Retrieval-Augmented Generation with Knowledge Graphs for

Customer Service Question Answering v1

*Note: Method has been deployed within LinkedIn’s customer service*

**Problem statement:** To track customer’s ticket issue and response based on the past issue history using intra-issue and inter issues relationship.

**Approaches (Figure1 ):**

*Step1:* Find intra-team entity, relationship based on historical issue tickets and generate a tree(subgraph)

*Step2:* Using subgraph (trees) design KG with inter-issue ticket entity relation.

*Step3:* Retrieval: During the question-answering phase, the method parses consumer queries and retrieves related sub-graphs from the KG to generate answers. which stores the embedding in the vector DB.

“This integration of a KG not only improves retrieval accuracy by preserving customer service structure information but also enhances answering quality by mitigating the effects of text segmentation with fix size.”

A diagram of a tree

Description automatically generated

Figure 1: Knowledge Graph DB structure for customer issue tickets

A diagram of a graph

Description automatically generated

Figure 1: An overview of our proposed retrieval-augmented generation with knowledge graph framework. The left side of this

diagram illustrates the knowledge graph construction; the right side shows the retrieval and question answering process.

**CONCLUSIONS AND FUTUREWORK**

The research significantly advances automated question answering systems for customer service based on historical data. Integrating retrieval augmented generation (RAG) with a knowledge graph (KG) has improved retrieval and answering metrics, and overall service effectiveness. Future work will focus on developing an automated mechanism for extracting graph templates, enhancing system adaptability; investigating dynamic updates to the knowledge graph based on user queries to improve real-time responsiveness; and exploring the system’s applicability in other contexts beyond customer.