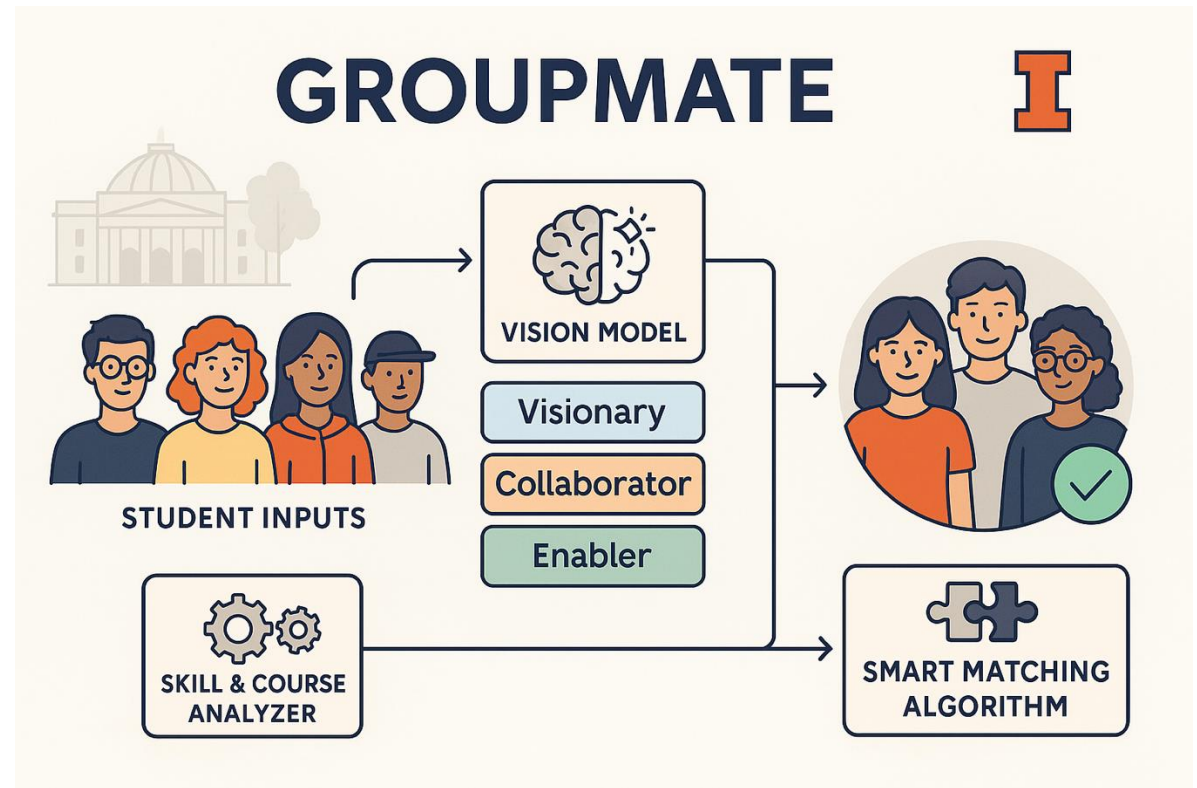


# GroupMate

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# Introduction & Motivation

**Problem:** Traditional team formation (manual or self-selected) often leads to mismatched skills, low motivation, and inefficient collaboration.

**Motivation:** Instructors spend hours forming teams, and students often end up in groups driven by convenience—not compatibility.

**Our Solution:** GroupMate

- Passion alignment (from vision essays)
- Skill complementarity
- Course and project history

**Key Features:**

- Fine-tuned transformer model to score student engagement
- Role-aware categorization: Visionary, Collaborator, Enabler
- LLM-powered skill inference and project matching

# Vision Scoring Model

What makes a great team?



Visionary  
forward-thinking,  
original ideas



Collaborator  
bridge between  
ideas & skills



Enabler  
strong  
implementers

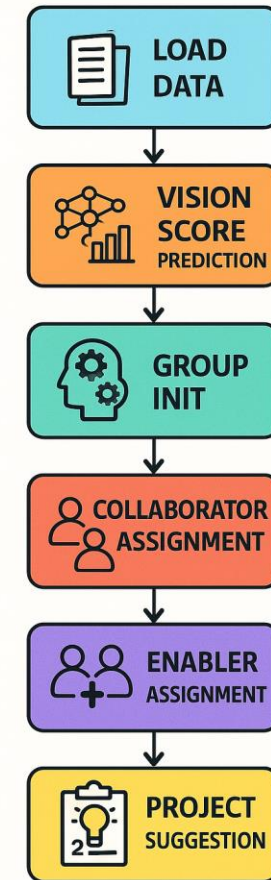
# Quantifying a visionary idea

- LLMs?
  - Inconsistency and Non-Determinism
  - Lack of Domain Sensitivity
  - Surface-Level Understanding of Novelty
- Our approach: Finetuned SciBERT Model
  - Trained on 50k+ CS papers in arxiv (2023+)
  - Heuristics:
    - Semantic Distance: how original the topic is
    - Categorical Entropy: interdisciplinary depth via author history
    - Lexical Similarity: trend alignment via TF-IDF



# Group Formation Algorithm

- **Tiering:**  
`students_sorted ← sort_desc(students, by=score)`  
split into Visionaries, Collaborators and Enablers.
- **Group Initialization:**  
one Visionary per group; track `current_skills` + empty `needed_skills`.
- **Skill inference:**  
`picks ← llm.select_skills(essays, total_skills, k=5-7)`  
ensures each group targets complementary skills.
- **Collaborator assignment:**  
round-robin over groups; match on skill gaps, then fill smallest if needed.
- **Enabler fill:**  
sort groups by size; fill the smaller teams to balance out numbers.
- **Project suggestion:**  
`g.projects ← llm.suggest_projects(essays, skills, k=2)`  
two custom ideas per group.



# Evaluation & Results (vision scoring)

Student ID	Model Label	Suggested Label	✓/✗	Justification
stu_3000	Visionary	Visionary	✓	Proposes an original “Contextualizer” system to combat dis-information using semantic AI; highly interdisciplinary and forward-thinking.
stu_3001	Collaborator	Collaborator	✓	Proposes a cultural context-aware translator; while innovative, it’s more an application of existing ideas with moderate novelty.
stu_3002	Enabler	Enabler	✓	Practical AI assistant for healthcare documentation; domain-specific, implementation-focused rather than novel.
stu_3003	Enabler	Enabler	✓	“Personal Knowledge Curator” is useful but mainly a productivity tool that assembles known concepts; does not propose frontier innovation.
stu_3004	Collaborator	Collaborator	✓	Focuses on AI-powered productivity and personal organization; bridges existing technologies for daily use.
stu_3005	Visionary	Visionary	✓	Invents an immersive VR/AR knowledge universe (IKU); highly original and interdisciplinary, transforming how humans interact with knowledge.
stu_3006	Collaborator	Collaborator	✓	Designs an AI “Data Life Optimizer” to filter noise and manage time; a supportive assistant, not fundamentally novel.
stu_3007	Collaborator	Collaborator	✓	Proposes immersive cognition systems; while conceptually ambitious, the framing lacks specificity or technical feasibility for visionary classification.
stu_3008	Enabler	<b>Visionary</b>	✗	Invents an emotional feedback navigator blending psychology and AI; highly novel and crosses into new affective computing territory.
stu_3009	Collaborator	Collaborator	✓	Real-time AR + AI analytics in sports is a compelling application but firmly domain-specific, hence collaborative not visionary.
stu_3010	Visionary	Visionary	✓	Introduces a general-purpose AI situational assistant for optimized decision-making across domains; broad, impactful vision with interdisciplinary flavor.
stu_3011	Enabler	<b>Collaborator</b>	✗	Suggests improving how information is filtered and delivered based on goals and cognition; not novel enough for Visionary, not narrow enough for Enabler.
stu_3012	Visionary	Visionary	✓	Proposes AR MindSpace for cognitive augmentation through visualized overlays; visionary use of AR and LLMs for knowledge interaction.

# Evaluation & Results (group matching)

**Tested on 13 students with fake PII info & real vision essays from CS510 textdata**

## ***Greedy Approach***

- Focused on maximizing pairwise similarity using fixed weights (80% vision, 10% skill, 10% course diversity).
- Formed 4 strong, thematically aligned teams but left 1 student ungrouped.
- Best at clustering clearly similar visions, but less flexible with outliers or unique profiles.

## ***LLM-Based Grouping***

- Used semantic understanding to form 4 balanced teams based on essay content, skillset, and course history.
- No ungrouped students. Captured interdisciplinary themes and latent connections across essays.
- Weaker in strict similarity metrics, but stronger in creative and contextual group fit.

## ***Our Method: GroupMate Optimized Matching (GOM)***

- Combines the structure of greedy matching with LLM-informed scoring and role-aware classification (Visionary / Collaborator / Enabler).
- Balanced team size, high thematic alignment, and strong skill coverage across all groups.
- Avoids outliers, supports role diversity, and encourages both passion and feasibility.

# Implementation

- Implemented as a web-application that can be used across courses
- Authentication and Authorization pipeline uses Django authentication system
- API-driven for clear distinction of operations

Group Mate	
<div>+ Create Course</div> <div>View Courses</div>	<div>Course Key</div> <div>View Class Members</div> <div>View Class Feed</div> <div>Run team generator</div>
Username	Name
stu_3000	Megan Chang
stu_3001	James Patel
stu_3002	Olivia Smith
stu_3003	Liam Lee
stu_3004	Emma Brown
stu_3005	Noah Kim
stu_3006	Sophia Garcia
stu_3007	Aiden Davis
stu_3008	Isabella Martinez
stu_3009	Lucas Taylor
stu_3010	Mia Nguyen
stu_3011	Ethan Wilson
stu_3012	Avery Anderson

## Instructor View

Group Mate

Join class

View Courses

Add Details

View Team Members

View Class Members

Class Feed

Megan Chang (stu\_3000)

Today we are bombarded with information but many of us are not truly informed on many topics. We get our news based on attention-grabbing headlines with small snippets of what is going on, and this kind of environment is flooded with disinformation. The core challenge isn't accessing information, it's the ability to meaningfully inform oneself, to construct a coherent picture from the fragmented digital landscape. Imagine a tool designed to address this: The Contextualizer. Instead of a search engine, it is a sense-making engine. Using conversational and semantic AI, it grasps intent, detects bias, and understands the historical and societal context surrounding any piece of information to provide a holistic and nuanced perspective on any topic. When presented with a news headline, a viral social media post, or a complex policy document, the Contextualizer assesses the reliability of the source, tracing its origins, identifying potential biases, and evaluating its track record for accuracy. Simultaneously, it reconstructs the timeline of the event or issue, placing it within a broader framework of the present situation. The Contextualizer does not present a single, definitive truth but instead gathers and summarizes a range of perspectives. The Contextualizer is not intended to replace, but instead enhance critical thinking, serving as a powerful tool in the information age. By providing context, revealing biases, and presenting multiple perspectives, it enables users to cut through the noise and distinguish between information and disinformation. #vision #intelligentagent

ANNs   microcontroller programming   interface design   eigenvalue problems   network theory   Advanced Operating Systems   Adv Competitive Algorithm Prog   Software Design Lab

Stat Reinforcement Learning   Advanced Data Management

James Patel (stu\_3001)

#productivity #vision #othertool Cultural misunderstandings has been a problem although technology advances in translation and communication. The real challenge lies not in translating words, but also in the complex web of cultural contexts, unspoken assumptions, and emotional resonances, which shape how people from different backgrounds perceive and interpret the world. Therefore, I would imagine a deep culture translator goes beyond simple translation to facilitate true cross-cultural understanding. It would be able to analyze patterns of thought, communication styles, and cultural frameworks across different societies. It would create a dynamic model of how concepts, emotions, and social interactions are understood and expressed in different cultural contexts.

statistics   benchmarking   automata   digital ethics   information retrieval   Discrete Structures   Deep Learning for Compt Visn   Social Spaces   Iterative & Multigrid Methods

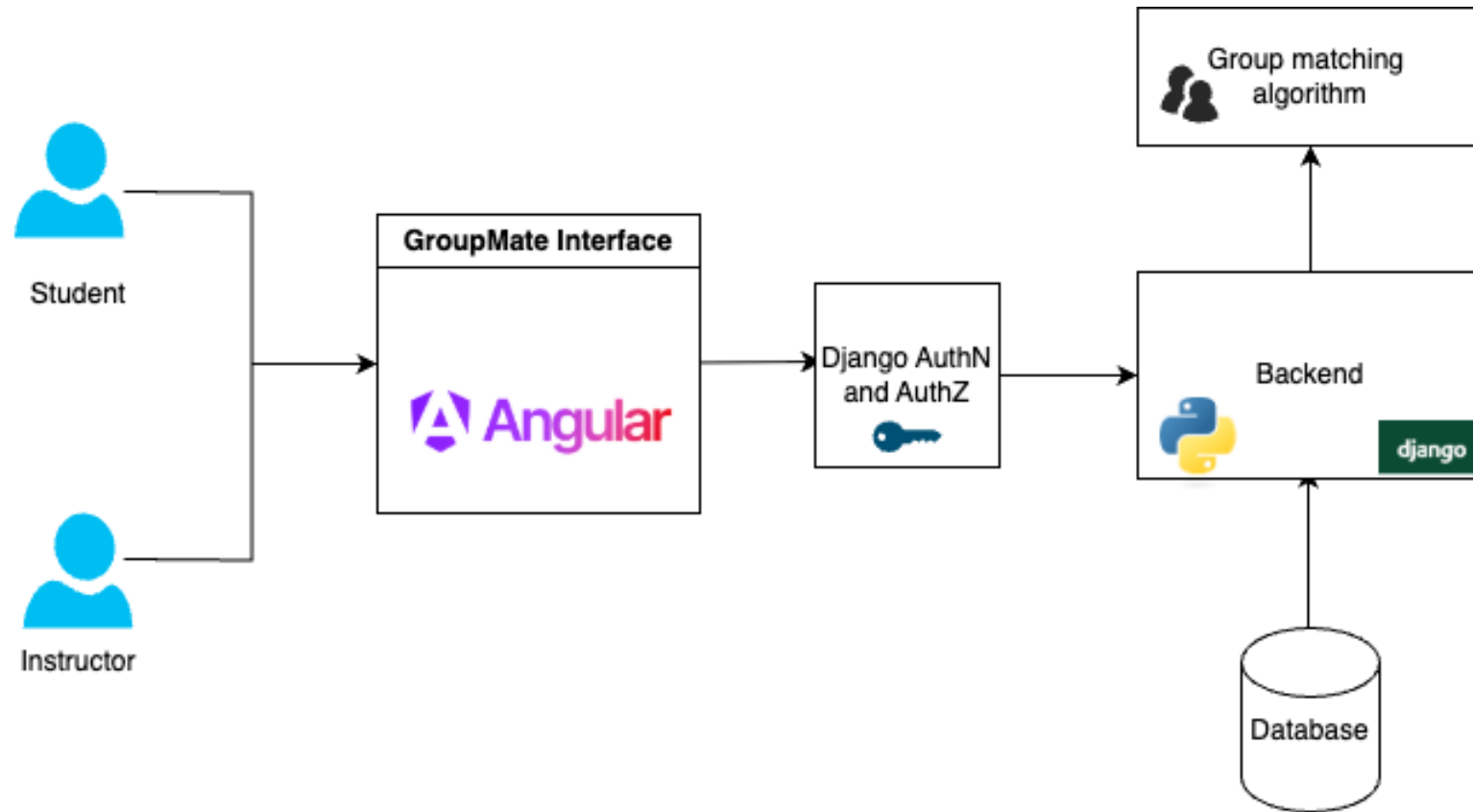
Olivia Smith (stu\_3002)

Every day, doctors and nurses spend hours writing patient notes, searching medical records, and keeping up with new research. We can use an AI-powered assistant designed to ease this burden. It listens during patient visits, automatically generating accurate summaries and treatment suggestions based on medical history and the latest guidelines. Instead of spending late nights on paperwork, doctors can focus on patient care. It also highlights important research tailored to each physician's specialty, ensuring they never miss a breakthrough. With its seamless integration into hospitals and clinics, the agent turns overwhelming medical data into clear, actionable insights—helping doctors make faster, more informed decisions and improving healthcare for everyone. #vision #healthcare

## Student View



# Flow diagram




# Demonstration



## Login

Username:

Password:

 Login

[Register for Group Mate](#)

# Conclusion/ Future Work

## ***Future Work***

- We plan to incorporate additional inputs like resumes, GitHub links, and working style surveys to improve team matching accuracy.
- Future versions will gather student and instructor feedback to evaluate and refine LLM-generated project suggestions.
- We also aim to scale GroupMate to support multiple courses and enable dynamic regrouping during the semester.

## ***Conclusion***

- GroupMate intelligently forms balanced, passion-aligned teams by combining vision scoring, skill matching, and LLM-driven project analysis.
- It shows clear advantages over random assignment, greedy baselines, and fully LLM-based grouping methods.
- With broader data and real-world feedback, GroupMate has strong potential to enhance collaboration in classrooms at scale.