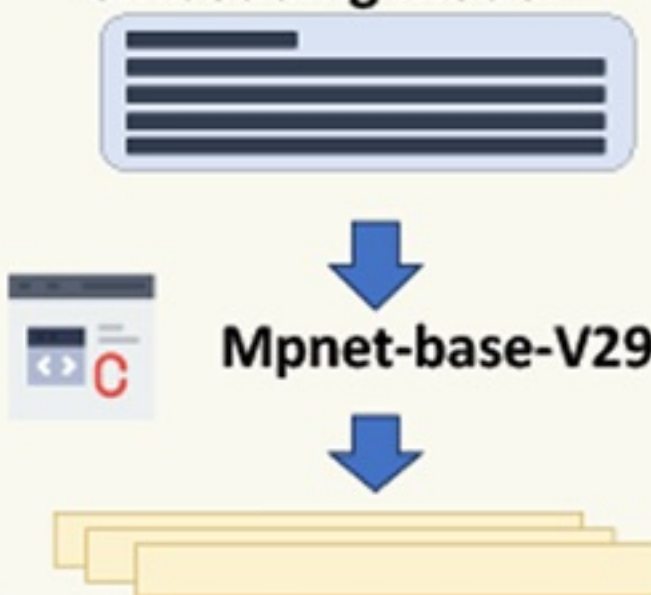# Agentic Contextual Retrieval

A. Knowledge Preparation and Query Understanding
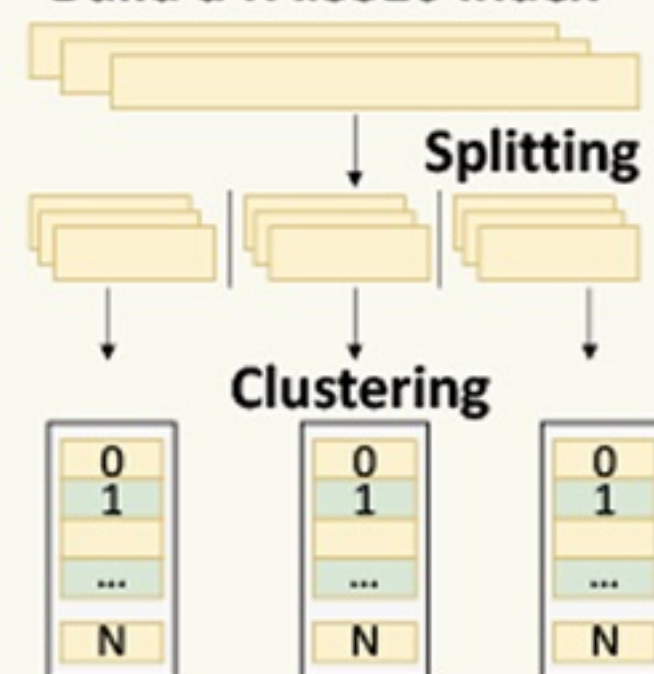
- **Load documents from database**

  3GPP

- **Mpnet-base-V29 embedding model**

  Mpnet-base-V29

- **Build a FAISS10 index**

  Splitting

  Clustering

0	0	0
1	1	1
...	...	...
N	N	N

Prompt

What is the role of the **serving network in fraud control**?
A: To process charging information in real time
B: To collect charging information from network elements
C: To handle cost control mechanisms
D: To meter charge flows independently

User

Enhanced Agent

①

Enhanced query

What is the responsibility of the serving network in managing fraud prevention and control mechanisms according to 3GPP Release 18 standards, including real-time charging processes, collection of charging data from network components, cost control systems, or independent charge flow metering?

Key Concept

- 3GPP Release 18 fraud control',
- 'Serving network role in fraud management',
- 'Real-time charging information processing',
- 'Charging data collection in 3GPP',
- 'Cost control mechanisms in telecommunications',
- 'Independent charge flow metering'

B. Multi-Source Knowledge Retrieval

The second step involves multi-source retrieval, where information is extracted from heterogeneous sources to ensure completeness and relevance
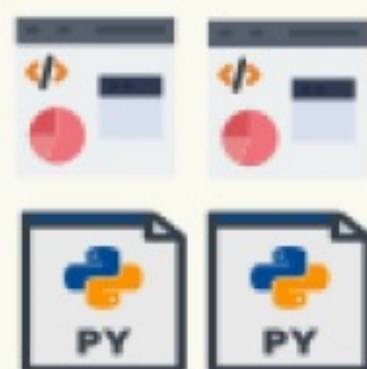
- **Optimizes query**

Enhanced query Key Concept

Local library

Mpnet-base-V29

0 1	0 1	0 1
...	...	...
N	N	N

Online search

PY   PY

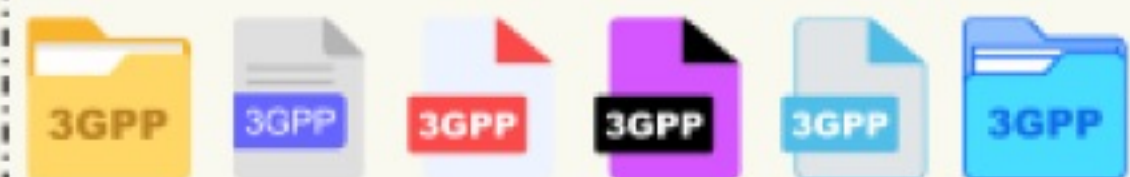## C. Contextual Evidence Aggregation and Reasoning:

Once relevant information is retrieved, the third step focuses on contextual evidence aggregation and reasoning, where multi-source knowledge is synthesized into a structured, interpretable response.

- **Summarize the retrieved evidence**

Agent for reasoning

Evidence

3GPP   3GPP   3GPP   3GPP   3GPP   3GPP

3GPP from multiple sources

2 Retrieve Results

7.2.2 Fraud Control by the Serving Network **Charging information shall be collected from the network elements and processed in real time**. This will allow the serving network to always be aware of the exposure to visitors. A limit for the accumulated charges ....

3 Retrieval summary

The serving network collects and processes charging data in real time to manage fraud and cost control, enabling the setting of charge thresholds and ensuring secure, standardized transfer of charging information between networks. This supports accurate billing, fraud prevention, and efficient dispute resolution in telecommunications systems.

D. Decision-Making and Self-Validation

The final step ensures decision-making accuracy and self-validation, reducing the likelihood of hallucinations and incorrect technical conclusions. This module applies confidence-based response verification, where retrieved answers are ranked based on relevance scores and alignment with authoritative 3GPP sources.

- **Evaluate consistency and reliability.**

  ✅ Analyzing the differences between rel-16 and rel-17

  ❌ Analyzing the early-stage discussions in Rel-19

- **Use this reflection to inform potential refinements**

  Agent for reflection

  ✅ 5G URLLC latency guarantees
  ✅ TS 23.501 (System Architecture)
  ❌ TS 38.824 (Performance Metrics)

  Evaluation and Update

- **Answer Generation**

  Agent for answering

  chain-of-thought reasoning → Final answer

4

Counterexample for semantic retrieval if needed:

option 1: To process charging information in real time", While the serving network does collect charging information, the key role in fraud control is the real-time processing of this information to monitor and manage potential fraud risks. Therefore, the correct answer is 'option 1'.

Response

Option 2: To collect charging information from network elements.
Because the serving network is responsible for collecting charging data from its network elements and processing it to manage fraud exposure, as emphasized in 3GPP standards on fraud control mechanisms.