RAG-Augmented LLM Recommendations for UNC Freshman Housing Selection

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Why did we choose this idea? Let's see!

#1

Existing tools list amenities, but don't interpret personal preferences

#2

Reviews on Reddit, YouTube tours, and housing pages are inconsistent and hard to compare

#3

Students often don't know what they value until they experience dorm life, especially in their first year and everything is new to them

#4

Many freshmen feel under-informed before housing selection, increasing uncertainty and stress during the transition.

#5

Students often struggle to compare dorms because features like vibe, noise levels, or community atmosphere are subjective and not captured in official descriptions

#6

Housing decision is multidimensional (location, social environment, room style, walkability, cost), and AI helps simplify this complexity by turning ambiguous, natural-language goals into clear recommendations.

System, Tech Stack Overview, and Timeline: How did we bring this idea to life?

React, Python, CSS, HTML, JS, Google Gemini

Curated JSON Dorm Dataset (room type, location, pros and cons, walkability, social atmosphere, amenities)

Identified Freshman Pain Points (scattered info, unclear dorm differences, no personalized guidance)

RAG AI Framework → enhanced Gemini with UNC-specific dorm data for grounded recommendations.

Convert vague student preferences into personalized grounded recommendations

Analyzed performance through factual queries, preference profiles, and multi-turn dialogues

Implemented LLM-driven preference matching (prompt templates, constraint satisfaction, ranking logic)

Additional features to improve the user experience with the chatbot (saved chat history, keyword search, crafted frq prompts)

What did we learn and how would we expand on this idea?

PRESENTATION

Building this system showed how combining our curated dorm dataset with a RAG-based AI framework allowed Gemini to specialize to the UNC housing niche, enabling it to interpret vague student preferences and translate them into grounded, attribute-based recommendations that reflect real differences between residence halls.

INVESTORS

Through testing and iterating on retrieval, prompt structure, and dataset organization, we gained insight into how AI handles subjective or ambiguous housing preferences, revealing strong contextual reasoning when information is well-defined, but also highlighting sensitivity to missing attributes and subtle phrasing changes.

VALUE

This project revealed clear opportunities for expansion, including scaling the RAG dataset to support additional universities, integrating safety-focused information like well-lit paths and nearby emergency resources, and extending the system to off-campus apartments to create a comprehensive, personalized living-decision assistant for students.