



UVA AI Course Assistant

CS 4774 Final Project

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BACKGROUND

Course information is spread over many sites, including SIS, CourseForum, RateMyProfessor, and HoosList



A colorful illustration of a young person with dark hair, wearing a white and yellow striped shirt and brown pants, sitting cross-legged on a stack of four books. They are holding an open yellow book and looking surprised or excited. The books are stacked horizontally, with the top one being yellow and the others having red, blue, and orange spines. The background is light beige with abstract shapes like a large white cloud and a green circle with radiating lines. There are also small blue star-like sparkles.

MOTIVATIONS

MOTIVATIONS



CONSOLIDATE

Consolidate course information with an AI assistant that interacts naturally with users



ACCESS

CS students have to go out of their way to get advising and on some occasions aren't able to



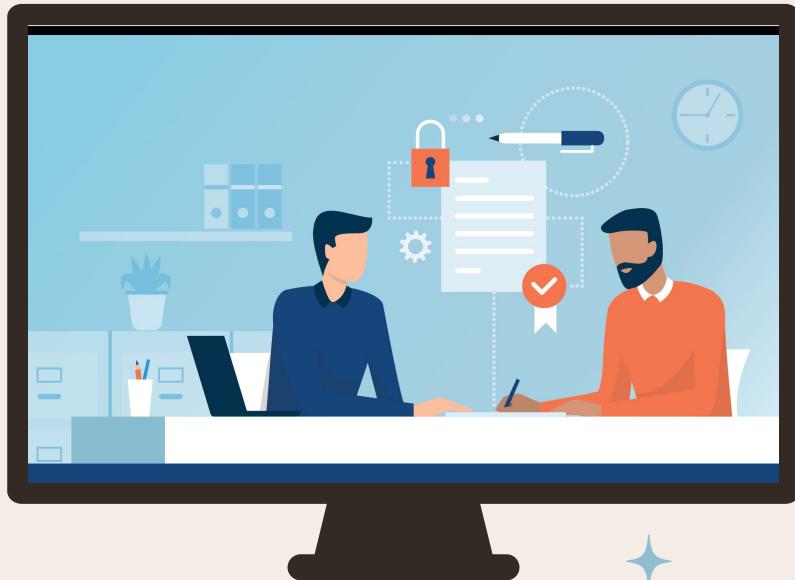
RELIEF

Provide relief for advisors who are very busy

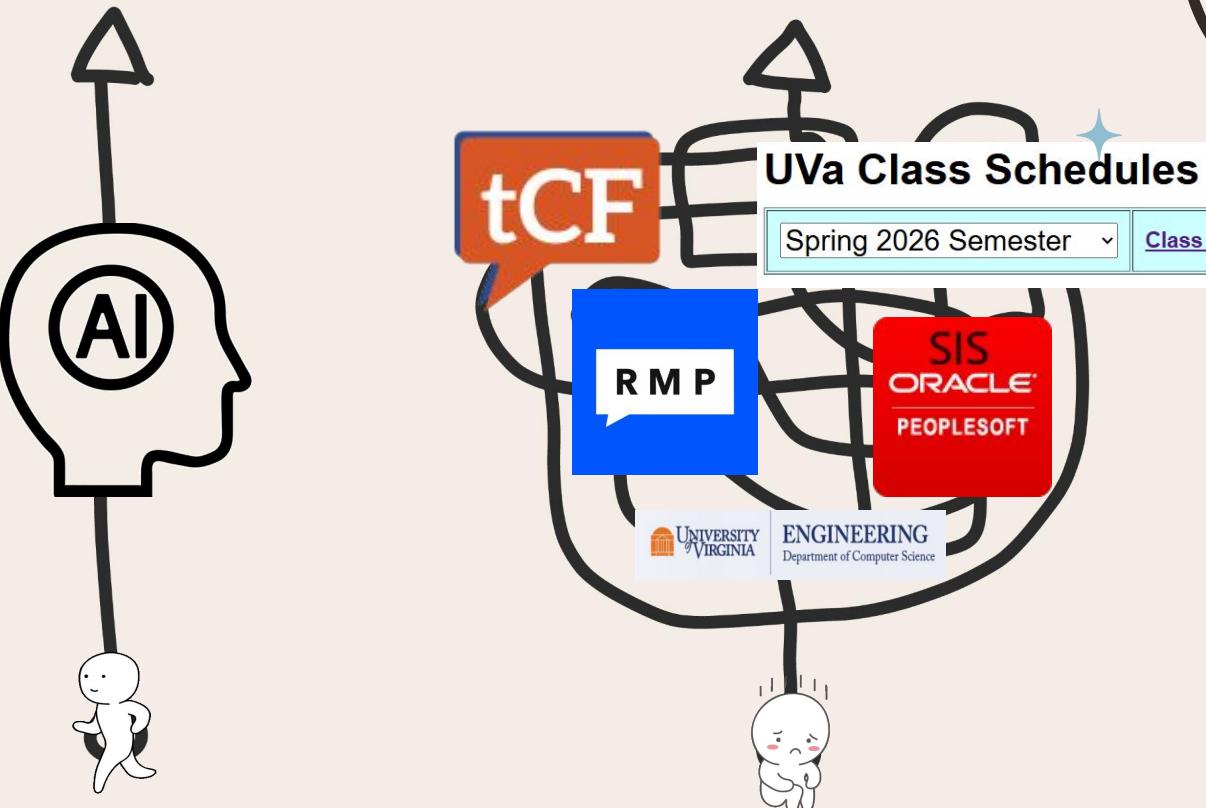


CLAIM

We created an AI
assistant that will help
with planning courses



WHY CLAIM - INTUITIVE FIGURE



PROPOSED SOLUTION

ADVISING

Friendly, personalized, one-on-one, 24/7 accurate advising with memory

RECOMMENDATIONS

Look at user's degree progress and provide course recommendations



SCENARIOS

Ability to plan out different scenarios for the remainder of semesters or potential majors/minors

SCHEDULING

Ability to build different schedules to easily compare and contrast



IMPLEMENTATION



Gemini 2.5 flash implementation

Project SIS API:

<https://s23.cs3240.org/sis-api.html>



DATA SUMMARY



Hoos' List

SIS / Hoos List

Future Courses
Course Information

DATA SUMMARY



COURSE WEBSITES

Instructor Reviews

Course Reviews

SIS

Purpose: Gather information on courses offered next semester

Data Collected: Course sections, instructors, dates/times, enrollment data, etc.

Data Normalization:

- Collect course mnemonics and catalog numbers as a consistent form of course identification
- API flags: subject, catalog_nbr, instructor_name, units, etc.

Data Storage: Store in ChromaDB vector database

Challenges: SIS API was not able to access course descriptions and prerequisites



HOOSLIST

Hoos' List

Purpose: Gather course descriptions to supplement SIS,

Data Collected: Course descriptions + course prerequisites, via HoosList API

Data Normalization:

- Splits up description and prerequisites, caching the data following the established organization method using subject + catalog number

Data Storage: Merged into vector database





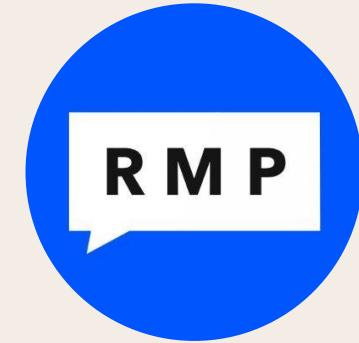
RATE MY PROFESSOR

Purpose: Gather student sentiment and feedback on instructors

Source: RMP's internal GraphQL API

Data Collected:

- Professor data: professor names, overall rating, number of ratings
- Review data: course identifier, reviews, per-review metrics, date of review



Data Normalization:

- Strictly enforce UVA course format
- Filter out ambiguous course labels
- Remove duplicated professor course pairings

Data Storage:

- Cached professor list in JSON file
- Cached reviews incrementally in JSONL file

Challenges:

- Inputs were free text (course names)
- RMP API has a rate limit, often causing timeouts
- Raw student reviews are long and noisy

Reviews were summarized prior to inputting into Gemini LLM





THE COURSEFORUM

Purpose: Gather student sentiment and feedback on instructors and courses

Data Collected:

- Web scraping: per course, per instructor reviews
 - Rating, difficulty, GPA, student reviews
- API: historical course data
 - Average rating, instructor, enjoyability, recommendability, difficulty, workload hours/week, grade distributions



Data Normalization:

- Instructor Review Statistics: Scrape all available past data and match up to next semester's instructors during indexing, so reviews don't get accidentally shared when data is missing
- Student Reviews: Scrape only data from CS, STAT, MATH, STS, DS classes to match data collected from HoosList, limited scope for current implementation

Data Storage:

- Student reviews cached in JSON file
- Other data is merged with SIS data in vector database

Challenges:

- TCF API is extremely limited for instructors, unable to access their statistics and reviews
- Figuring out how to handle missing data

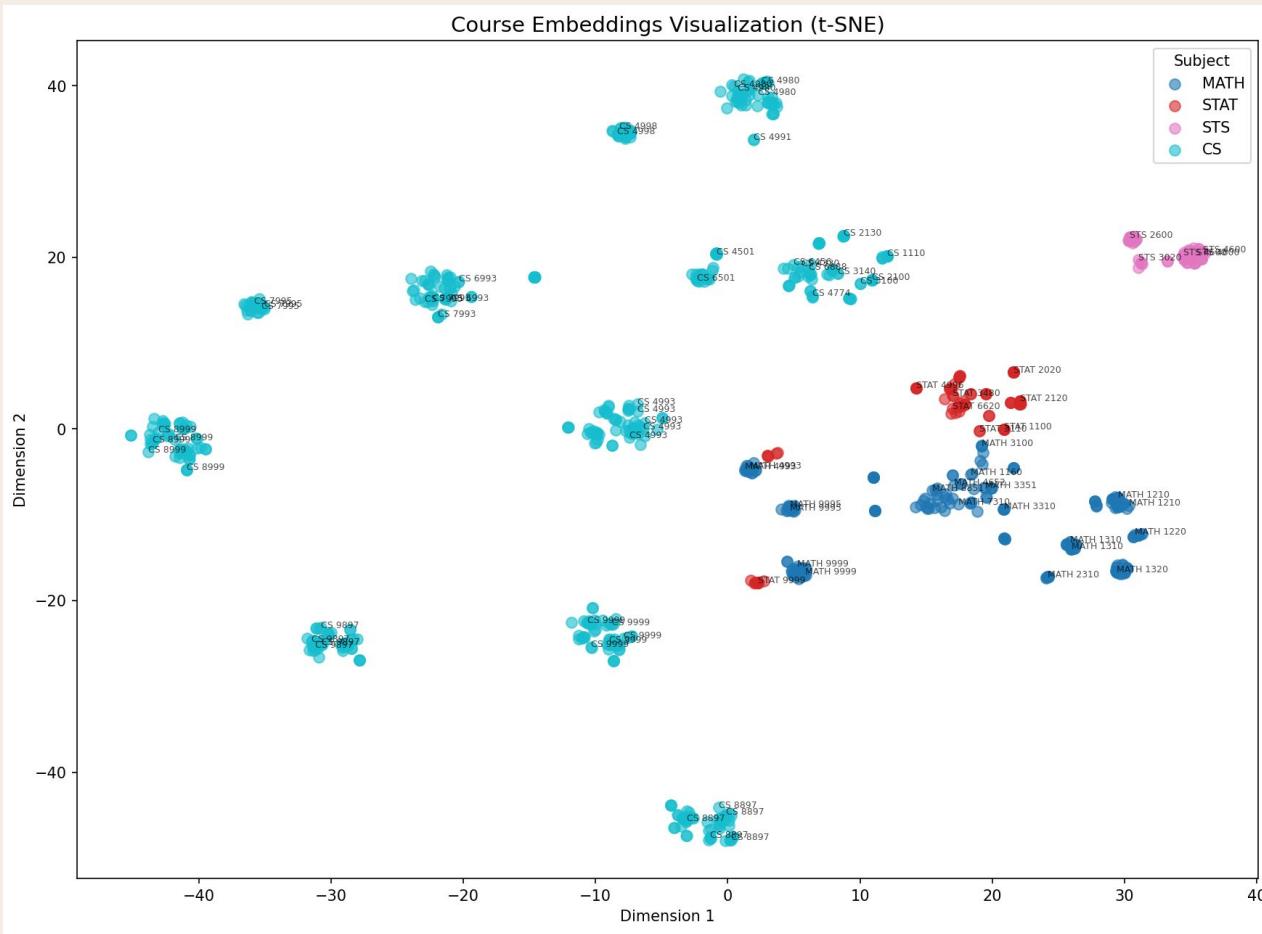


RESULTS



VIDEO





RESULTS - CHAT

HoosAdvisor
Ask me anything about UVA courses!

I want to take a fun CS course next semester, that is not too early in the morning. Can you give me three recommendations?

Here are three recommendations for fun CS courses that are not too early in the morning:

Course Number: CS 4730: Computer Game Design

- Credits: 3
- Course Description: This course will introduce students to the concepts and tools used in the development of modern 2-D and 3-D real-time interactive computer video games. Topics covered in this include graphics, parallel processing, human-computer interaction, networking, artificial intelligence, and software engineering.
- Prerequisites: CS 2150 or CS 3140 with a grade of C- or better

Course Sections and Instructors

Main Course Sections:

- Section 1
 - Days: MoWeFr
 - Time: 10:00 AM – 10:50 AM
 - Instructor: Robbie Hott

Instructor Reviews

- Robbie Hott:
 - Rating: 3.67/5
 - Difficulty: 3.00/5
 - Student reviews: Students find Professor Hott to be a great professor who teaches material well and gives assignments that reinforce understanding. Some reviews describe the course as being "barely an elective," which might imply it's a more accessible option.

Course Number: CS 4501: Special Topics in Computer Science

Ask about courses, prerequisites, professors... Send

HoosAdvisor
Ask me anything about UVA courses!

Can you give me a summary about the differences in Applied Linear Algebra vs Elementary Linear Algebra in terms of difficulty and instructors?

Here's a summary of the differences between Applied Linear Algebra (MATH 3350) and Elementary Linear Algebra (MATH 3351) in terms of difficulty and instructors:

MATH 3350: Applied Linear Algebra

- **Difficulty:** Based on instructor reviews, Daniel James's sections are rated with a Difficulty of 5.0/5. This suggests the course can be challenging, but his high ratings for Clarity and Helpfulness indicate he teaches the material effectively.
- **Instructors:** Daniel James is the instructor for both sections offered. He has received overwhelmingly positive reviews, with students highlighting his clarity, helpfulness, and overall passion for teaching.

MATH 3351: Elementary Linear Algebra

- **Difficulty:** The difficulty ratings for instructors in MATH 3351 vary. Julie Bergner has a Difficulty rating of 3.0/5, while Bakhyt Aitzhanova has a Difficulty rating of 3.0/5. This suggests a moderate level of difficulty.
- **Instructors:**
 - Julie Bergner: Has ratings of 2.0/5 for Clarity and Helpfulness. Reviews suggest she is prepared and organized, but it can be difficult to track progress in her class.
 - Bakhyt Aitzhanova: Has ratings of 4.5/5 for Clarity and Helpfulness, with a 100% "Would Take Again" rate. Students found her motivating and that she made the subject seem easy.

Summary of Differences:

- **Focus:** MATH 3350 is application-oriented and uses computer software, while MATH 3351 is more theory-focused with abstract arguments.
- **Instructor Reviews:** Daniel James in MATH 3350 has exceptionally high ratings across the board. In MATH 3351, Bakhyt Aitzhanova also has very strong reviews, while Julie Bergner's reviews are more mixed.
- **Difficulty Perception:** While both are college-level math courses, the high

Ask about courses, prerequisites, professors... Send

RESULTS - COURSES

Course Browser

Subject Keyword Term

CS - Computer Science discrete math Spring 2026 Search

Found 4 course sections

CS 2120 3 credits
Discrete Mathematics and Theory 1
Sarah Elder
MoWeFr 10:00 AM - 10:50 AM ***
✓ 22 seats open + Add

CS 2120 3 credits
Discrete Mathematics and Theory 1
Aidan San
MoWeFr 1:00 PM - 1:50 PM ***
✓ 68 seats open + Add

CS 3120 3 credits
Discrete Mathematics and Theory 2
Raymond Pettit
TuTh 2:00 PM - 3:15 PM ***
✗ Full (14 waitlist) + Add

CS 3120 3 credits
Discrete Mathematics and Theory 2
Wei-Kai Lin
TuTh 9:30 AM - 10:45 AM ***
✓ 77 seats open + Add

Course Browser

Subject Keyword Term

CS - Computer Science 3120 Spring 2026 Search

Found 2 course sections

CS 3120 3 credits
Discrete Mathematics and Theory 2
Raymond Pettit
TuTh 2:00 PM - 3:15 PM ***
✗ Full (14 waitlist) + Add

CS 3120 ✓ Added
Discrete Mathematics and Theory 2
Wei-Kai Lin
TuTh 9:30 AM - 10:45 AM ***
✓ 77 seats open × Remove

My Schedule

Clear All

Enrolled Courses (5)

CS 3120

Discrete Mathematics and Theory 2

TuTh 9:30 AM – 10:45 AM

Remove

CS 3710

Introduction to Cybersecurity

MoWeFr 10:00 AM – 10:50 AM

Remove

MATH 3354

Survey of Algebra

MoWe 3:30 PM – 4:45 PM

Remove

DS 3021

Analytics I: Foundations of Machine Learning

TuTh 3:30 PM – 4:45 PM

Remove

CS 3205

HCI in Software Development

TuTh 2:00 PM – 3:15 PM

Remove

RESULTS - SCHEDULE

Weekly View

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM					
9:00 AM		CS 3120 9:30 AM – 10:45 AM		CS 3120 9:30 AM – 10:45 AM	
10:00 AM	CS 3710 10:00 AM – 10:50 AM		CS 3710 10:00 AM – 10:50 AM		CS 3710 10:00 AM – 10:50 AM
11:00 AM					
12:00 PM					
1:00 PM					
2:00 PM		CS 3205 2:00 PM – 3:15 PM		CS 3205 2:00 PM – 3:15 PM	
3:00 PM	MATH 3354 3:30 PM – 4:45 PM	DS 3021 3:30 PM – 4:45 PM	MATH 3354 3:30 PM – 4:45 PM	DS 3021 3:30 PM – 4:45 PM	

RESULTS - MEMORY

The screenshot shows a dark-themed AI chatbot interface named "HoosAdvisor". At the top, it says "Ask me anything about UVA courses!" Below the input field, a user asks "Which professors are teaching DMT2 next semester?". The bot responds with a list of professors teaching CS 3120: Raymond Pettit and Wei-Kai Lin. Then, the user asks "How are Pettit's reviews?", and the bot provides instructor reviews for Raymond Pettit, detailing his teaching style and student reviews.

HoosAdvisor
Ask me anything about UVA courses!

Which professors are teaching DMT2 next semester?

Here are the professors teaching CS 3120 (Discrete Mathematics and Theory 2) next semester:

- Raymond Pettit
- Wei-Kai Lin

How are Pettit's reviews?

Here are the reviews for Professor Raymond Pettit:

Instructor Reviews

- Raymond Pettit:
 - Clarity: 4.6/5
 - Helpful: 4.6/5
 - Difficulty: 2.4/5
 - Would Take Again: 100%

◦ **Student reviews:** Students generally find him to be an excellent professor who is knowledgeable about algorithms. While some note that algorithms can be inherently difficult, his teaching style is well-regarded, and the difficulty rating suggests the material is manageable.

Ask about courses, prerequisites, professors... Send

My Schedule

The screenshot shows a dark-themed mobile application interface for managing a schedule. At the top, there is a red "Clear All" button. Below it, a section titled "Enrolled Courses (5)" lists five courses:

- CS 3120**: Discrete Mathematics and Theory 2. Meets TuTh from 9:30 AM to 10:45 AM.
- MATH 3354**: Survey of Algebra. Meets MoWeFr from 3:30 PM to 4:45 PM.
- DS 3021**: Analytics I: Foundations of Machine Learning. Meets TuTh from 3:30 PM to 4:45 PM.
- CS 3205**: HCI in Software Development. Meets TuTh from 2:00 PM to 3:15 PM.
- CS 3710**: Introduction to Cybersecurity. Meets MoWeFr from 10:00 AM to 10:50 AM.

Each course card includes a "Remove" button at the bottom right.

This screenshot shows a conversation with the HoosAdvisor AI. The user asks, "hey what classes am I enrolled in?". The AI responds with a list of the user's enrolled courses:

Here are the courses you are currently enrolled in:

- **CS 3120: Discrete Mathematics and Theory 2**
 - Instructor: Wei-Kai Lin
 - Meeting Time: TuTh 9:30 AM – 10:45 AM
- **MATH 3354: Survey of Algebra**
 - Instructor: Pavel Coupek
 - Meeting Time: MoWe 3:30 PM – 4:45 PM
- **DS 3021: Analytics I: Foundations of Machine Learning**
 - Instructor: Terence Johnson
 - Meeting Time: TuTh 3:30 PM – 4:45 PM
- **CS 3205: HCI in Software Development**
 - Instructor: Panagiotis Apostolellis
 - Meeting Time: TuTh 2:00 PM – 3:15 PM
- **CS 3710: Introduction to Cybersecurity**
 - Instructor: Angela Orebaugh
 - Meeting Time: MoWeFr 10:00 AM – 10:50 AM

At the bottom, there is a text input field with placeholder text "Ask about courses, prerequisites, professors..." and a blue "Send" button.

RESULTS - SCHEDULE MEMORY

This screenshot shows a detailed view of the course CS 3710: Introduction to Cybersecurity. At the top, there is a "HoosAdvisor" header with the sub-instruction "Ask me anything about UVA courses!" and a "tell me about the cyber class I'm enrolled in" button.

Course Number: CS 3710: Introduction to Cybersecurity

- Credits: 3
- Course Description: This course provides an introduction to the fundamental concepts and principles of cybersecurity. Topics include threats, vulnerabilities, risk management, cryptography, network security, and incident response.
- Prerequisites: CS 2100: Introduction to Computing (or equivalent)

Course Sections and Instructors

Main Course Sections:

- Section 1
 - Days: MoWeFr
 - Time: 10:00 AM–10:50 AM
 - Instructor: Angela Orebaugh

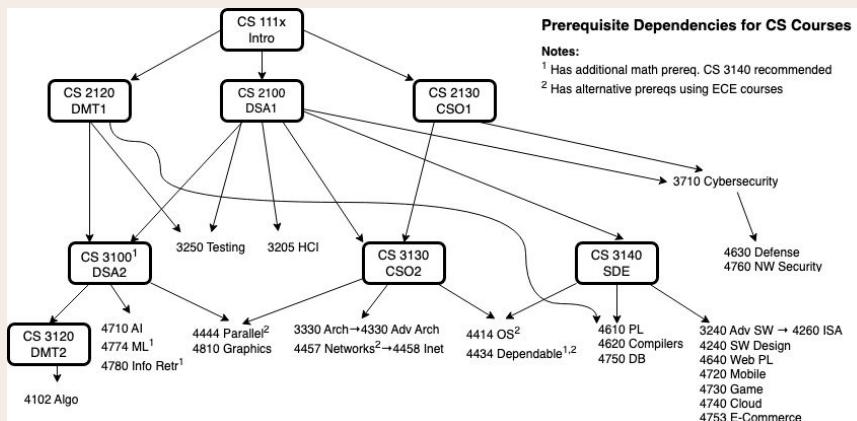
Instructor Reviews

- Angela Orebaugh:
 - Rating: 4.4/5
 - Difficulty: 3.2/5
 - Avg GPA: 3.34
 - Student reviews: Students find Angela Orebaugh to be a knowledgeable and engaging instructor who explains complex topics clearly. They appreciate her passion for cybersecurity and her willingness to help students. Some students mention that the course can be challenging but is rewarding.

At the bottom, there is a text input field with placeholder text "Ask about courses, prerequisites, professors..." and a blue "Send" button.

LIMITATIONS

Decision Tree - Not all that useful to create a graph that shows prerequisites when it's easier for user to just output in chatbox.



Course data scope is limited to next semester's courses

Did not set up UVA user login for direct access to a user's past courses, degree progress, etc.

Did not set up information for summer courses at other colleges

CHALLENGES

CHALLENGE

Indexing the vector database from live data sources was time-consuming and slowed development and testing

CHALLENGE

Hallucinations, giving too much information, formatting issues

SOLUTION

Implemented local caches of preprocessed course and review data

SOLUTION

Prompt engineering: markdown templates, explicit instructions to DO or DO NOT do actions, define follow ups



CHALLENGES

CHALLENGE

Getting AI Assistant to retain memory

CHALLENGE

Data normalization: how to store and combine data from multiple sources

SOLUTION

Added genai.ChatSession for model to remember information from the current session

SOLUTION

Creating an overarching document_builder.py for merging multiple data sources in indexing



THANKS!

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