

Enhancing Clinical Decision Support Systems Using Vector-Based Retrieval-Augmented Generation

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Abstract: *Clinical Decision Support Systems (CDSS) play a pivotal role in modern healthcare by assisting clinicians in making informed decisions. However, traditional CDSS often rely on static rules or limited knowledge bases, which can hinder adaptability and limit clinical relevance. This paper explores the integration of vector-based Retrieval-Augmented Generation (RAG) into CDSS to enhance their contextual understanding, scalability, and responsiveness. By leveraging dense vector representations and large language models, RAG enables dynamic retrieval of relevant clinical information from extensive medical literature, guidelines, and patient records. We demonstrate how vector-based RAG improves the quality and accuracy of decision support outputs by grounding generated content in up-to-date and context-specific data. The proposed approach shows promise in reducing diagnostic errors, improving treatment recommendations, and augmenting clinician workflow efficiency. This research underscores the potential of RAG-powered CDSS to serve as more intelligent, interpretable, and data-aware tools in clinical environments*

Keywords: AI Fitness Assistant, Lang Flow, Astra DB, Personalized Health, Workout Planning, Nutrition Management

