DataRoad

Motivation Approach Features Evaluation

AI-Powered Data Science Learning Platform

Transforming how Lebanese University students learn data science through intelligent AI assistance

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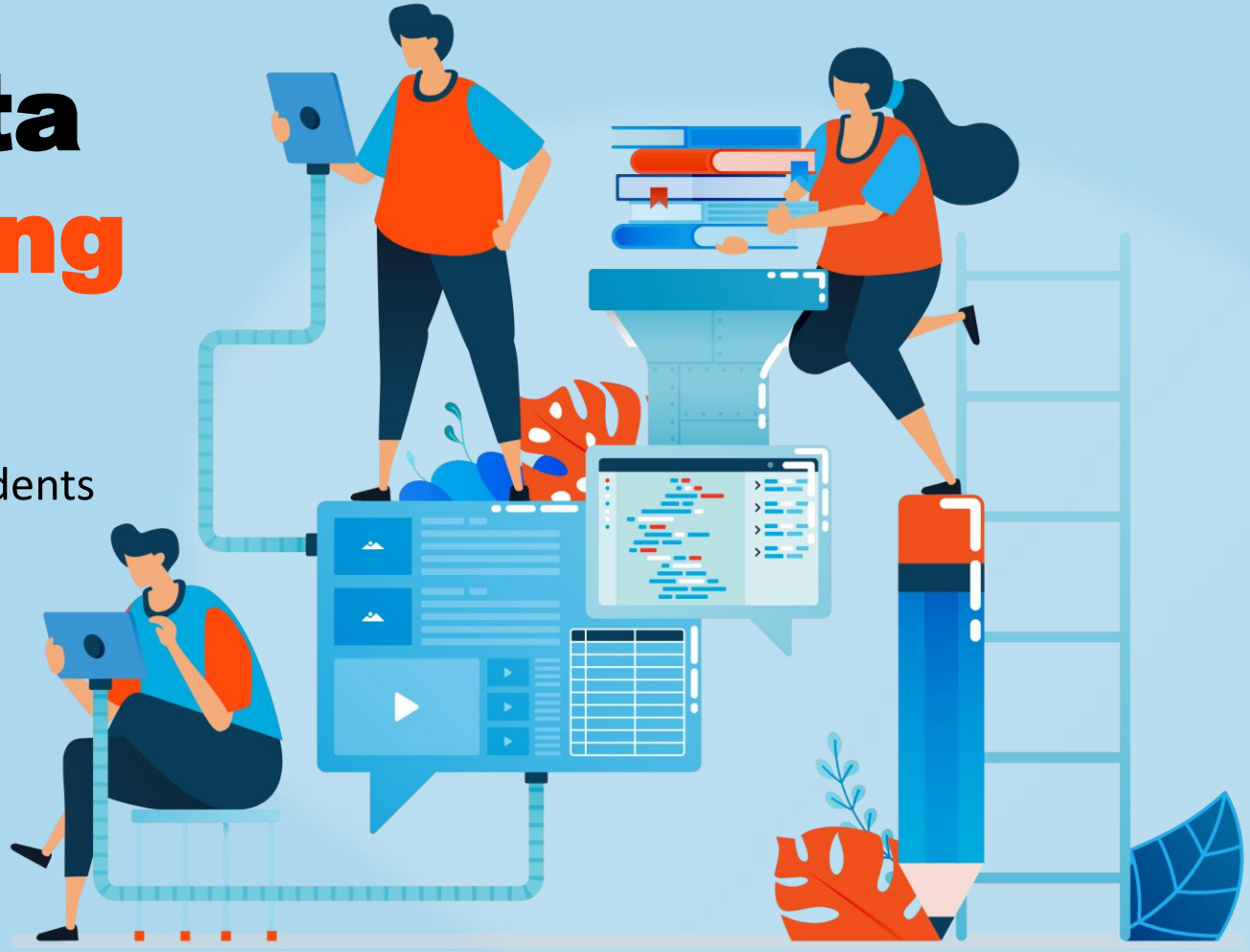


DataRoad

WHY?

Motivation

AI Dependency

- Students ask What's the answer? instead of How do I solve this?
- AI tools do their work rather than teaching them to think
- Students struggle when AI isn't available (exams, interviews, real work)

Disorganized Learning Materials

- Students spend hours searching for basic course materials
- No clear explanation of how courses connect in their learning journey
- Must create their own notes from scattered, unstructured PDFs

Inefficient Notes

- Students take photos of whiteboards but never look at them again
- Hours wasted retyping handwritten notes for assignments
- Blurry photos and bad lighting make notes unreadable later

Limited Learning Insights

- The need to understand student learning experiences
- Current feedback methods don't provide actionable improvement data
- Time-consuming to analyze and respond to student concerns effectively

AI Assistants

- Three specialized assistants for different learning needs
- Each designed to teach and guide, not provide direct answers
- Tutor, Orienter, and Searcher work together for complete support

AI Notes Converter

- Transform handwritten notes into polished digital documents
- Multi-agent system preserves math, diagrams, and formatting
- No more messy photos or manual retyping

HOW?

Approach

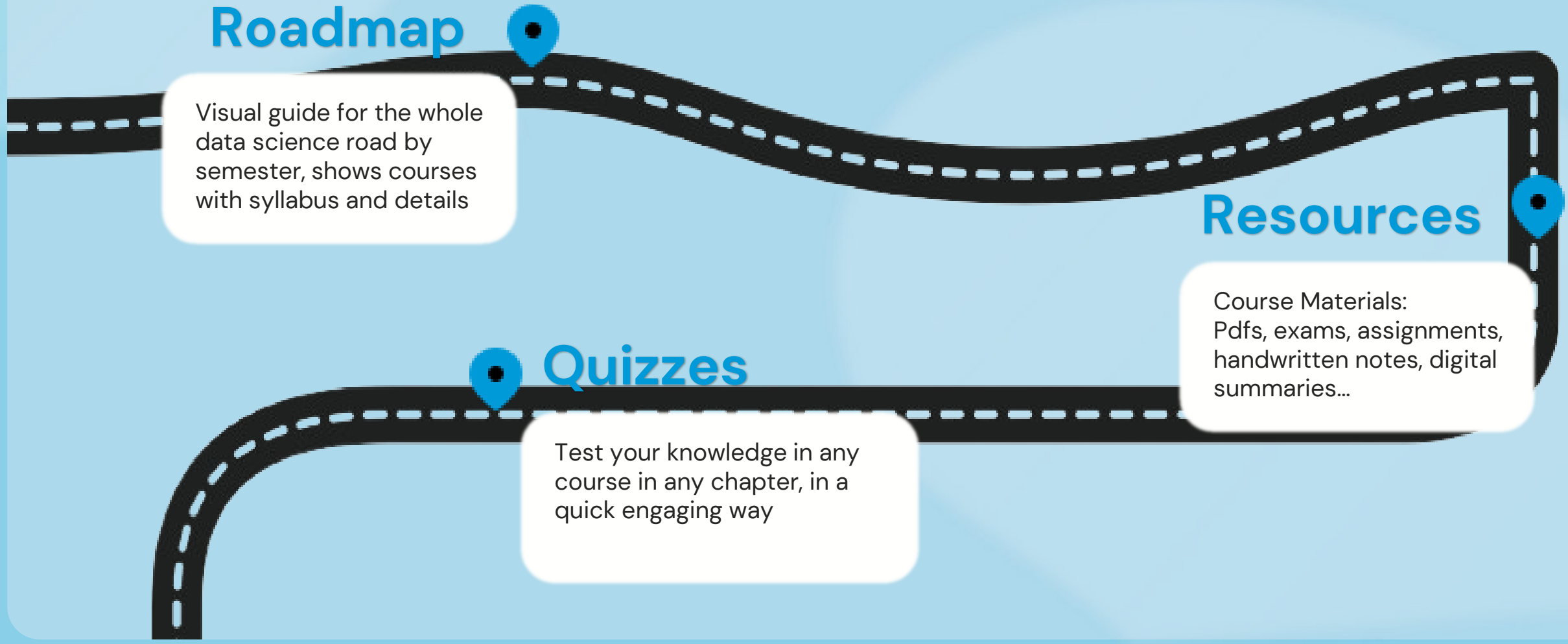
Organized Roadmap

- Complete LU Data Science curriculum in structured format
- Clear "Why" and "What" explanations for every course
- Resources, summaries, and AI-generated quizzes in one place

Admin Dashboard

- Real-time analysis of student feedback and satisfaction
- AI-generated improvement recommendations for courses
- Data-driven insights to enhance teaching effectiveness

01 Roadmap



Roadmap

Visual guide for the whole data science road by semester, shows courses with syllabus and details

Resources

Course Materials:
Pdfs, exams, assignments, handwritten notes, digital summaries...

Quizzes

Test your knowledge in any course in any chapter, in a quick engaging way

02 Notes Converter

02 Notes Converter
AI Agents Approach

Transforming Handwritten Notes to Digital Documents

Automated conversion of photos/whiteboard images into styled, interactive HTML documents

The Multi-Modal Challenge

Handwritten notes contain diverse elements: text, math equations, code snippets, tables, diagrams, and plots - all requiring different processing techniques for accurate digital conversion.

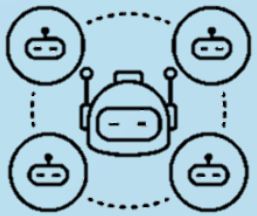
What are AI Agents?

Specialized AI systems working together autonomously

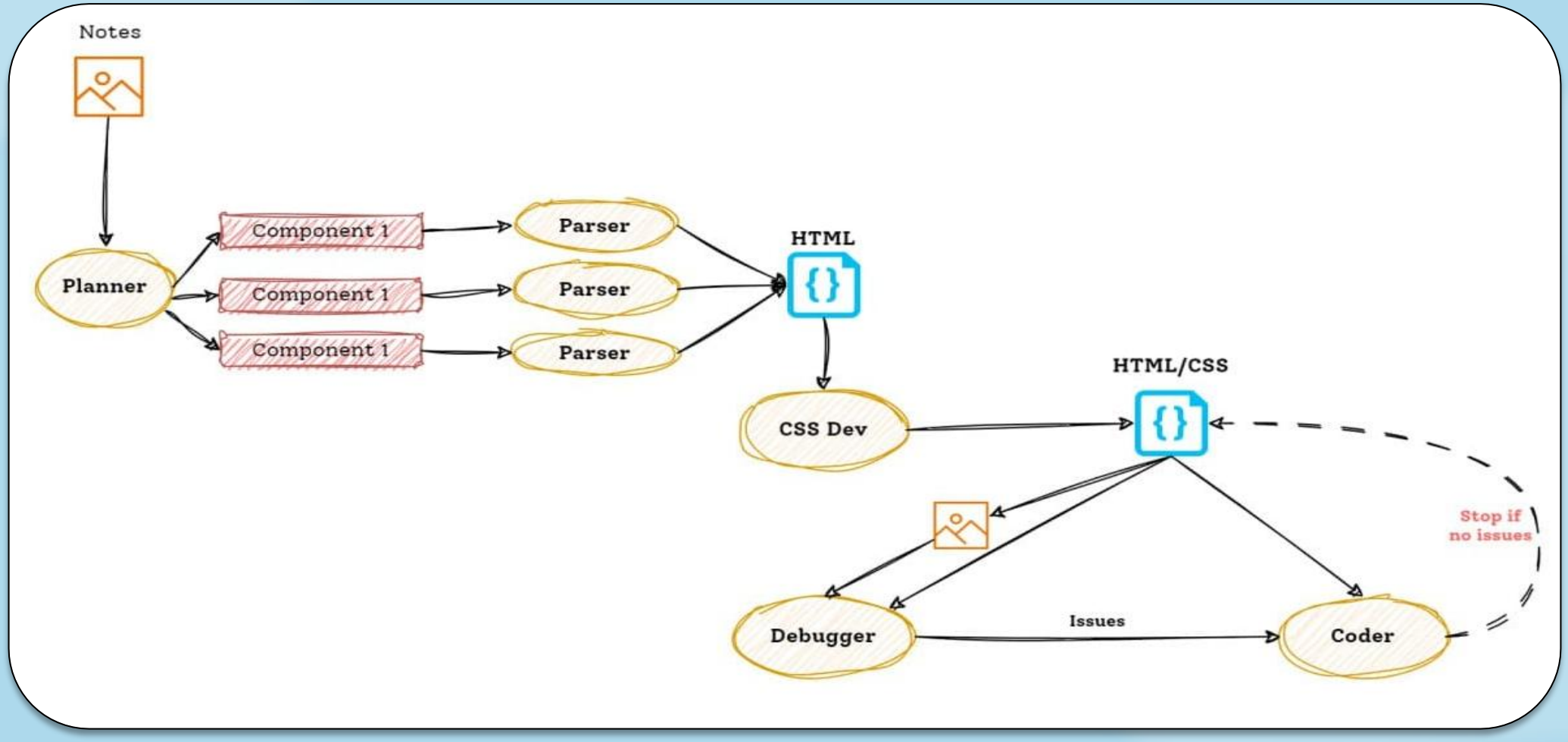
AI Agents are individual models designed for specific tasks that collaborate to execute complex workflows. Instead of one model handling everything, agents specialize in distinct capabilities and coordinate their efforts.

For notes conversion, this approach delivers superior results through:

- **Task Specialization:** Each agent masters one content type
- **Parallel Processing:** Multiple agents work simultaneously
- **Quality Control:** Dedicated debugging for clean output
- **Modular Design:** Easy to improve individual components



02 Notes Converter
Agentic System Architecture



03
AI Assistants

3 Specialized AI Assistants

Tutor Assistant
Focuses on interactive learning

Searcher Assistant
Helps research through scraping & processing documents

Orienter Assistant
Provides program guidance & FAQs

Built on Gemini 2.5 Flash Model

Why Gemini 2.5 Flash?

Multimodal understands text, images, documents…

Large context window handles long materials & conversations

Advanced reasoning executes complex prompts & tasks

Speed & efficiency great for near real-time experience

Cost-effective free-tier enables sustainable deployment

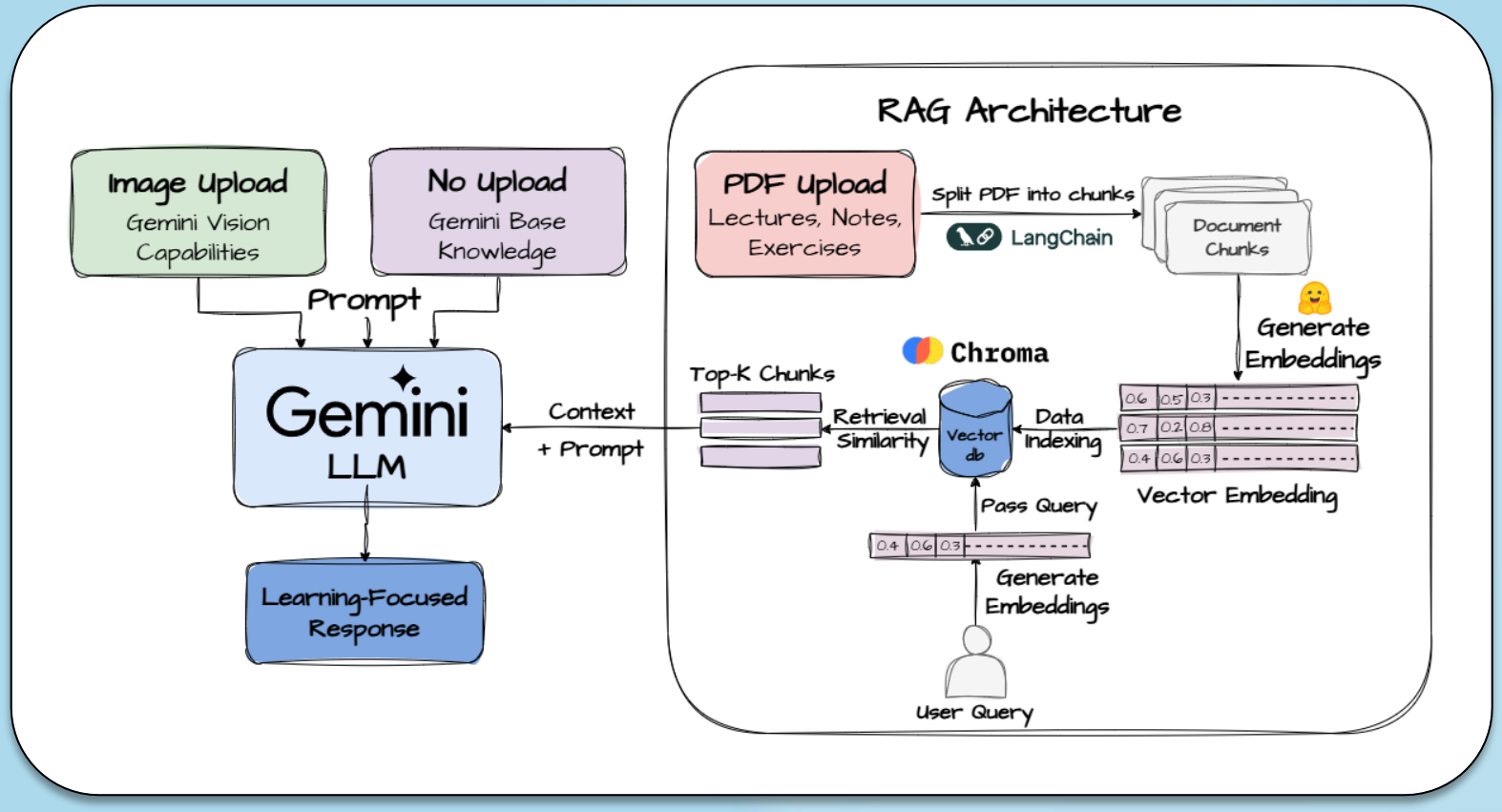
03 AI Assitants

Tutor: Learning-Focused AI Guidance

Prompt Engineering Strategy

System prompts control LLM behavior to ensure effectiveness

- Ask questions
- Provide hints & suggestions
- Encourage critical thinking
- Avoid giving complete solutions



03 AI Assitants
Searcher: Academic Writing Support

3 Specialized Modes

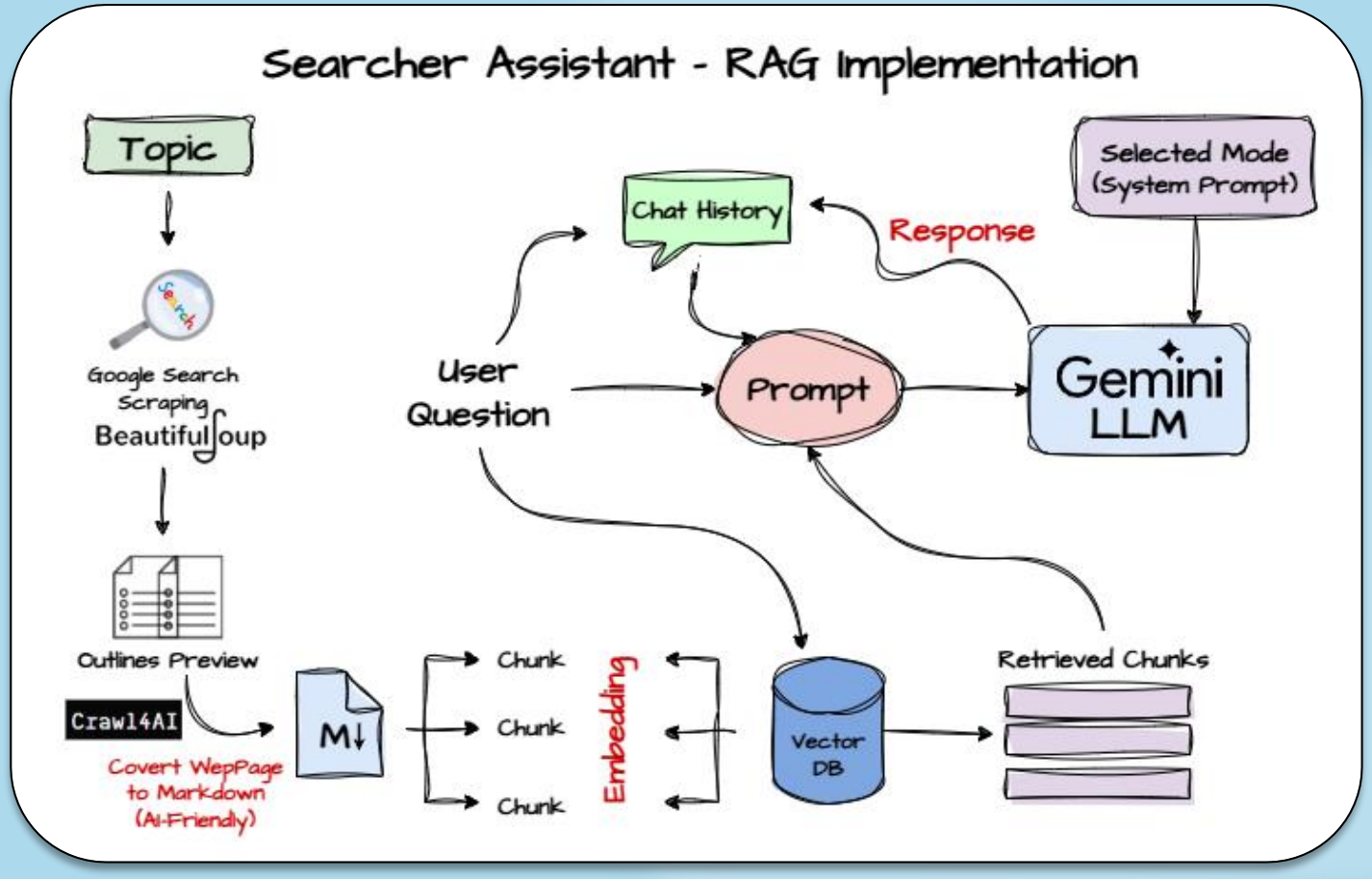
Different prompting strategies for different academic formats

Research Academic writing support with proper citation guidance

Essay Structured argumentation and thesis development assistance

Presentation Content organization and slide structure guidance

Each mode guides students through appropriate research methodologies rather than providing final answers



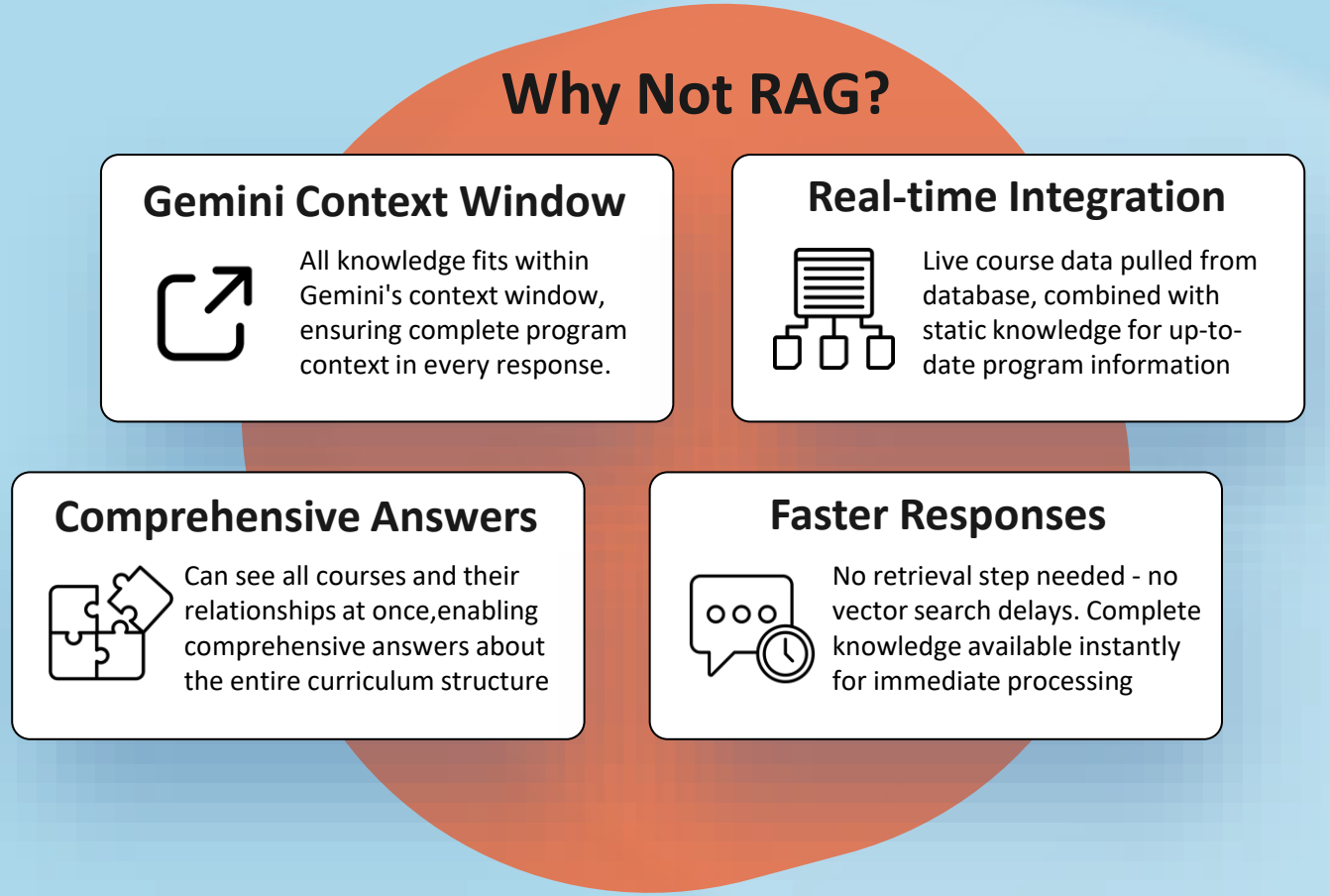
03 AI Assitants

Orienter: Academic Program Navigation

Context Augmentation Approach

Complete knowledge base loaded directly into conversation context

The Orienter Assistant loads all curated LU Data Science program knowledge directly into every conversation. This enables comprehensive explanations of course connections, program structure, and helps both current and prospective students navigate their academic journey.



04 Admin

04 Admin Page

Comprehensive Administrative Control

Unified platform for managing all DataRoad features and student interactions

Resources & Course Management

Upload/organize course materials, edit course information, generate AI-powered quizzes

Traffic Monitor

Platform usage analytics, user activity tracking, performance metrics

User Messages

Manage student inquiries from contact forms, track response status

Feedback Dashboard

Real-time sentiment analysis of student course feedback with AI-generated recommendations

Unified Authentication

Secure access control for all administrative functions

04 Admin Page
Feedback Dashboard - Sentiment Analysis & Visualization

Sentiment Analysis Engine

Twitter RoBERTa model processes student feedback automatically

- **Model:** twitter-roberta-base-sentiment specialized for social media-style comments
- **Scoring:** -1 (negative) to +1 (positive) with confidence weighting
- **Real-time:** Instant analysis as students submit feedback
- **Text Processing:** convert to lowercase, remove punctuation, filter stopwords

Interactive Dashboard with Dash

Transform sentiment data into actionable visual insights

- **Dynamic Visualizations:** Bar charts, pie charts, trend analysis
- **Interactive Features:** Semester filtering, drill-down, hover details
- **Word Cloud:** Visual representation of frequent comment terms
- **AI Recommendations:** Gemini generates improvement suggestions

Evaluation and Results

Response Time

Orienter: < 5 sec
(consistent performance)

Tutor: 5 - 15 sec
(varies with document complexity)

Notes Converter: 2-3 mins
(75% Faster with async)

BERTScore Chatbot Evaluation

Metric: Semantic similarity measurement

Method: RoBERTa contextual embeddings + token-level cosine similarity

Orienter Assistant Score:
0.837 F1

User Satisfaction

Testing Method:

Multi-background student group evaluation

Real-world usability testing scenarios

Results:

High satisfaction with platform functionality and design

DataRoad

Thank You For Your Attention

Any Questions ?