

Beyond the Call

Agentic Knowledge Engine for Enterprise Customer Intelligence



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Problem Statement:

Comcast's CX data contains valuable insights, but existing analytics mainly categorize why customers contact the company without capturing actions and resolution paths. Deeper questions therefore require manual review and custom pipelines, limiting speed, scalability, and reuse.

Project Goal:

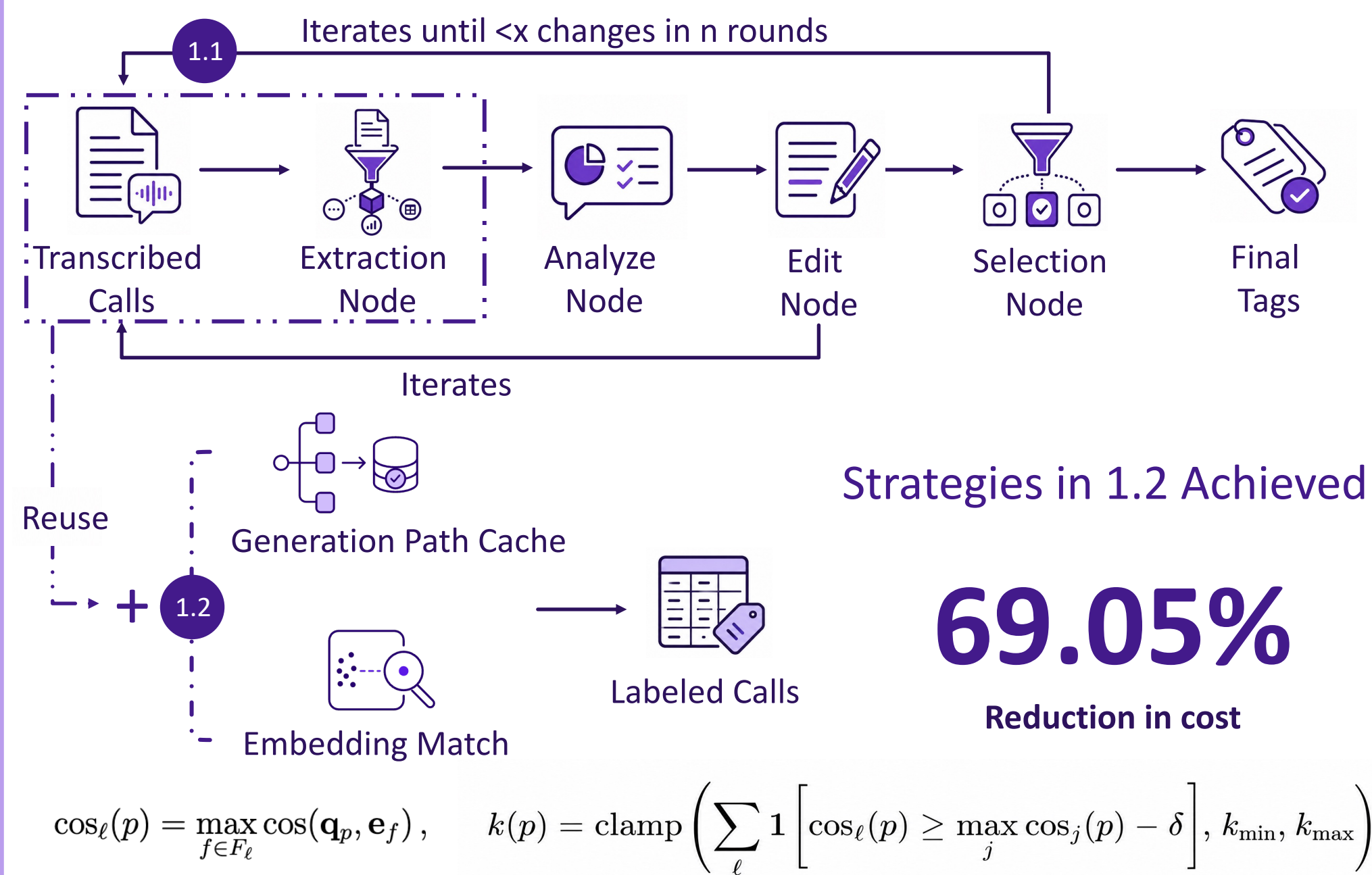
Develop a robust, granular LLM-based tool that enables interactive exploration of customer conversations while reducing insight-extraction time from days to seconds.

Dataset

Call Interactions &
Meta DataCustomer & Agent
Attributes

Methodology

Tag Generation



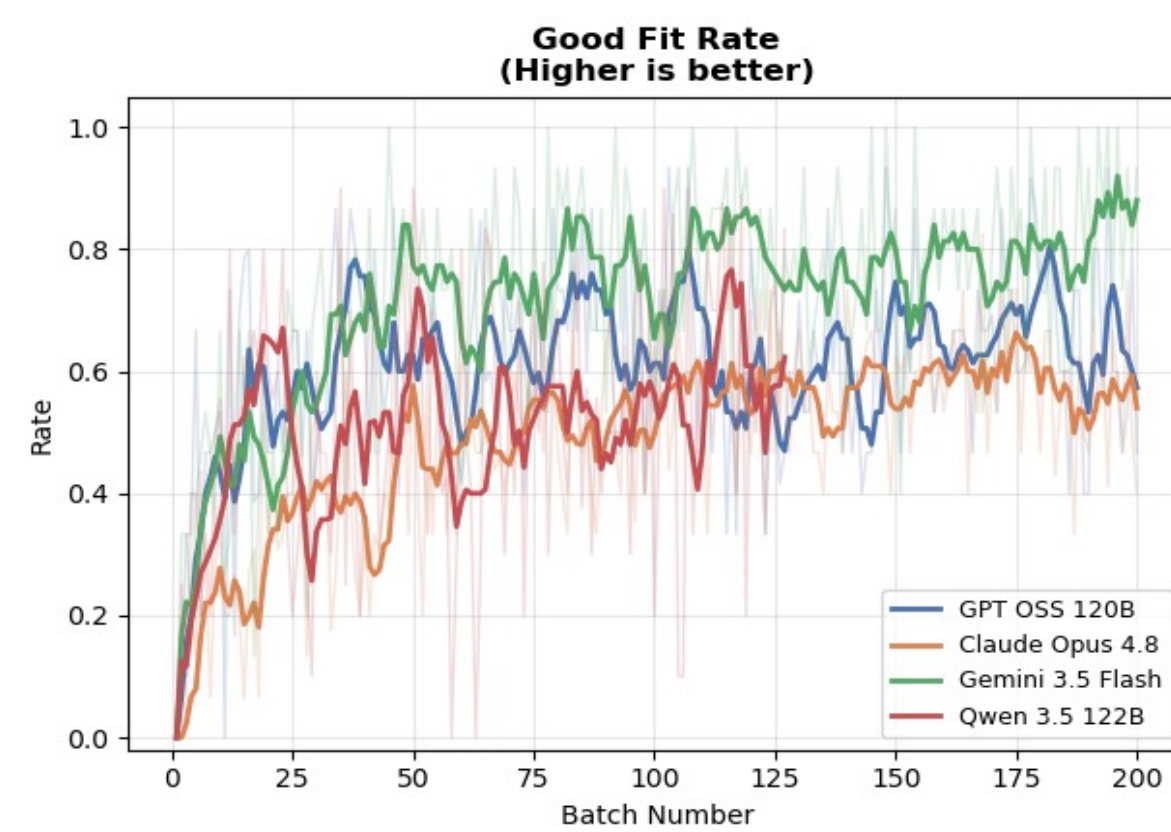
1.2 Large-Scale Labelling:

Cached mappings bypass repeated LLM calls, while embedding retrieval limits each prompt to $k(p)$ candidates, reducing context length and API inference cost.

1.1 Iterative Learning:

Tag generation is iterative rather than exhaustive, mimicking stochastic gradient descent. Sampled call batches progressively produce a scalable taxonomy that represents population-level patterns.

The extraction prompt is auto-improved at each round by the Analyze Node, while the Selection Node evaluates the taxonomy on a hold-out set. The final taxonomy contains 1) Chain of Action Tags with sequence index, 2) Call Overall Outcome terms, 3) Step Outcomes (Failed/Success/Unclear) of each action.



Cost Efficiency of GPT OSS

\$0.25

Per 1% Exact Fit Rate

Insight:

Keeping all else constant, GPT OSS achieved the lowest cost with comparable tag quality.

Knowledge Graph

2. Knowledge Graph Construction

Generated tags are combined with existing CX datasets and transformed into graph-ready node and edge tables.

Why Knowledge Graph

Preserves how issues, agent actions, resolution steps, and outcomes connect across interactions, making it easier to identify patterns linked to resolutions and repeats.

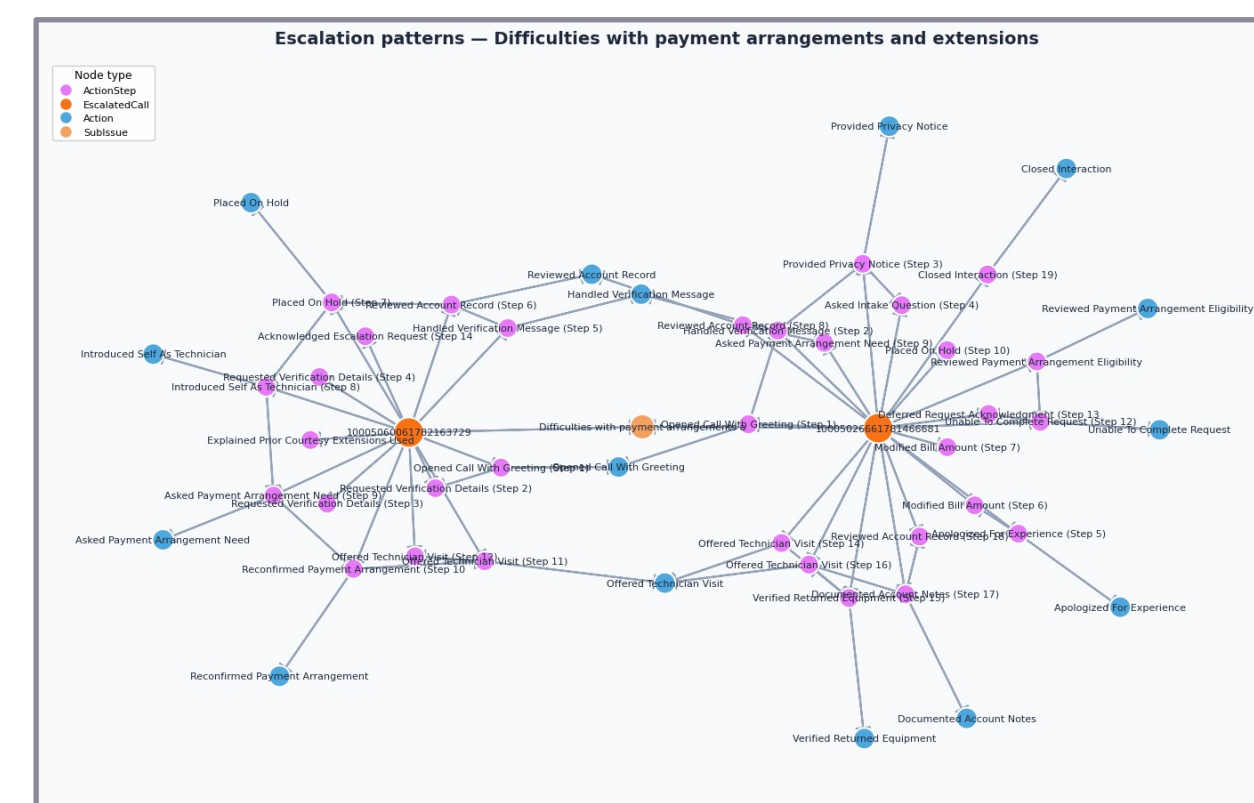
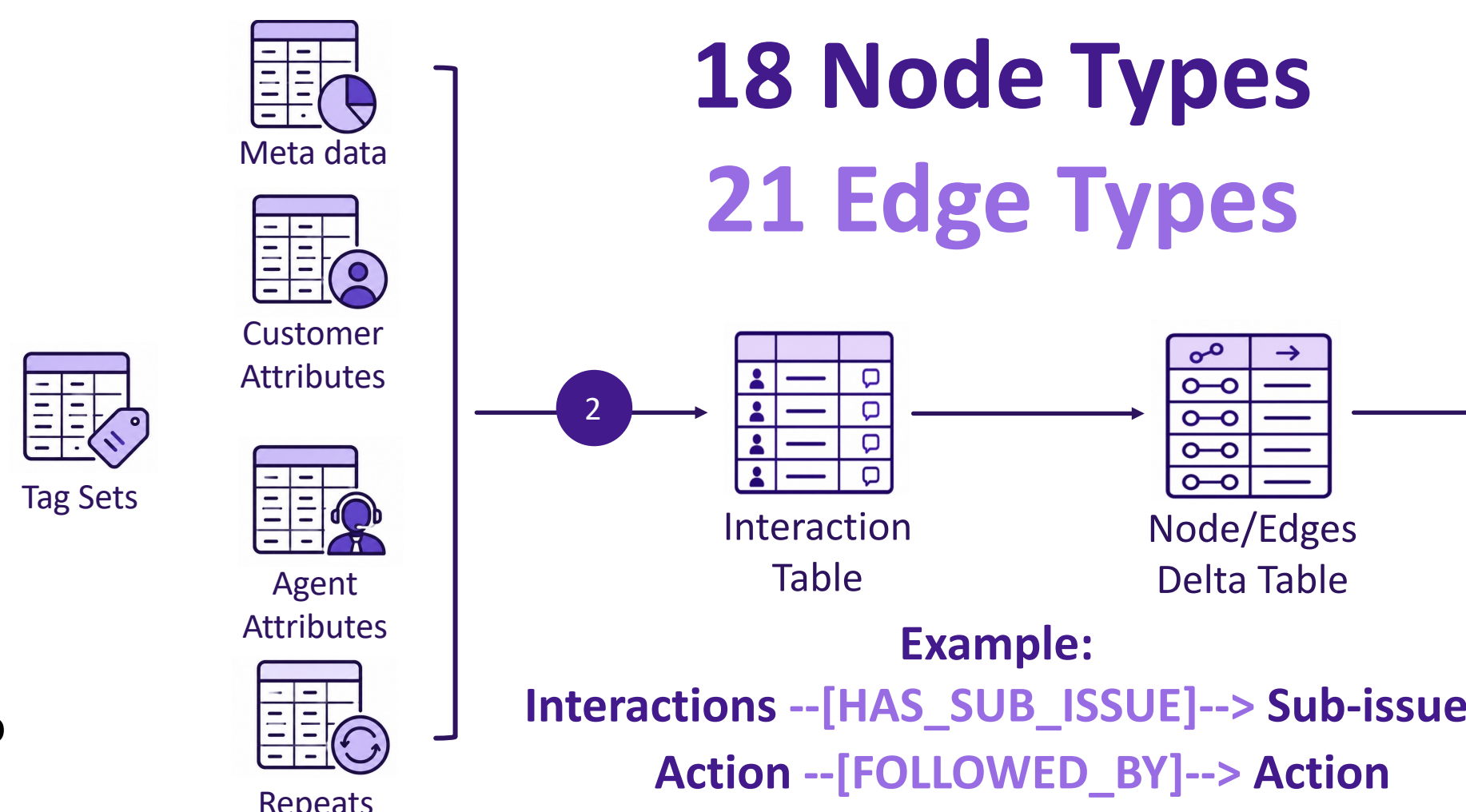
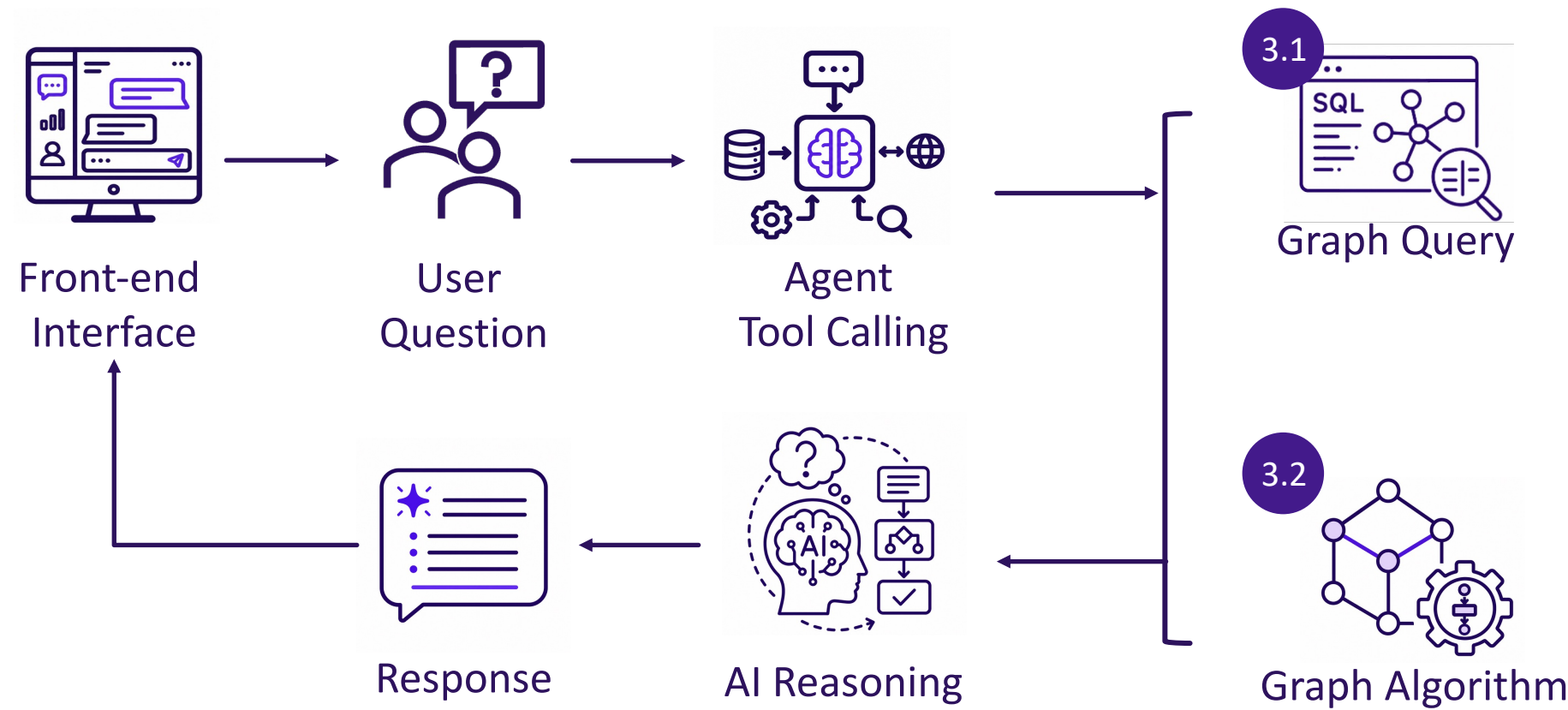


Figure 2: Example sub-graph showcasing the relationship between two escalated interactions and their step actions

AI Agent



3. AI Agent Tool Calling

An AI agent interprets each business question, selects the appropriate SQL or graph analysis tool, and combines the results into a clear, evidence-backed response.

3.1 Graph Query

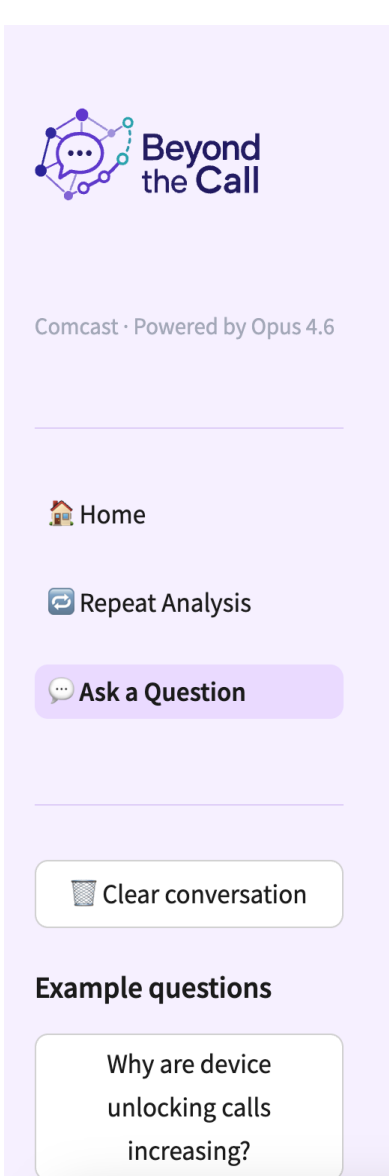
Databricks Genie translates natural-language business questions into SQL queries that retrieve and quantify relevant CX patterns from the underlying graph tables.

3.2 Graph Algorithm

Applies clustering, centrality, and path-based analyses to identify interaction clusters, recurring patterns, and common resolution pathways.

Result & Impact

We built an illustrative demo on Databricks with a stratified sample based on call interactions in June 2026:

1614
Action Tags**25**
Outcome Terms**30K**
Call Transcripts

Ask the CX Analyst

Ask any business question about Comcast CX data. The analyst uses the knowledge graph to give evidence-backed answers.

⚠️ This tool is intended for exploration only. Please verify important information and do not treat its outputs as definitive.

What are the attributes of the agents action steps that are correlated with higher resolution rates and lower resolution rate?

✓ 7 tools used

genie_query — What are the top 15 agent actions by resolution rate, showing the action name, total call count, and resolution rate (percentage of calls with outcome_name = "Resolved")? Only include

Ask a question about CX data...

With our agentic-powered CX Analytics Engine, we drive up time efficiency, cost reduction, and expected operational savings:

99%

Reduction in Time

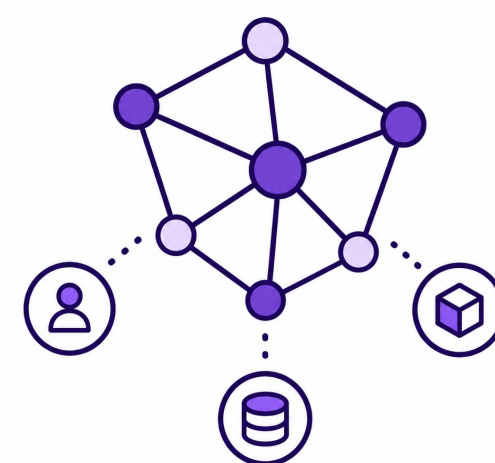
96%

Reduction in Cost

\$5M

Expected Operational Savings

The framework also provides an ecosystem of analytics for the EBI team:



Extensible Knowledge Graph: Pluggable with new fields to capture an increasingly diverse set of entities and relationships.



Organic Feature Surfer: Capable of extracting any target of interest with only a minor shift in analytical focus.