Title : **Tax Information & Service Chatbot for Smart City Public Services**

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ABSTRACT

In the context of Smart City development, government agencies must deliver accurate and accessible digital tax information services, yet repetitive inquiries continue to burden officers. This research develops a tax information chatbot by integrating a Large Language Model (LLM) with a Retrieval-Augmented Generation (RAG) architecture, leveraging reliable official documents to improve answer accuracy. The system incorporates embeddings, a FAISS vector database, and an agent-based design to enhance retrieval quality and support multi-step reasoning.

Five experimental configurations (Method IDs M1–M5) were implemented by systematically varying the generator model, embedding model, retrieval strategy (single vs. multi-retrieval), and system framework. Each Method ID represents a distinct component combination. In particular, M5 employs a Recursive Language Model (RLM) framework, which performs iterative retrieval–reasoning cycles by recursively refining intermediate outputs to strengthen logical consistency and reliability.

Results on a tax-related question–answer dataset indicate that M3 achieved strong overall performance

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with consistent answer quality and lower computational cost than the top-scoring configuration (M4). Although M4 produced the highest scores, M3 was selected for deployment due to its balanced trade-off between effectiveness and cost.

The proposed system supports digital tax information services, reduces officers' workload, and provides a practical framework for applying LLM+RAG in Smart City public service systems.

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