Development of a RAG System to Derive Requirements from Legal Documents

1. Objectives

- To develop a Retrieval-Augmented Generation (RAG) system specialized for extracting regulatory requirements from complex legal texts such as FDA and Medical Device Regulation frameworks.

- To automate regulatory alignment and comparison, thereby reducing manual effort, improving accuracy in compliance interpretation, and mitigating risks of non-compliance.

2. Key Contributions

- Introduces a domain-adapted RAG model that retrieves and generates aligned regulatory clauses across varying legal frameworks.

- Demonstrates how RAG can enhance semantic understanding beyond keyword or rule-based systems by capturing nuanced regulatory requirements.

- Explores extensions such as Self-RAG, Corrective RAG, Adaptive RAG, and Graph RAG for dynamic retrieval, evaluation, and context-aware generation tailored to regulatory documents.

3. Framework Overview

- The system uses vector-based embeddings and retrieval techniques to find relevant clauses and passages from a knowledge base of regulatory texts.

- Uses generative language models to synthesize aligned requirements and explanations from the retrieved data.

- Incorporates feedback loops and verification modules to ensure factual accuracy, completeness, and traceability in the generated outputs.

- Employs graph-based and multi-step retrieval for handling complex relationships across regulatory entities and clauses.

4. Evaluation and Challenges

- Evaluation uses key performance indicators (KPIs) such as retrieval accuracy, text generation quality, and compliance alignment across different legal frameworks.

- Addresses challenges in efficiency, reliability, interpretability, and domain adaptation typical in regulatory text processing.

- Emphasizes the importance of grounding generated requirements in authoritative source texts to ensure traceability and factual correctness.

5. Relevance for Academic Compliance Project

- Provides a methodological blueprint for building explainable, traceable RAG systems in highly regulated domains.

- The multi-step retrieval, graph-based context, and dynamic evaluation mechanisms can be adapted for academic policy compliance automation.

- Offers insights into addressing domain adaptation and semantic alignment challenges relevant to overlapping and evolving education regulations.

- Demonstrates best practices for evaluating both retrieval and generation tasks for high-stakes compliance applications.