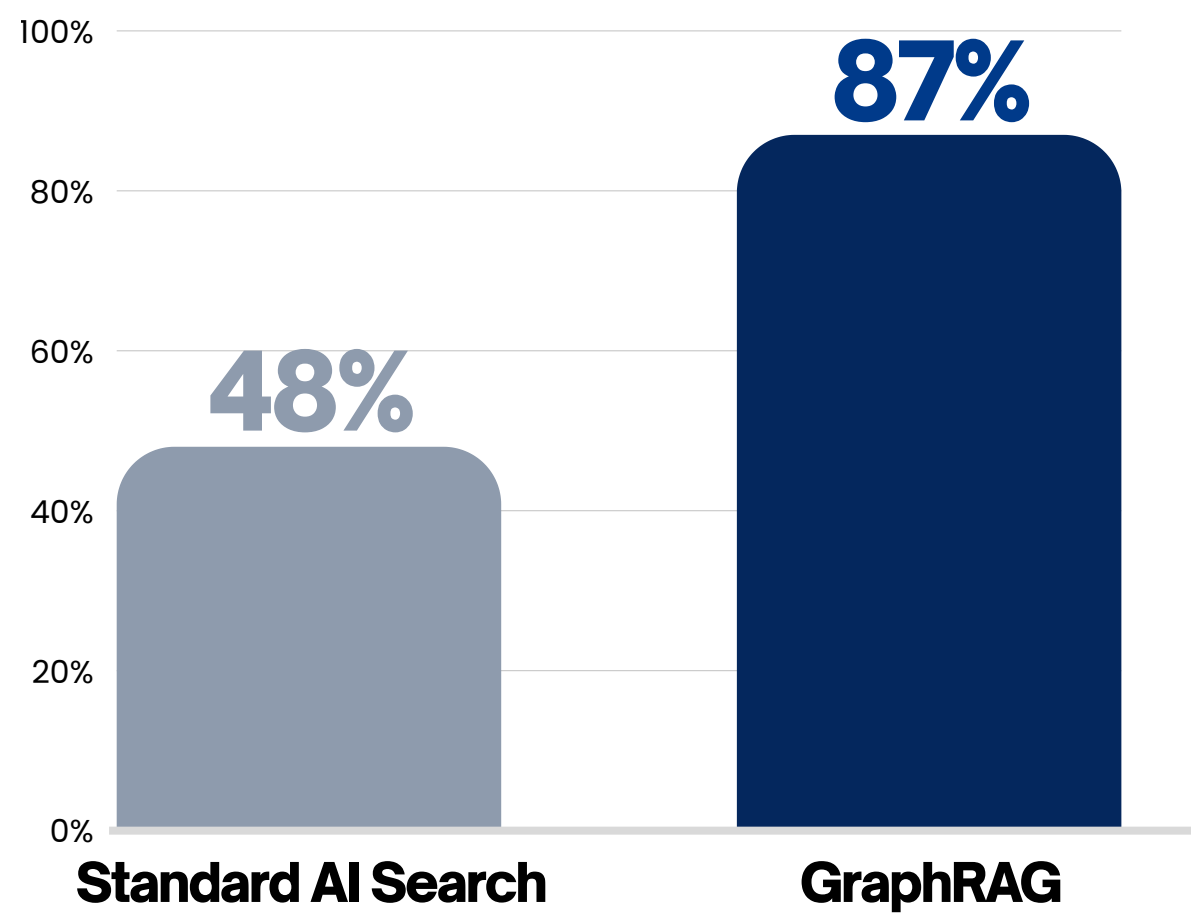
Cypher Query Agent



Produces grounded, cited answers without manual Cypher

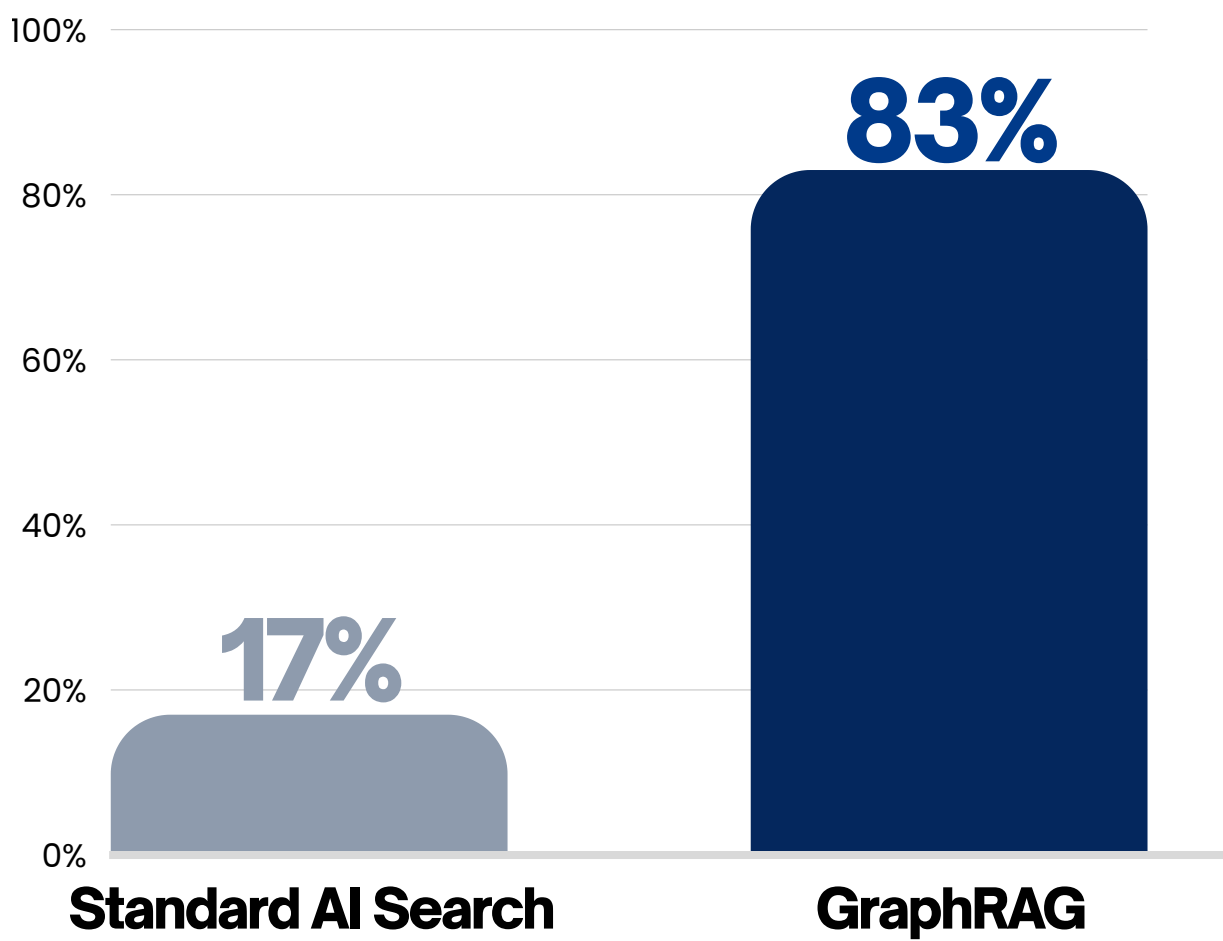
Results

All Coverage Questions



60 Benchmark Questions

Comparing Two Insurers



12 Payer-pair comparisons across key scenarios



Hallucinated Coverage: 0 of 60

GraphRAG never claimed coverage the documents don't support.



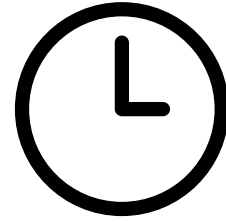
Trap Questions: 10 of 11

Questions with no policy in the corpus were correctly answered "no such policy."



Every Answer Cited: 100%

Each response includes the source document and the executed query, so reviewers verify instead of re-read.



Median Latency: 41s vs 6.5s

Slower than standard search, but far more accurate and still reduces investigations from days to minutes.

Business Impact



Faster Investigation

3 days → 20 minutes

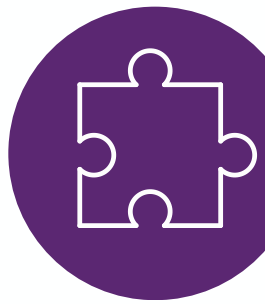
One cross-payer investigation typically involves 20-30 related questions



Broader Review Coverage

Manual GraphRAG

The same team can now review far more policies



Reusable Framework

Domain profiles enable expansion to new document types such as commercial contracts