

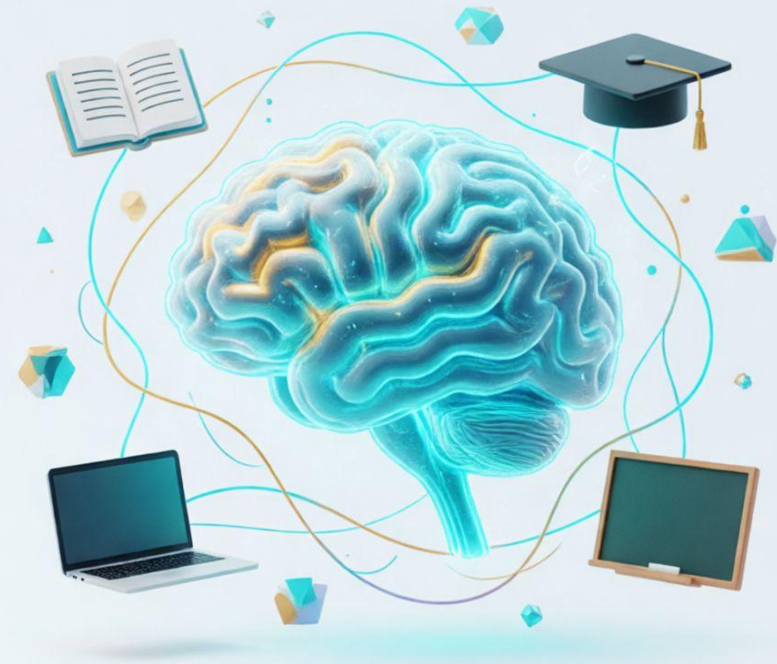
Generative AI Multi-Agents Workflows for Education

Ir Prof Alan Lam, JP

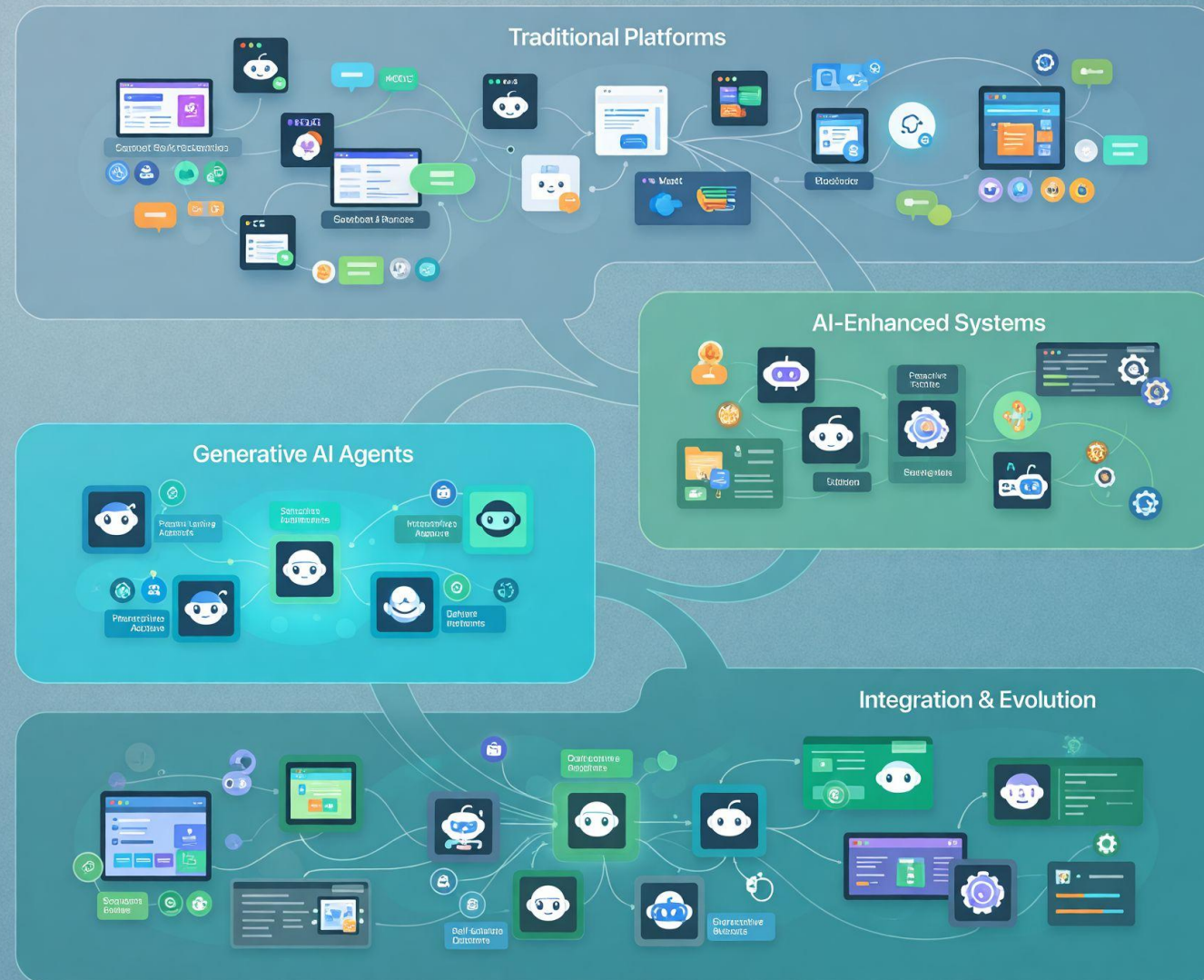


Integration of GenAI Agents for Education Applications

Ir Prof Alan Lam, JP



Existing Educational Technologies Overview



Compatibility and Integration Strategies



Objectives of GenAI Integrated Systems for Education



Reduced Educator Workload

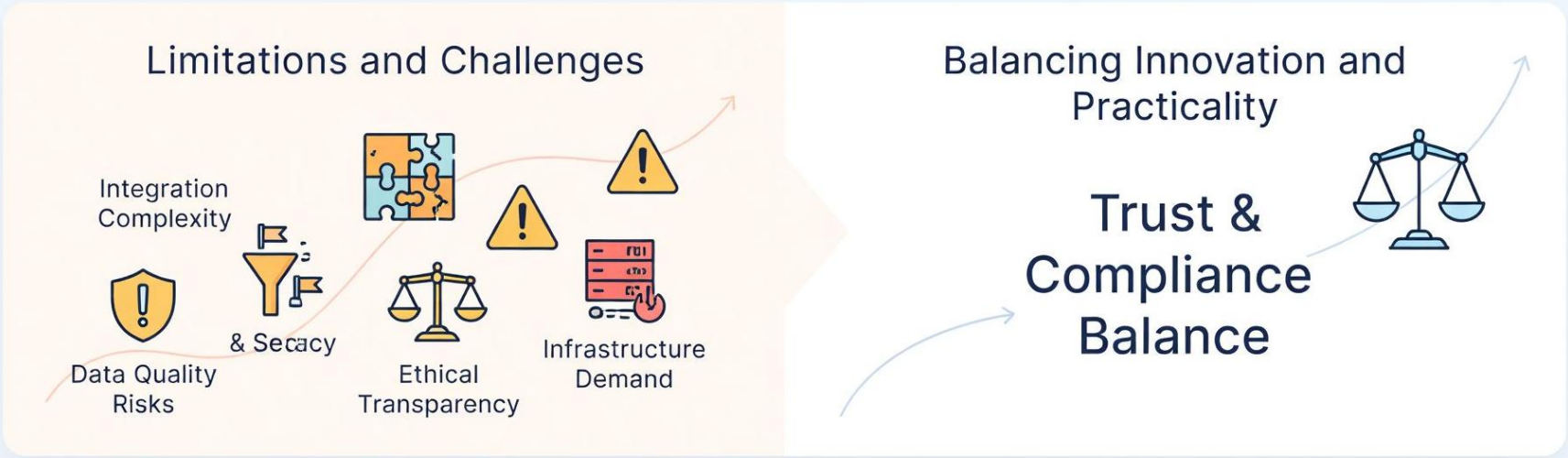
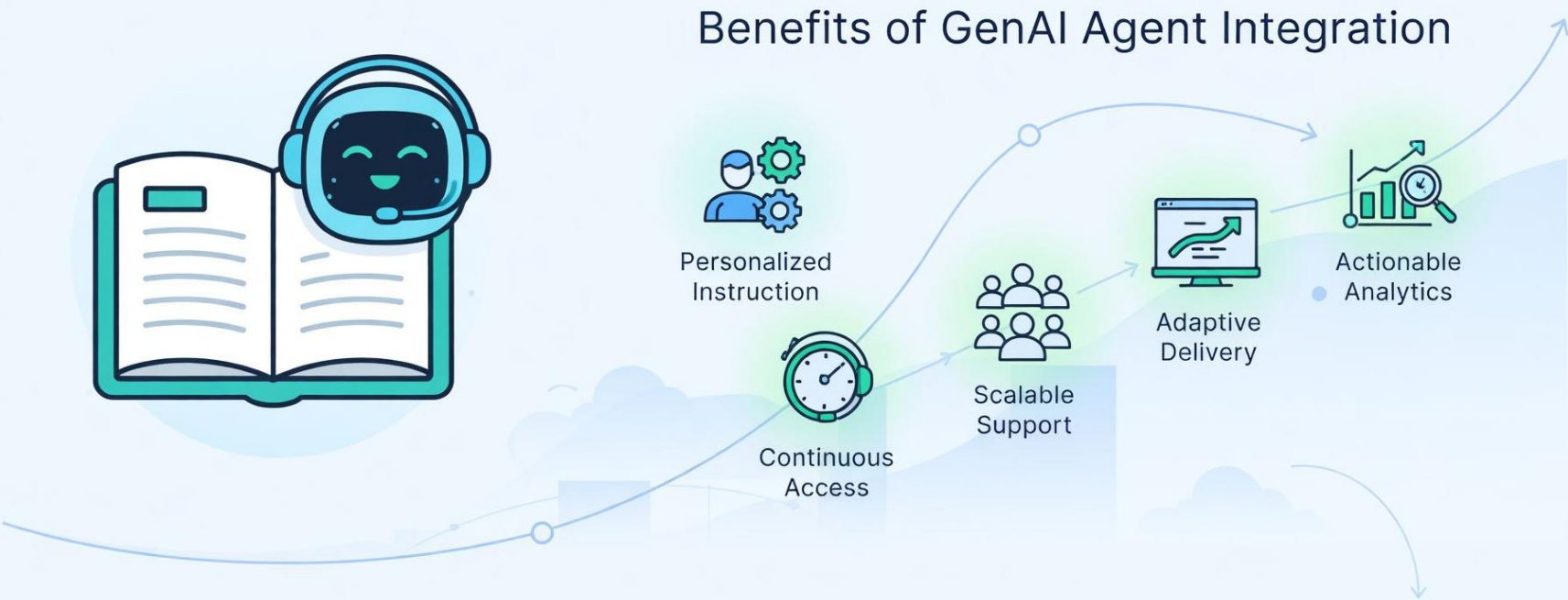


Enhanced Learner Autonomy



Interactive Personalized Engagement

Benefits and Limitations of Integration



Security and Privacy Considerations

Legal and Regulatory Compliance



GDPR



FERPA
GenAI
Regulations

Technical Security Measures



Encryption



Access Control

Monitoring and Incident Response



Detection



Rapid Response

Transparency and Ethical AI Practices



Fairness



Bias Mitigation



Explainability



Supervised Use

Age-Appropriate Deployment

Roadmap for Seamless Integration

Assessment & Partnership



Compliance & Scaling



Development & Pilots



Cultural Adoption & Improvement



Poffices.ai for Education Application



Poffices.AI

Smart GenAI Platform
For Education, Work & Beyond

Describe the document to generate (e.g. Marketing plan for a toy shop)

Enter



 Chinese Primary Lecture



Disclaimer: Generated content may reference third-party materials. Users are responsible for verifying rights and usage. See [T&C](#) for detail.

Poffices.ai for Education Application



Settings

General

Agent Master

Digital Assets

Agent Master Settings

Pipeline setup

Select agents below to build your pipeline.

Search agents or offices...

> My Office (0/1 selected)

> General Office (0/4 selected)

> HK Primary Education (0/30 selected)

> HK Secondary Education (0/78 selected)

> Business Office (0/9 selected)

> Strategy Office (0/15 selected)

> Research Office (0/5 selected)

> Project Office (0/5 selected)

> Sales & Marketing Office (0/10 selected)

Selected Agents 0/10

Start Building Your AI Workflow

1

Search or select agents from the left

2

Drag to reorder execution sequence

3

Same agent can be selected multiple times

Please select at least one agent to enable Agent Master Mode.

Clear All

Please select at least one agent to enable Agent Master Mode.

Cancel

Apply Settings

Watch tour

30 Primary Agents for Teaching Plan, Lecture Note, Exam

Agent Master Settings

Pipeline setup

Select agents below to build your pipeline.

Search agents or offices...

HK Primary Education

- Chinese Primary Lecture
- English Primary Lecture
- Mathematics Primary Lecture
- General Studies Primary Lecture
- Visual Arts Primary Lecture
- Music Primary Lecture
- Physical Education Primary Lecture
- Putonghua Primary Lecture
- Moral and Civic Education Primary Lecture

Agent Master Settings

Pipeline setup

Select agents below to build your pipeline.

Search agents or offices...

- Chinese Primary Teaching Plan
- English Primary Teaching Plan
- Mathematics Primary Teaching Plan
- General Studies Primary Teaching Plan
- Visual Arts Primary Teaching Plan
- Music Primary Teaching Plan
- Physical Education Primary Teaching Plan
- Putonghua Primary Teaching Plan
- Moral and Civic Education Primary Teaching Plan
- Technology Education Primary Teaching Plan
- Chinese Primary Exam

Agent Master Settings

Pipeline setup

Select agents below to build your pipeline.

Search agents or offices...

- Chinese Primary Exam
- English Primary Exam
- Mathematics Primary Exam
- General Studies Primary Exam
- Visual Arts Primary Exam
- Music Primary Exam
- Physical Education Primary Exam
- Putonghua Primary Exam
- Moral and Civic Education Primary Exam
- Technology Education Primary Exam

Selected Agents

0/10



Start Building Your AI Workflow

- 1 Search or select agents from the left
- 2 Drag to reorder execution sequence
- 3 Same agent can be selected multiple times

Please select at least one agent to enable Agent Master Mode.

Clear All

78 Secondary Agents for Teaching Plan, Lecture Note, Exam

Agent Master Settings

Pipeline setup

Select agents below to build your pipeline.

Search agents or offices...

HK Secondary Education

Chinese Language Secondary Lecture

English Language Secondary Lecture

Mathematics Secondary Lecture

Citizenship and Social Development Secondary Lecture

Integrated Science Secondary Lecture

Physics Secondary Lecture

Chemistry Secondary Lecture

Biology Secondary Lecture

History Secondary Lecture

Agent Master Settings

Pipeline setup

Select agents below to build your pipeline.

Search agents or offices...

Chinese Language Secondary Teaching Plan

English Language Secondary Teaching Plan

Mathematics Secondary Teaching Plan

Citizenship and Social Development Secondary Teaching Plan

Integrated Science Secondary Teaching Plan

Physics Secondary Teaching Plan

Chemistry Secondary Teaching Plan

Biology Secondary Teaching Plan

History Secondary Teaching Plan

Geography Secondary Teaching Plan

Economics Secondary Teaching Plan

Agent Master Settings

Pipeline setup

Select agents below to build your pipeline.

Search agents or offices...

Chinese Language Secondary Exam

English Language Secondary Exam

Mathematics Secondary Exam

Citizenship and Social Development Secondary Exam

Integrated Science Secondary Exam

Physics Secondary Exam

Chemistry Secondary Exam

Biology Secondary Exam

Geography Secondary Exam

Economics Secondary Exam

Chinese History Secondary Exam

Selected Agents

0/10

Start Building Your AI Workflow

1

Search or select agents from the left

2

Drag to reorder execution sequence

3

Same agent can be selected multiple times

Please select at least one agent to enable Agent Master Mode.

Clear All

Practical Exercise

1. Keep this note confidential. You must NOT share to others or release to public.
2. Login <https://poffices.ai/>
3. Using Agent Master to choose the above education agent and input the prompt accordingly
4. Using General agent and input the same prompt
5. Review the results and compare education agent and general agent



(1) Click **Agent Master** to choose newly created agents

Integrating RAG in GenAI Agent Development

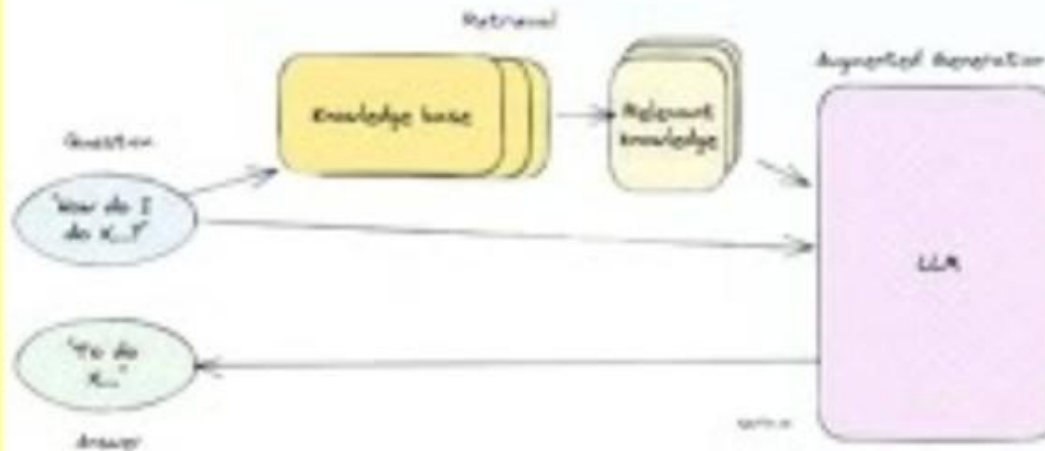
Ir Prof Alan Lam, JP



What is Retrieval-Augmented Generation?

What Is

Retrieval
Augmented
Generation



Definition of RAG

Motivation for RAG



Two-Phase Framework: Retrieval and Generation



Mathematical Formalization



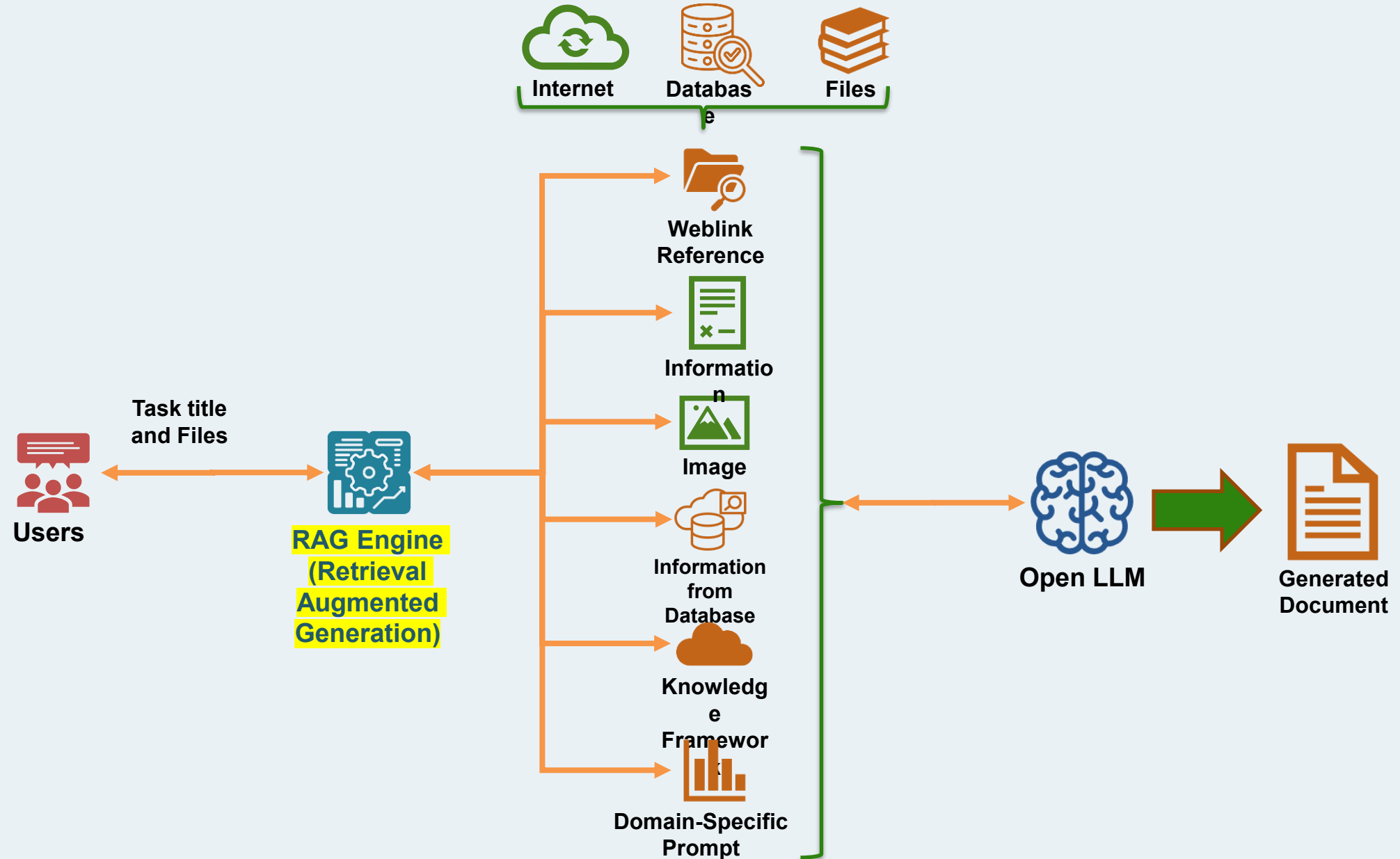
Retrieval via Embedding-Based Similarity Search



Domain Applications



Architecture of RAG for Document Generation



Web Search Principles

Core Web Search Workflow



Crawler

Indexing (Keywords & Embeddings)



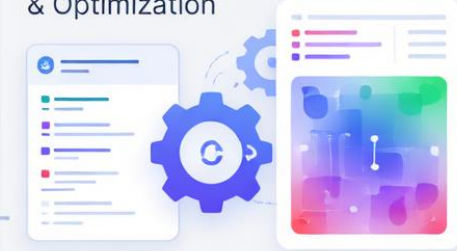
Ranking Optimization



Hybrid Search



Relevance Ranking & Optimization



Keyword Search



⌚ Keyword Match

Semantic Search



⌚ Vector Embeddings

⌚ Cosine Similarity

LLM with Agent: Web-Search Engine



General Agent

- Limited knowledge base
- Static Responses
- Inability to adapt
- Risk of Errors
- Scalability issues

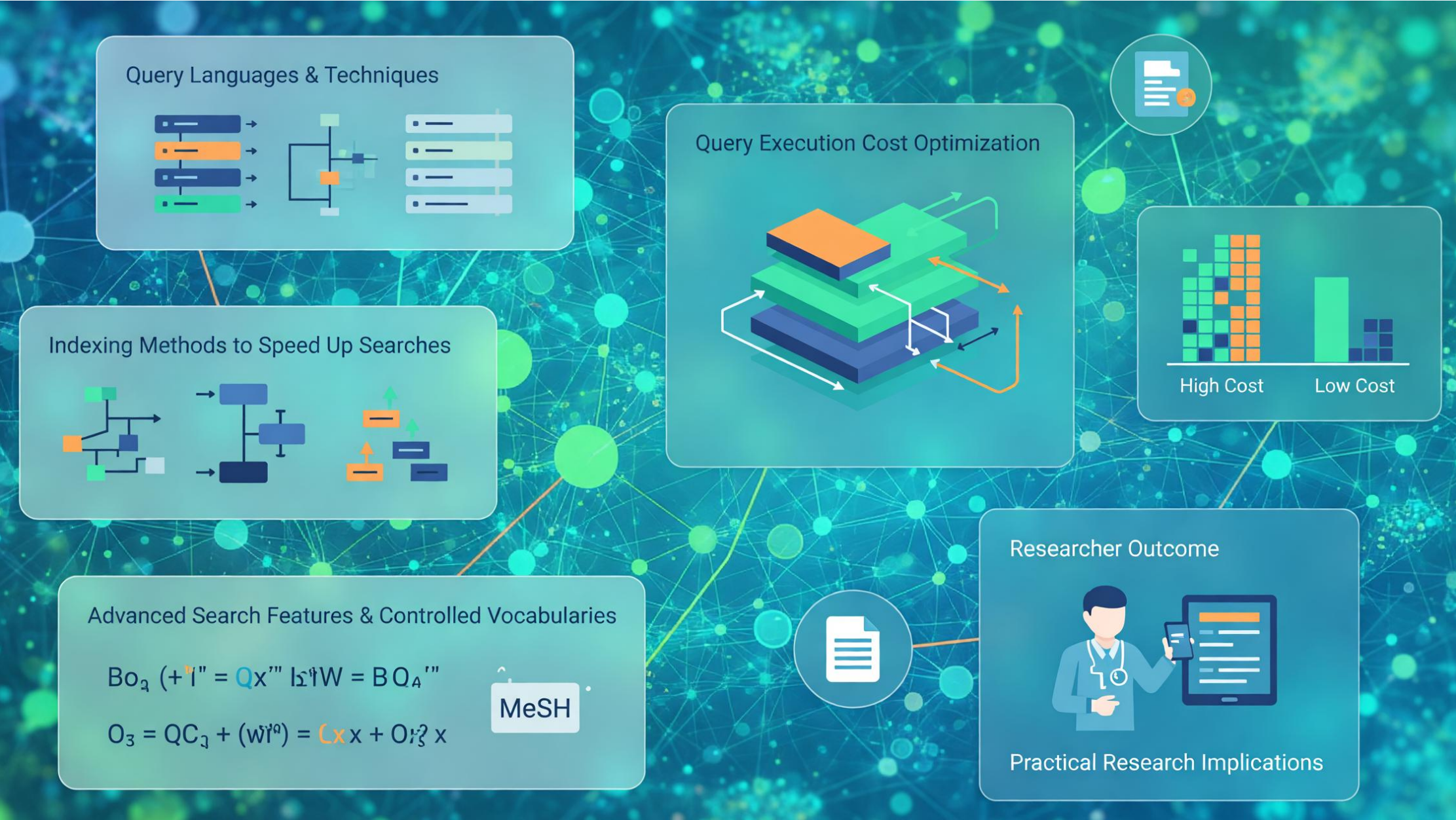


Poffices.AI

Poffices.AI Web-search Function

Example: Poffices.AI

- Real-time data retrieval
- Improved Adaptability and Learning
- Better Handling of Complex Queries
- Contextual Awareness
- Enhanced Personalization
- Error Reduction
- Significant Scalability
- Compliance Adherence



LLM with Agent: Data-Search Engine



General Agent

- Limited Adaptability
- Dependency on Pre-trained Knowledge
- Inability to Understand Context
- Generation of Hallucinations
- Resource Intensive and High Maintenance Costs

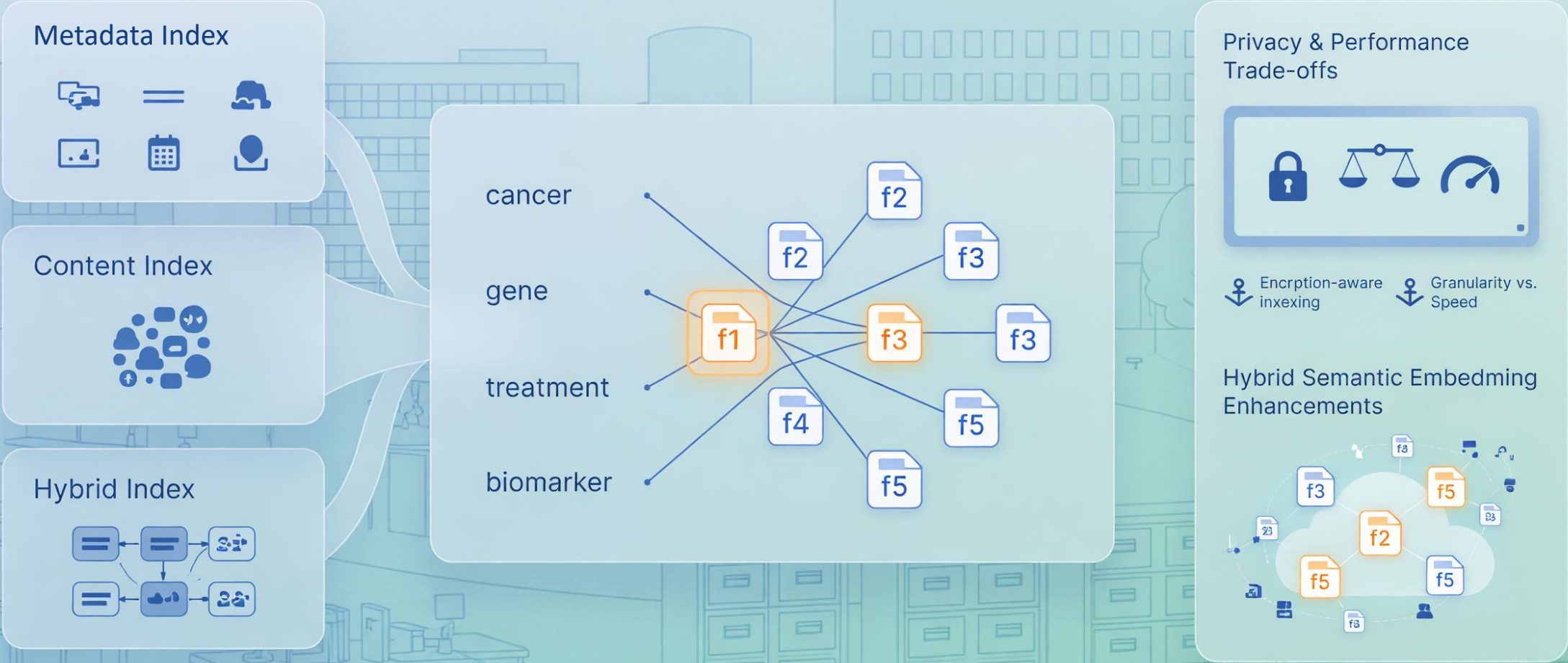


Poffices.AI Database Search Function

Example: Poffices.AI

- Access to Real-time Data
- Reduction in Maintenance Costs
- Continuous Learning and Improvement
- Enhance Contextual Understanding
- Utilization of RAG\
- Higher Interaction Quality
- Scalability
- Resource Efficiency

File Search Mechanisms



LLM with Agent: File-Search Engine



 **Poffices.AI**
Poffices.AI File Search Function

General Agent

- Static knowledge base
- Single-Turn Interactions
- Limited Goal-Oriented Behavior
- Inability to Access Unstructured Data Memory Limitations

Poffices.AI

- Dynamic Knowledge Integration
- Contextual Awareness
- Goal-Oriented Functionality
- Efficient Handling of Unstructured Data
- Enhanced Learning Capabilities

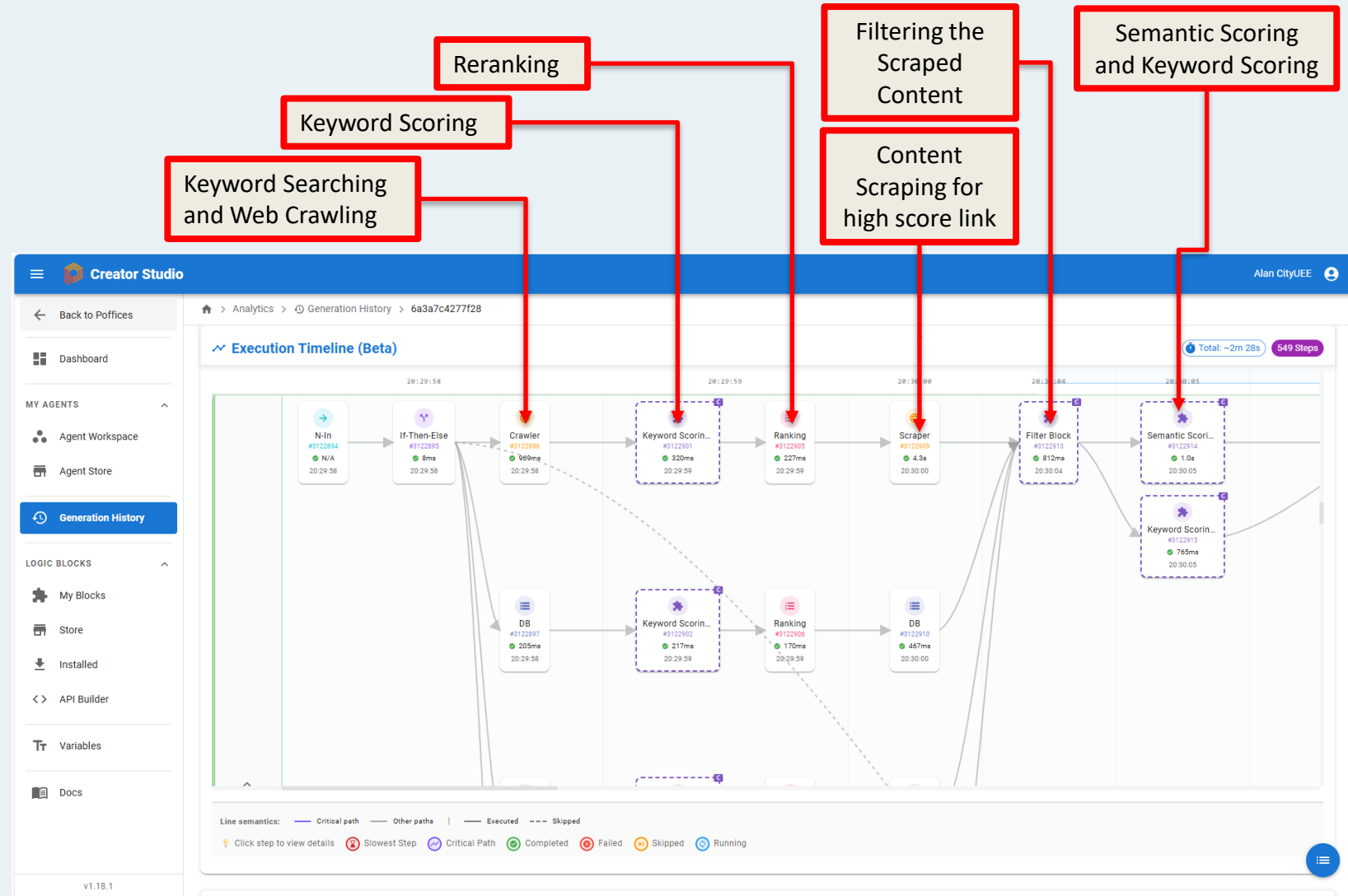
Use Cases in Education



- AI chatbots automate student support, assisting specialized populations at scale with prompt engineering.
- Multi-agent automation of content creation, grading, and adaptive feedback.
- API integration allows curriculum customization and agent iterative improvement via analytics.
- Security enforcement prevents malicious input exploitation in sensitive education data.
- Integrated AI agents improve learning outcomes while reducing educator workload and boosting engagement.
- Market data confirms growing global investment in GenAI agents for next-gen educational technology.

Practical Exercise

1. Keep this note confidential. You must NOT share to others or release to public.
2. Login <https://poffices.ai/>
3. Review the previous results in the Creator Studio Generation History about the web search results
4. Discuss your findings



Testing of Web Links and Image Links Crawler



The screenshot shows the Poffices.AI 1st Anniversary AI Document Generator interface. The page is decorated with yellow balloons and confetti. The main heading is "Poffices.AI" with "AI Document Generator" below it. A text input field contains the prompt: "Web Links and Images Links about Market trends of GenAI Server". Below the input field are three radio buttons: "Private", "Agent Master" (which is selected and has a green '1' badge), and "Digital Assets". To the right of the radio buttons are two icons: an upload arrow and a right-pointing arrow. A red box on the left contains the text "Input the topic for getting Web links and Image links", with a red arrow pointing to the text input field. Another red box at the bottom contains the text "Select Web and Image link Searcher agent in data office", with a red arrow pointing to the "Agent Master" radio button. On the right side of the interface, there is a "Language" dropdown and a user profile "Alan_gravitycp". A red box below the user profile contains the text "Login Poffices.ai", with a red arrow pointing to the user profile.

Testing of Web Links and Image Links Crawler



 Language

 Alan_gravitycp

Using Web and Image link Searcher to do crawling

Web and Image link Searcher

Good evening, Alan_gravitycp!

Quick status update on your request:

Request received: "Web Links and Images Links about Market trends of GenAI Server". Agent Web and Image link Searcher (Agent 148 (Web-Image-linker)) is handling the execution.

Output parameters: The document will be named "Market Trends of GenAI Server", it will be formatted as a Professional Document, written in English, following the ## Introduction, ## Current Market Trends, ## Future Predictions, ## Conclusion structure.

Content themes: GenAI Server market trends. These topics will shape the output structure and content flow.

Processing has started with the given parameters, and the result will be available shortly.

Time of preparation: **4.5s** Time of completion: **181.2s**

Generate the keyword for web search

Generate the document structure

Generate the document title

Market Trends of GenAI Server

Web Links

- Webpage Title:** AI Servers Now One-third of Global Server Market
Short Description: This article discusses the growth of the global server market focused on AI servers, emphasizing the impact of the GenAI boom on revenues.
Webpage Link: [AI Servers Now One-third of Global Server Market](#)
- Webpage Title:** Data Center infrastructure market: AI-driven CapEx pushing IT and ...
Short Description: An overview of the anticipated growth in the data center server market by the end of the decade, driven by AI investments.
Webpage Link: [Data Center infrastructure market: AI-driven CapEx pushing IT and ...](#)
- Webpage Title:** AI Infrastructure — Another Growth Opportunity For Electronic ...

Testing of Web Links and Image Links Crawler

10 webpages with title, description and link are crawled

Webpage Links

1. **Title:** GPU Server Market Size, Share & Industry Trends 2030
Description: Analyzes the GPU server market's growth trajectory, emphasizing GenAI's role in driving demand for high-performance hardware.
Link: <https://www.marketsandmarkets.com/Market-Reports/gpu-server-market-224437074.html>
2. **Title:** Emerging Technology Trends
Description: Highlights performance gains for GenAI models and market trends from 2023–2032, focusing on hardware and software integration.
Link: <https://www.jpmorgan.com/content/dam/jpmorgan/documents/technology/jpmc-emerging-technology-trends-report.pdf>
3. **Title:** AI Servers Now One-third of Global Server Market
Description: Reports that AI servers now constitute ~33% of the global server market, reflecting strong adoption across industries.
Link: <https://counterpointresearch.com/en/insights/post-insight-research-notes-blogs-ai-servers-are-now-one-third-of-the-global-server-market>
4. **Title:** AI Server Supply Chain Market size, share and insights 2025–2029
Description: Examines component costs, BOM analysis, and supply chain dynamics for AI servers supporting GenAI workloads.
Link: <https://reports.valuates.com/market-reports/MICR-Othe-1D11/unleashing-opportunities-in-the>
5. **Title:** Generative AI to Become a \$1.3 Trillion Market by 2032, Research Finds
Description: Details how AI servers will fuel revenue growth in the generative AI sector, with hardware as a key driver.
Link: <https://www.bloomberg.com/company/press/generative-ai-to-become-a-1-3-trillion-market-by-2032-research-finds>
6. **Title:** AI Server Market Size & Share, Statistics Report 2025–2034
Description: Outlines market growth factors, including cross-sector adoption and infrastructure requirements for GenAI.
Link: <https://www.gminsights.com/industry-analysis/ai-server-market>
7. **Title:** Server Market Analysis – 1H24 Omdia
Description: Focuses on GenAI's impact on server usage for training and inferencing, with insights into LLMs and market segmentation.
Link: <https://omdia.tech.informa.com/om121647/server-market-analysis-1h24>
8. **Title:** AI data center growth: Meeting the demand | McKinsey
Description: Discusses strategies for scaling data centers to meet AI-driven power and computational demands.
Link: <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ai-power-expanding-data-center-capacity-to-meet-growing-demand>
9. **Title:** Megatrends, PCs, Servers and Moore
Description: Explores server market size (\$120 billion) and growth cycles tied to GenAI and Moore's Law.
Link: <https://www.citigroup.com/global/insights/megatrends-pcs-servers-and-moore->
10. **Title:** AI Servers Now One-third of Global Server Market
Description: Reiterates Counterpoint Research's findings on AI servers' dominance in the global market.
Link: <https://www.counterpointresearch.com/insight/post-insight-research-notes-blogs-ai-servers-are-now-one-third-of-the-global-server-market?listUri=%2Finsights%2Finsight-category-research-notes-blogs%3Fpage%3D1>

Testing of Web Links and Image Links Crawler

Link: <https://www.counterpointresearch.com/insight/post-insight-research-notes-blogs-ai-servers-are-now-one-third-of-the-global-server-market?listUrl=%2Finsights%2Finsight-category-research-notes-blogs%3Fpage%3D1>

Image Links

- Title:** Server Market Analysis – 1H24 Omdia
Description: Visualizes market share and growth trends for GenAI servers in Q2 2024.
Link: <https://omdia.tech.informa.com/-/media/tech/omdia/assetfamily/2024/04/11/server-market-analysis-1h24/assetfamily004.png?rev=44be6cd993a8479f84cdaa95ec9ec362&hash=103B17B045666ED4D52886641BD4E798>
- Title:** How Long Before AI Servers Take Over The Market?
Description: Graphical projection of AI server market growth from 2021 to 2027.
Link: <http://www.nextplatform.com/wp-content/uploads/2023/10/idc-server-forecast-2021-2027-tnp.jpg>
- Title:** 2024 GenAI Insurance Trends
Description: Highlights GenAI's impact on insurance sectors through specialized server infrastructure.
Link: https://www.limra.com/siteassets/research/research-abstracts-shared/2024/genai-insurance-trends/0373-2024_featureimage3_480x270.jpg
- Title:** AI Server Market Size & Share, Statistics Report 2025–2034
Description: Infographic showing projected market size and share for AI servers up to 2034.
Link: <https://cdn.gminsights.com/image/rd/sustainable-and-smart-technologies/ai-server-markets-size-by-servers-2025-2034.webp>
- Title:** Projections reveal AI server spending to shoot to \$430B by 2033
Description: Chart depicting exponential growth in AI server spending from 2024 to 2033.
Link: <https://futurecio.tech/wp-content/uploads/2024/09/Value-of-Worldwide-AI-Server-Market.png>
- Title:** AI is poised to drive 160% increase in data center power demand
Description: Illustration of power consumption trends in data centers due to AI workloads.
Link: <https://www.goldmansachs.com/images/migrated/insights/pages/articles/ai-is-poised-to-drive-160-increase-in-data-center-power-demand/800x450.jpg>
- Title:** The Agentic AI Operational Intelligence Platform for ITOps, NOCOps
Description: Visual representation of AI platforms optimizing data center operations.
Link: <https://www.fabrix.ai/images/media/fabrixai-named-in-the-gartner-market-trend-report.jpg>
- Title:** Top Data Center Trends 2025: Global Overview
Description: Summary of data center trends, including AI server integration and sustainability.
Link: https://www.comarch.com/files-com/file_828/TOPDATACENTERTRENDS.jpg
- Title:** DeepSeek implications: Generative AI value chain winners & losers
Description: Diagram analyzing GenAI's value chain and competitive landscape.
Link: <https://iot-analytics.com/wp-content/uploads/2025/02/Deepseek-implications-winners-and-losers-in-the-genai-value-chain-vfeatured-image.png>
- Title:** The Generative AI Market
Description: Image showcasing the generative AI market's expansion and server dependencies.
Link: <https://www.berginsight.com/static/4c76659271b51b0facef489ce68bdeb2/d4ac7/Generative-AI-1.jpg>

10 images with title, description and link are crawled

Practical Exercise

1. Login <https://Poffices.ai>
2. In Agent Master to select “Web Link Searcher”, getting more web links and input your instruction to get the web links.
3. In Agent Master to select “Image Link Searcher”, getting more web links and input your instruction to get the web links.
4. In Agent Master to select “Web Links and Image Links Crawler” and Input your instruction in Poffices.ai to generate web links and image links based on your topic in instruction.
5. Compare all results above

Note: The web information can be supplied to RAG engine and be embedded to the Prompt to provide to LLM for content generation.



- (1) Click **Agent Master** to choose “Web Link Searcher” or “Image Link Searcher” or “Web Links and Images Links Crawler”

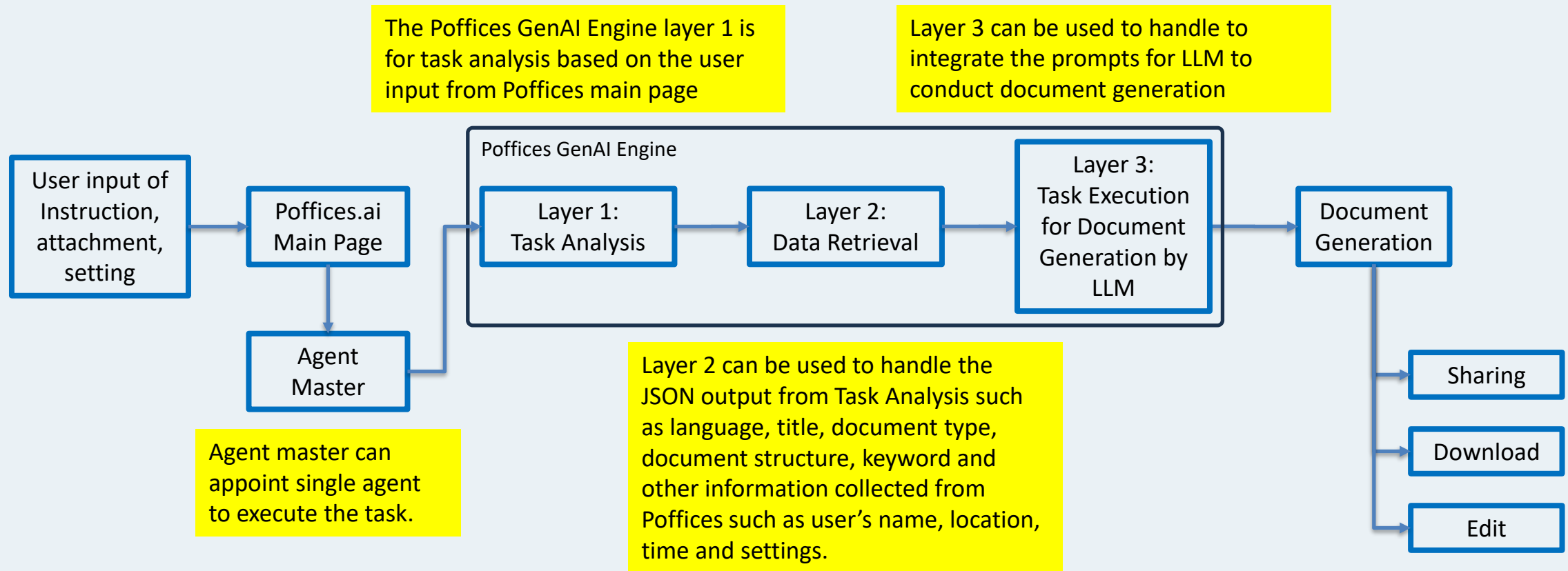
GenAI Agent with RAG for Educational Domain

Ir Prof Alan Lam, JP



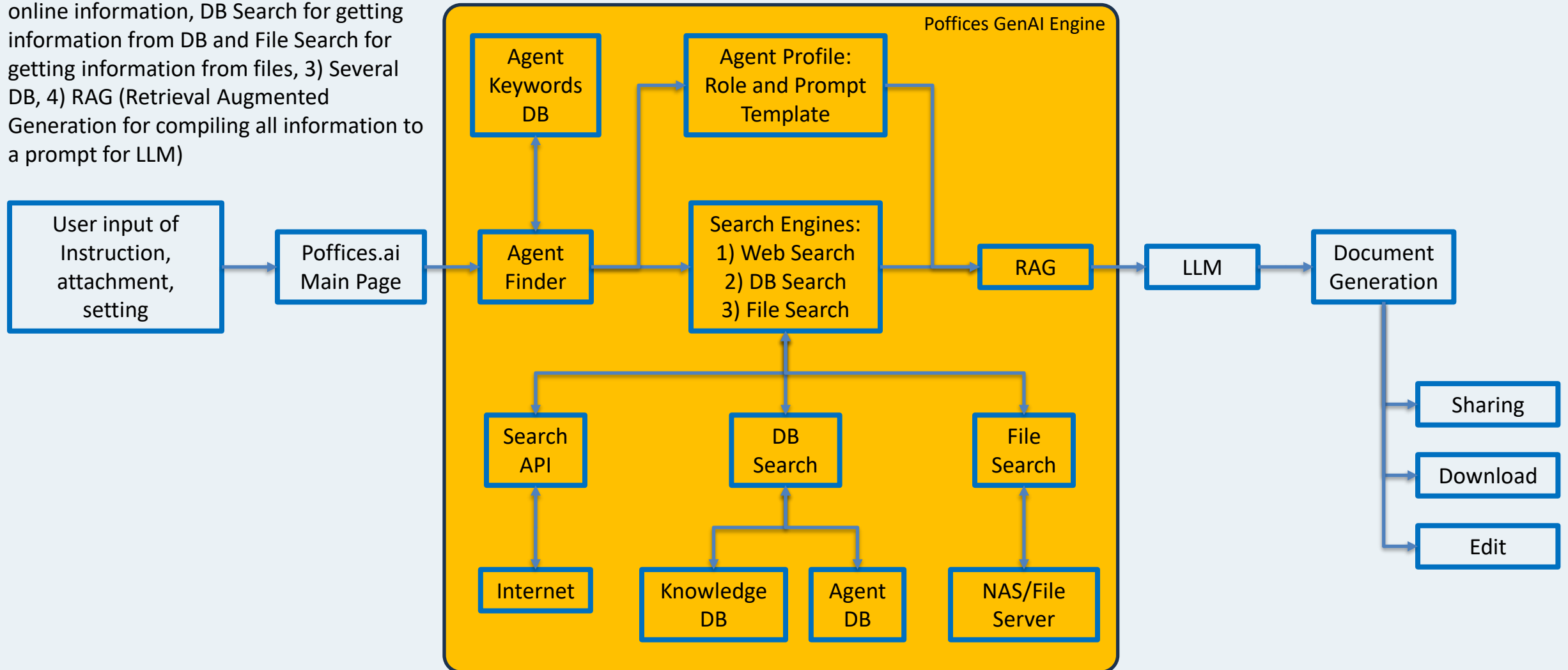
RAG for Poffices.ai

Block Diagram of Basic GenAI Agents in Poffices.ai



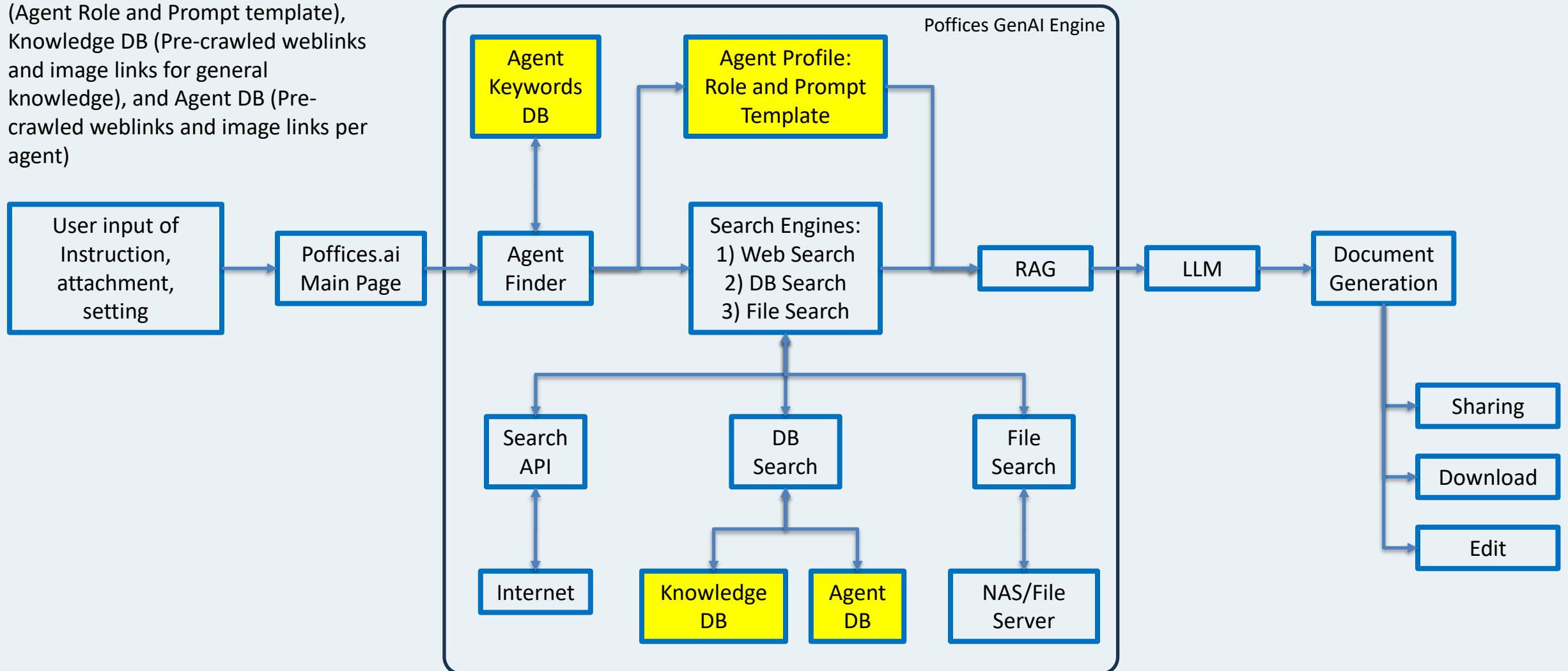
RAG for Poffices.ai

Poffices.ai Engine includes several major components: 1) Agent Finder, 2) Search Engines including Web Search for getting online information, DB Search for getting information from DB and File Search for getting information from files, 3) Several DB, 4) RAG (Retrieval Augmented Generation for compiling all information to a prompt for LLM)



RAG for Poffices.ai

There are 4 database equipped in the Poffices.ai including Agent keywords DB (classification), Agent Profile (Agent Role and Prompt template), Knowledge DB (Pre-crawled weblinks and image links for general knowledge), and Agent DB (Pre-crawled weblinks and image links per agent)



RAG based on Digital Assets for Poffices.ai



Introducing Digital Assets Builder on Poffices.AI

File Handling by Metadata Extractor and Metadata Builder



Language

Alan CityUEE

Poffices.AI

Smart GenAI Platform
For Education, Work & Beyond

Input the instruction for the summarization for attached document

Choose Summarizer agent in agent master

Summarize the attached file

Upload file



R1_A_Deep_Learning-Based_Smart_Baseball_Training_System_for_Batting_Performance_Digitalization-compressed.pdf

Disclaimer: Generated content may reference third-party materials. Users are responsible for verifying rights and usage. See [T&C](#) for detail.

File uploaded in Poffices.ai



 Language

 Alan CityUEE

Summarizer

Good afternoon, Alan CityUEE!

Quick status upd

Time of preparation: **1.2s**



Preparing your document...
It approximately takes 2 minutes.

Files Uploaded

Files have been uploaded. Processing may take longer than usual — please wait while we complete the extraction.

Got it (3)

⚠ The presence of images or references in the result depends on (1) the document type, (2) the web search results and (3) the subscription plan limitations.

⚠ Disclaimer: Generated content may reference third-party materials. Users are responsible for verifying rights and usage. See [T&C](#) for detail.



Summarizer

Good afternoon, Alan CityUEE!

Quick status update on your request:

Request received: "Summarize the attached file". Agent Summarizer (Agent 190 (summarizer)) is handling the execution.

Processing has started with the given parameters, and the result will be available shortly.

 R1_A_Deep_Learning_Based_Smar...
compressed.pdf
7.6 MB



Time of preparation: **1.2s** Time of completion: **118.5s**

A Deep-Learning Based Consumer Grade Smart Baseball Training System for Batting Performance Digitalization

I. INTRODUCTION

- Rising demand for scientific sports training with consumer-friendly digitalization.
- Traditional methods limited by high cost and lack of real-time feedback.
- AIoT technologies enable fast, accurate, affordable sports digitalization.
- Baseball system uses camera-based IoT node with smartphone for 3D batting capture.
- Proposes SimRepYOLOv4 model integrating RepVGG, CBAM, and NAM for lightweight detection.
- System achieves over 99.14% AP and 96.9% accuracy in distance calculation.



Text has been summarized and image database was built

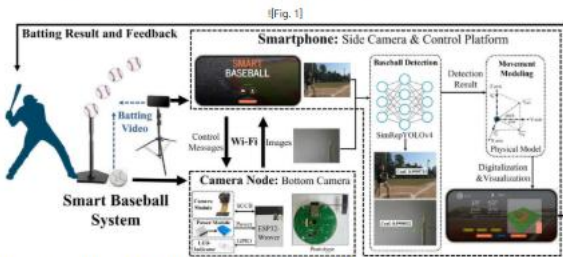
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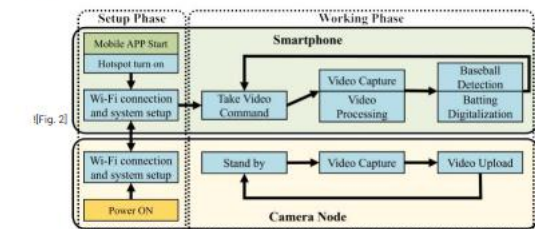
II. RELATED WORK

- Prior sports digitalization used multi-exposure and stereo vision for ball trajectory.
- Baseball systems rely on expensive multi-sensor setups or slow, impractical methods.
- Proposed system focuses on low-cost, consumer-grade vision-based digitalization.
- Uses deep learning and physical models to analyze baseball motion efficiently.



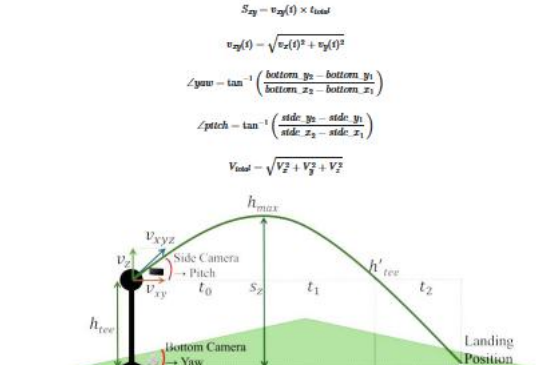
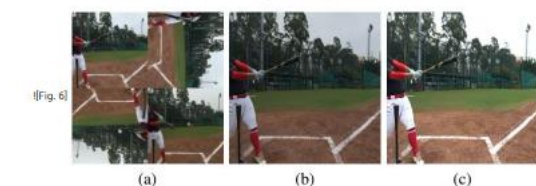
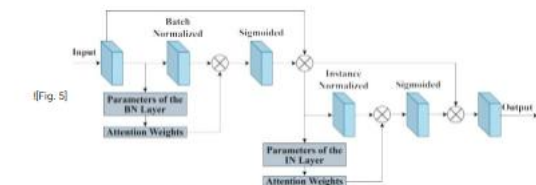
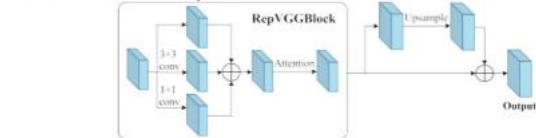
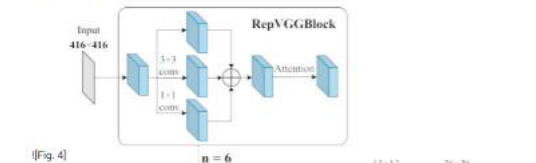
III. SYSTEM ARCHITECTURE DESIGN

- System includes ESP32-WiFi camera node (bottom-view) and smartphone (side-view & control).
- Camera node captures batting video, transmits via Wi-Fi to smartphone for processing.
- Smartphone visualizes speed, angles, distance, and 3D trajectory in real-time.
- Architecture optimized for low compute load and battery efficiency.
- Workflow phases: setup (Wi-Fi config) and working (video capture, detection, digitalization).

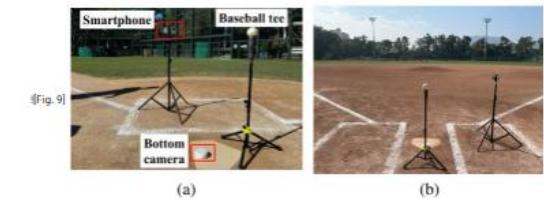


IV. METHODOLOGY

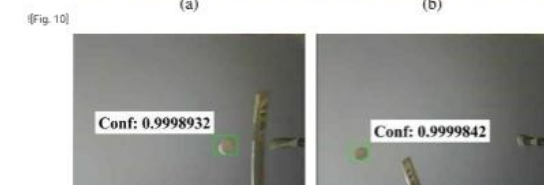
- Vision-based system uses lightweight YOLOv4 with RepVGG backbone and CBAM/NAM attention modules for baseball detection.
- Model optimized for small, fast-moving objects under various lighting and blur conditions.
- Mosaic and exposure augmentations improve robustness and generalization.
- Physical model decomposes velocity in 3D, calculates flight distance, yaw, and pitch angles from multi-angle video.
- Velocity and trajectory derived from pixel displacement and known baseball diameter.



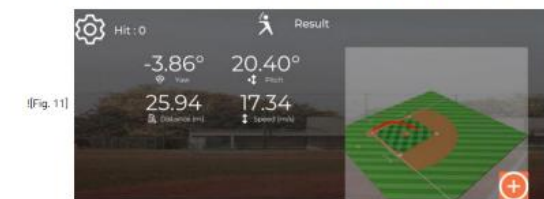
- Field test setup with one camera node and smartphone validates system in real baseball field.



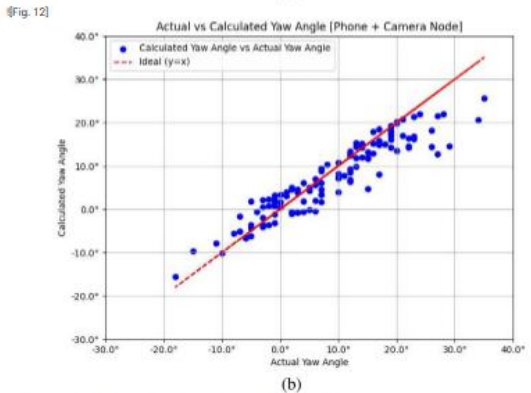
- Baseball detected in both views with high confidence confirms system function.



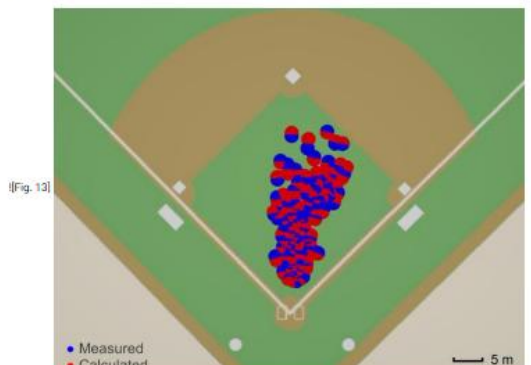
- Calculated batting parameters closely match actual measurements; simulated trajectory visualized accurately.



Date	Number	Distance (m)	Speed (m/s)	Pitch (°)	Yaw (°)
2024-Nov-29	25	12.77	13.22	16.95	1.86
2024-Dec-10	45	14.16	13.48	24.11	8.99
2024-Dec-19	30	18.00	14.80	25.84	11.45
2025-Apr-15	26	19.75	16.03	24.14	4.49
Metric	Result				
Average Actual Dist.	15.83 m				
Average Calculated Dist.	15.96 m				
Average Actual Yaw	8.71°				



- Lighting tests (507 trials) confirm stable system accuracy across ambient brightness variations.
- Distance accuracy exceeds 94% under all lighting; pitch error slightly rises in twilight.
- System visualizes landing points on a real baseball field with strong consistency.



Subject	Practice 1 Speed (m/s)	Angle (°)	Distance (m)	Practice 2 Speed (m/s)	Angle (°)	Distance (m)	Improvement
Beginner 1	14.63	18.16	14.62	14.01	28.21	17.48	+2.86 m (19.6%)
Beginner 2	13.89	30.17	14.75	15.40	24.03	17.99	+3.24 m (22.0%)

- System provides actionable feedback to improve launch angle and hitting power.
- Beginners show measurable improvement in batting performance after 10 days training.

VI. CONCLUSION

- Proposed low-cost smart baseball system digitizes batting using camera node and smartphone.
- Developed SimRepYOLOv4 model balances accuracy (>99% AP), lightweight design, and speed for mobile use.
- Physical trajectory model enables precise 3D flight and distance calculations (96.9% accuracy).
- System adaptable to diverse lighting, supports flexible training with practice nets.
- Demonstrates potential for fast ball sport digitalization; future work includes faster cameras, rotation detection, and environmental factor integration.

The summarized output can be saved as docx source file

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Deep-Learning Based Consumer Grade Smart Baseball Training System for Batting Performance Digitalization

I. INTRODUCTION

- Introduction for scientific sports training with consumer-friendly digitalization.
- Traditional methods limited by high cost and lack of real-time feedback.
- All-weather training enables data-driven, accurate sports digitalization.
- Baseball training centers limited to rule with swing force for 3D training systems.
- Proposed digitalized smart training system (DST) and ML for high-precision training.

System achieves over 90.04% AP and 90.04% accuracy in distance calculation.

II. RELATED WORK

- Prior sports digitalization and end-user experience and review for ball trajectory.
- Digitalized system only compression video capture or slow, impractical methods.
- Proposed system for consumer grade smart training system.
- Research training and physical enable to analyze ball data with accuracy.

Fig. 1. System Architecture Design



Fig. 2. Working Principle

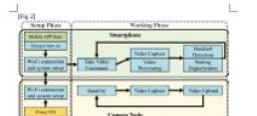


Fig. 3. Physical Model Diagram



Fig. 4. Velocity and Trajectory Diagram



Fig. 5. Evaluation and Testing

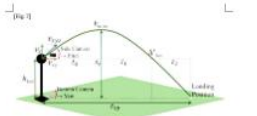


Fig. 6. Conclusion

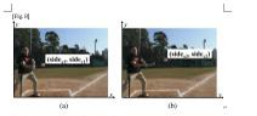


Fig. 1. System Architecture Design



Fig. 2. Working Principle



Fig. 3. Physical Model Diagram

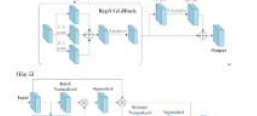


Fig. 4. Velocity and Trajectory Diagram



Fig. 5. Evaluation and Testing

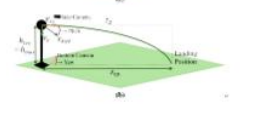


Fig. 6. Conclusion



Fig. 1. System Architecture Design



Fig. 2. Working Principle



Fig. 3. Physical Model Diagram



Fig. 4. Velocity and Trajectory Diagram



Fig. 5. Evaluation and Testing



Fig. 6. Conclusion



第 1 頁, 共 14 頁 699 個字 英文 (美國) 文字預測: 開啟 協助工具: 無法使用

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Presented by Ir Prof Alan Lam, JP, Powered by [Poffices.ai](#)

p.39

 Institute of Future Learning
香港城市大學
City University of Hong Kong
<https://cityu.edu.hk/ifl>

II. RELATED WORK

The diagram illustrates the Smart Baseball System architecture. On the left, a batter is shown swinging a bat, with a baseball in motion. A 'Smart Baseball System' is indicated. A 'Batting Video' is captured by a 'Smartphone: Side Camera & Control Platform'. This platform sends 'Control Messages' to a 'Camera Node: Bottom Camera' and receives 'Images' back. The Camera Node contains components like Camera Module, Sensor Module, Power Module, LED, and Microphone, and is powered by ESP32-WROOM and a 5V 1000mAh battery. The Smartphone platform also performs 'Baseball Detection' using 'SimRepYOLOv4' and 'Movement Modeling' to produce a 'Detection Result' and 'Physical Model' (involving F_{ball} , F_{bat} , F_{air} , F_{fric} , F_{spin} , F_{drag} , F_{lift} , $F_{gravity}$, F_{wind} , $F_{coriolis}$, $F_{magnetic}$, $F_{electric}$, $F_{thermal}$, $F_{acoustic}$, $F_{optical}$, $F_{mechanical}$, $F_{chemical}$, $F_{biological}$, F_{social} , $F_{cultural}$, $F_{economic}$, $F_{political}$, $F_{religious}$, $F_{philosophical}$, $F_{scientific}$, $F_{artistic}$, $F_{literary}$, $F_{musical}$, $F_{dramatic}$, $F_{cinematic}$, $F_{television}$, F_{radio} , $F_{internet}$, F_{mobile} , F_{cloud} , F_{big} , F_{data} , $F_{analytics}$, $F_{machine}$, $F_{learning}$, $F_{artificial}$, $F_{intelligence}$, $F_{robotics}$, $F_{automation}$, $F_{cybernetics}$, $F_{informatics}$, $F_{telecommunications}$, $F_{transportation}$, $F_{aviation}$, $F_{maritime}$, F_{land} , F_{space} , $F_{aerospace}$, $F_{defense}$, 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III. SYSTEM ARCHITECTURE DESIGN

The diagram illustrates the system architecture design, divided into two main phases: Setup Phase and Working Phase. The Setup Phase is enclosed in a dashed box and includes the following steps: Mobile APP Start, Hotspot turn on, Wi-Fi connection and system setup, and Power ON. The Working Phase is divided into two parallel paths: Smartphone and Camera Node. The Smartphone path includes Take Video Command, Video Capture, Video Processing, and Baseball Detection, Batting Digitalization. The Camera Node path includes Stand by, Video Capture, and Video Upload. Arrows indicate the flow of data and control between these components.

```
graph LR
    subgraph Setup_Phase [Setup Phase]
        A[Mobile APP Start] --> B[Hotspot turn on]
        B --> C[Wi-Fi connection and system setup]
        D[Power ON] --> C
    end
    C <--> E[Take Video Command]
    subgraph Working_Phase [Working Phase]
        subgraph Smartphone
            E --> F[Video Capture]
            F --> G[Video Processing]
            G --> H[Baseball Detection  
Batting Digitalization]
        end
        subgraph Camera_Node [Camera Node]
            I[Stand by] --> J[Video Capture]
            J --> K[Video Upload]
            K --> I
        end
    end
```

IV. METHODOLOGY

V. EVALUATION AND TESTING



(a)

(b)

End of Presentation
Thank You

5

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0 A Deep-Learning Based Consumer Grade Smart Baseball Training System for Batting Performance Digitalization Alan Lam

1 II. RELATED WORK

2 II. SYSTEM ARCHITECTURE DESIGN

3 IV. METHODOLOGY

4 V. EVALUATION AND TESTING

5 End of Presentation Thank You 投影片 1 / 0..5 英文 (美國) 協助工具: 調查

II. RELATED WORK

Batting Result and Feedback

Smartphone: Side Camera & Control Platform

Camera Node: Bottom Camera

Smart Baseball System

Batting Video

Baseball Detection

Movement Modeling

Digitalization & Visualization

SimRepYOLOv4

Physical Model

Control Messages

Wi-Fi

Images

Conf: 0.9999713

Conf: 0.9998932

Prototype

Presented by Alan Lam, Powered by [Poffices.ai](https://poffices.ai)

p.1

II. RELATED WORK

- Prior baseball digitalization used costly multi-exposure, stereo vision, or multi-sensors
- Existing systems are expensive or too slow for practical consumer use
- This system targets low-cost, consumer-grade vision-based digitalization
- Employs deep learning and physical models for efficient baseball motion analysis

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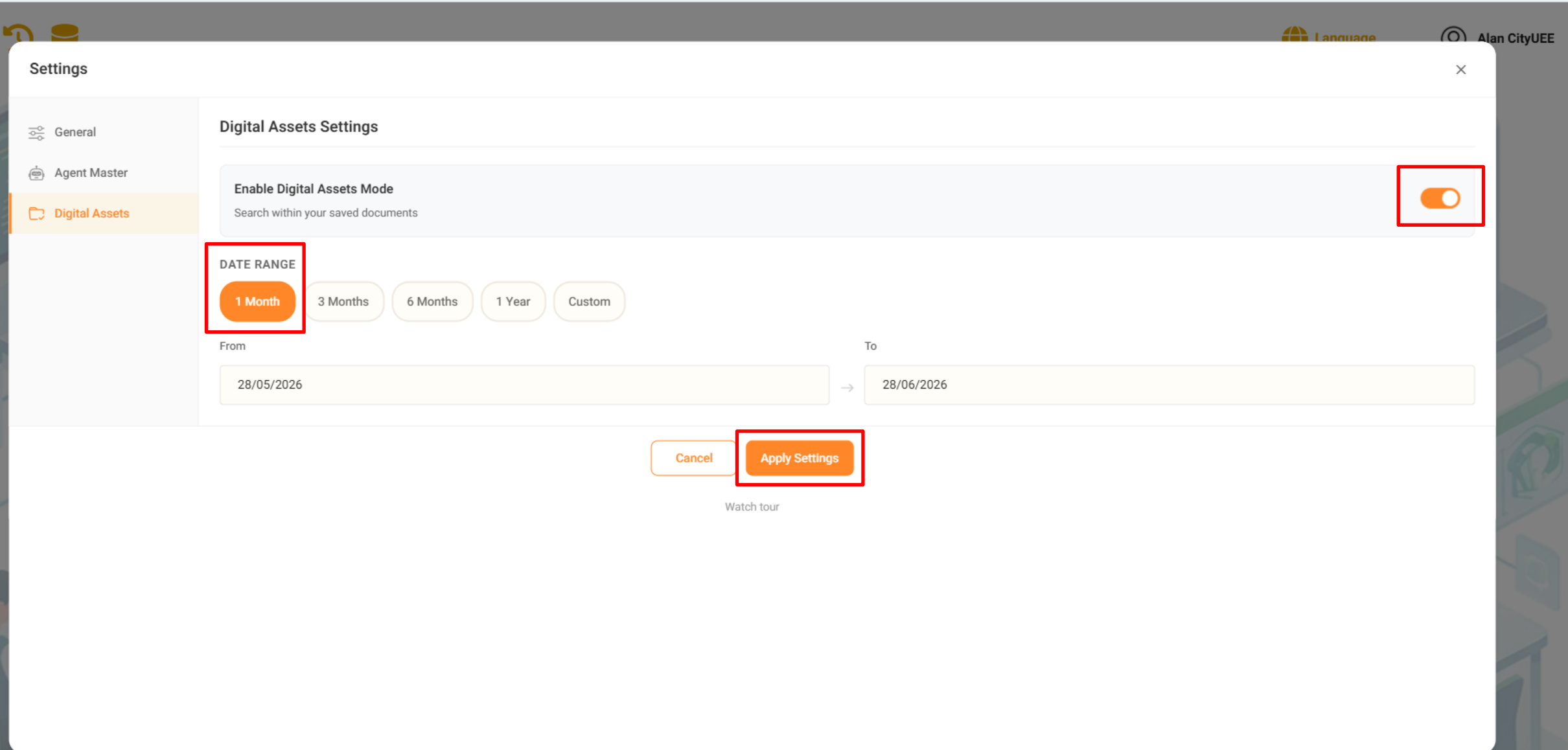
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Language

Alan CityUEE



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Using Chatbot to ask quick questions about digital assets



Alan CityUEE

Poffices.AI

Smart GenAI Platform
For Education, Work & Beyond

Input the instruction for the question about the previous document

Choose Chatbot agent for the quick question

What is the methodology for detecting the baseball |

Click to generate the answer



Disclaimer: Generated content may reference third-party materials. Users are responsible for verifying rights and usage. See [T&C](#) for detail.

Quick and accurate answer to be obtained

chatbot

Good afternoon, Alan CityUEE!

Allow me to present the details regarding your request:

The request states: "What is the methodology for detecting the baseball". I have the honor to serve as **chatbot**, Agent 5 (**chatbot**), in handling this request.

The output requirements encompass: The document will be named "**Methodology for Detecting the Baseball**", it will be formatted as a/an **Chat**, written in **English**, following the **##Methodology for Detecting the Baseball** structure.

The thematic elements to be addressed are: **Baseball Detection Methodology**. These components will ensure the output meets all specified objectives.

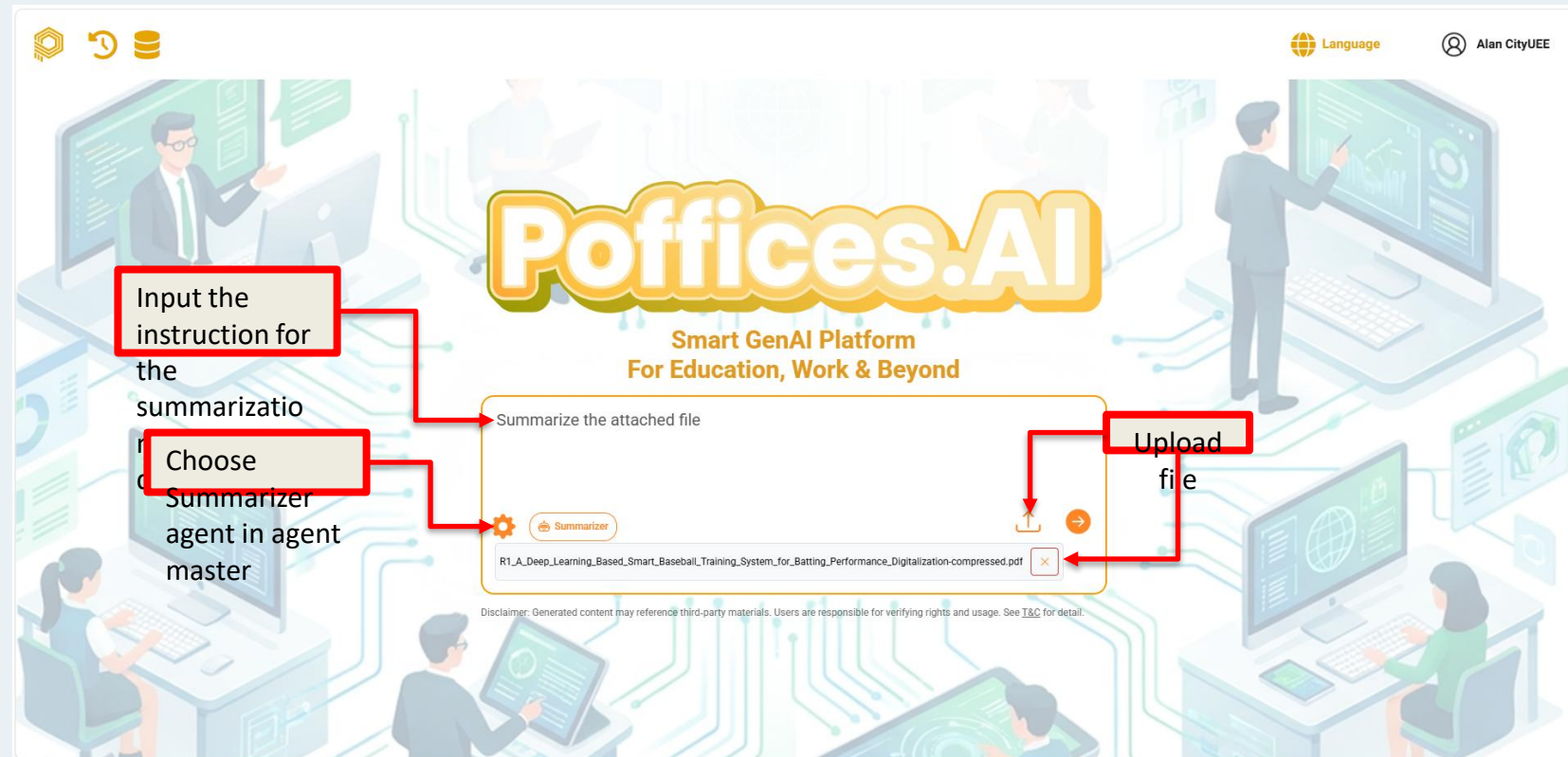
Handling of this request has started, and the result will follow shortly after completion.

Time of preparation: **1s** Time of completion: **18.1s**

The methodology for detecting the baseball in the proposed system employs a vision-based approach utilizing a lightweight deep learning model designed to accurately and efficiently detect and locate the baseball within images, despite challenges such as fast movement, varying environmental brightness, and potential image blurring. The detection model, named simpler-RepVGG-YOLOv4 (SimRepYOLOv4), is based on the YOLOv4 architecture with RepVGG as the backbone. It integrates advanced attention mechanisms, specifically the Convolutional Block Attention Module (CBAM) and Normalization Attention Mechanism (NAM), to enhance feature learning by focusing on relevant baseball features while suppressing environmental noise and uninformative data. Although the anchor mechanism is computationally costlier than anchor-free alternatives, it is employed here to simplify regression tasks, with customized anchor sizes derived by clustering bounding boxes to improve detection performance, considering the relatively fixed distance between the baseball and camera. Data augmentation techniques are utilized during model training to enhance robustness against different environmental conditions and object scales, ensuring the detector performs consistently under diverse and unpredictable settings. The model outputs a single detection head after the Feature Pyramid Network (FPN) to reduce post-processing time and improve efficiency since the baseball is a small target within the image. This approach achieves high detection accuracy and is fundamental for subsequent physical modeling and digitalization of the baseball's motion.

Practical Exercise

1. Keep this note confidential. You must NOT share to others or release to public.
2. Login <https://poffices.ai/>
3. Follow the above steps to try the digital assets mode using summarizer to summarize the attached file
4. Try to access the digital assets by asking quick question to Chatbot agent
5. Discuss your findings

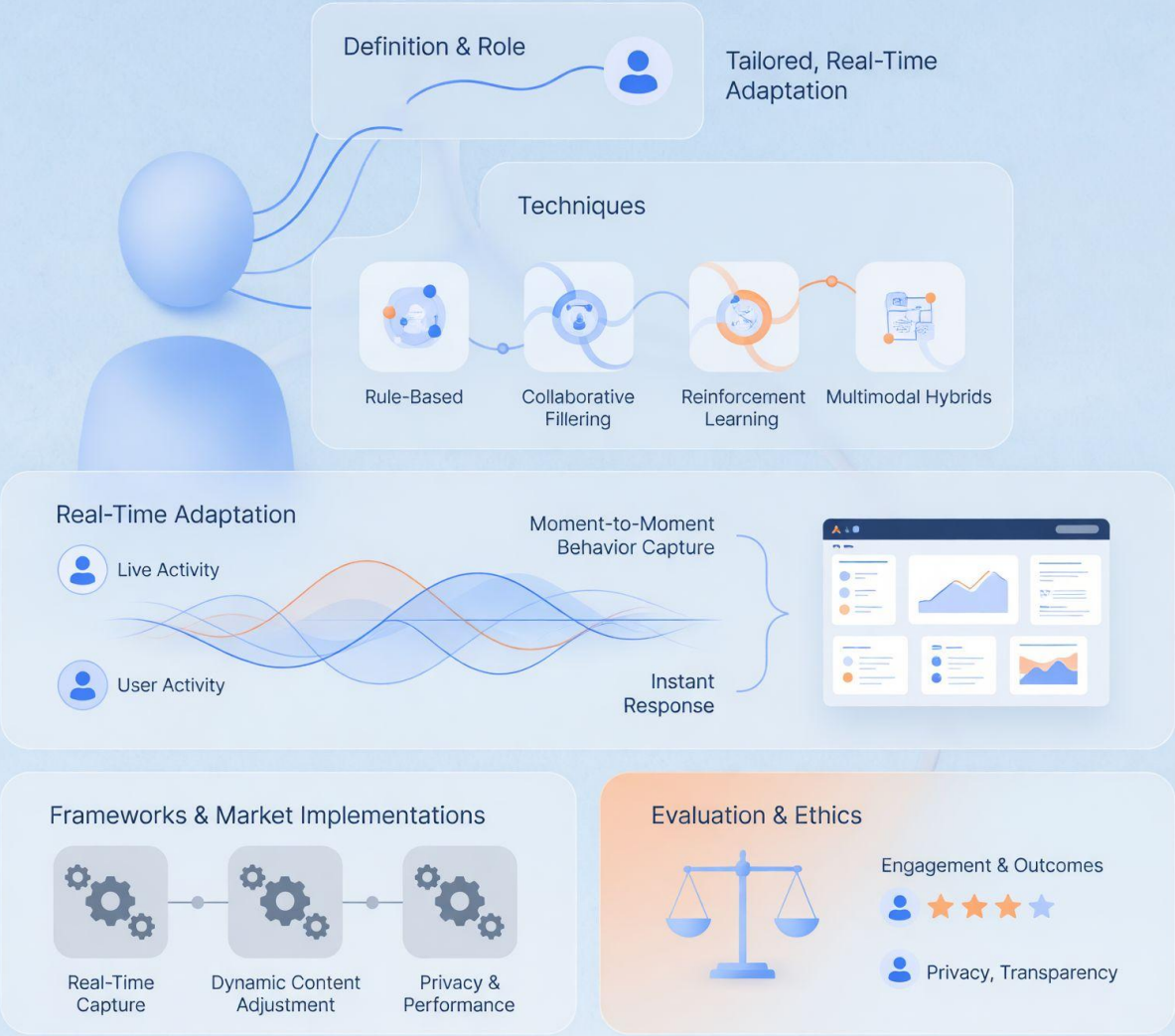


Enhancement Techniques by using Education Agents

Ir Prof Alan Lam, JP



Personalization Techniques in AI



Personalized Learning Agents



Mastery-Based Adaptive Instruction



Context-Aware Mental Health Interventions



Performance-Driven Content Personalization



Instant Strategy & Resource Adaptation



Proactive Multimodal AI Collaborators

Adaptive Learning Models

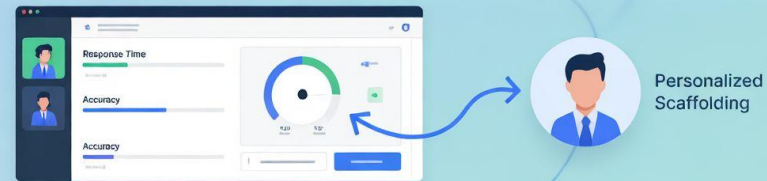
Cognitive Foundations for Adaptive Learning



Dynamic Curriculum Architecture (MOSAIC Model)



Intelligent Tutoring Systems with Real-Time Feedback



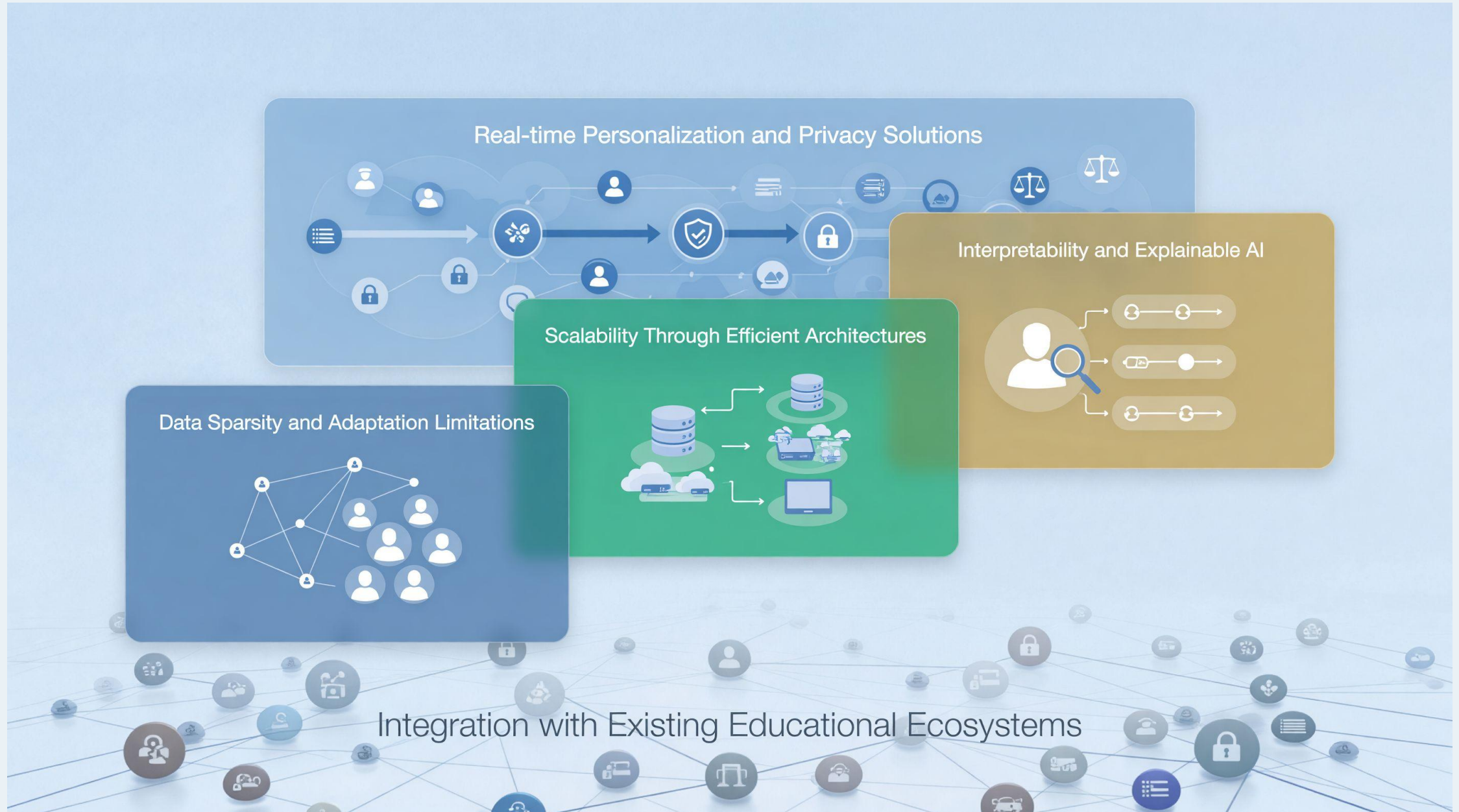
Reinforcement Learning Framework for Adaptation



Motivational Personalization through ARCS Model



Technical Challenges and Solutions

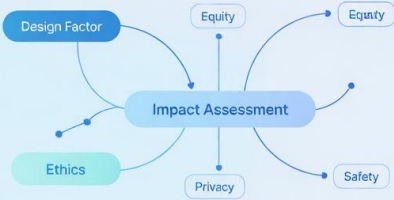


Future Directions in Personalization

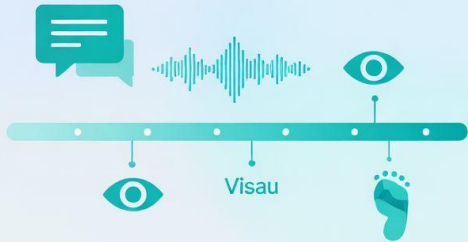
Advances in AI Technology



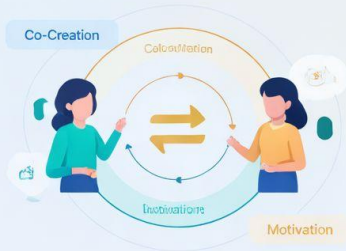
Formalizing Personalization Design and Evaluation



Multimodal and Real-Time Personalization



Human-AI Co-Agency in Learning

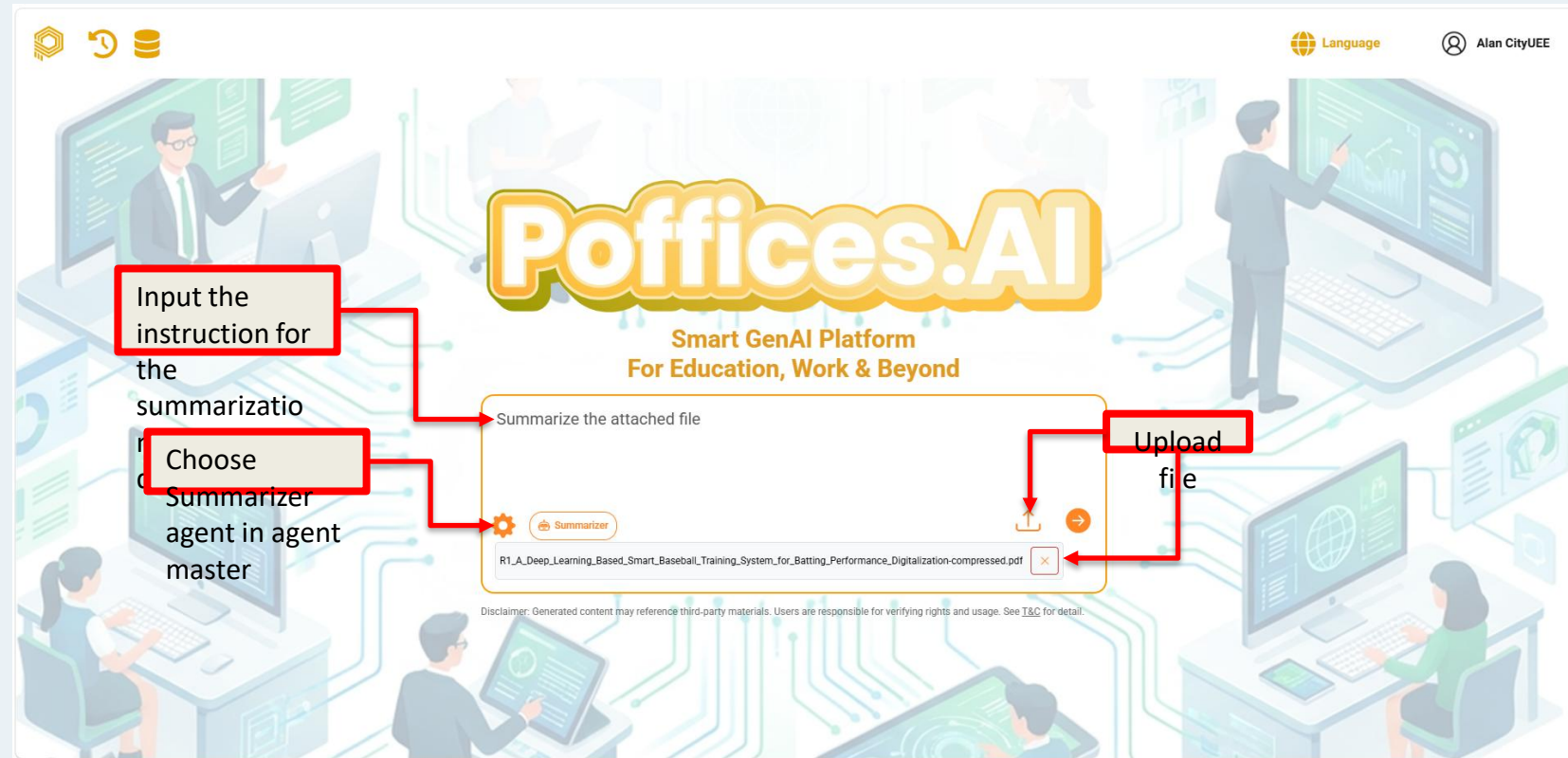


Ethics, Standardization, and Accountability



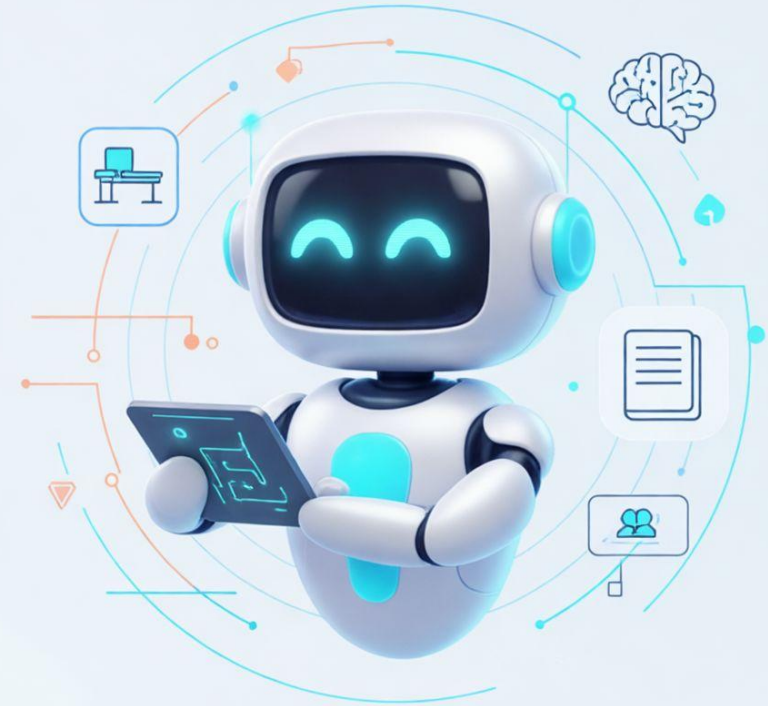
Practical Exercise

1. Keep this note confidential. You must NOT share to others or release to public.
2. Login <https://poffices.ai/>
3. Follow the above steps to build the digital assets based on your education database
4. Try to use your education agent to access the digital assets and input query
5. Discuss your findings

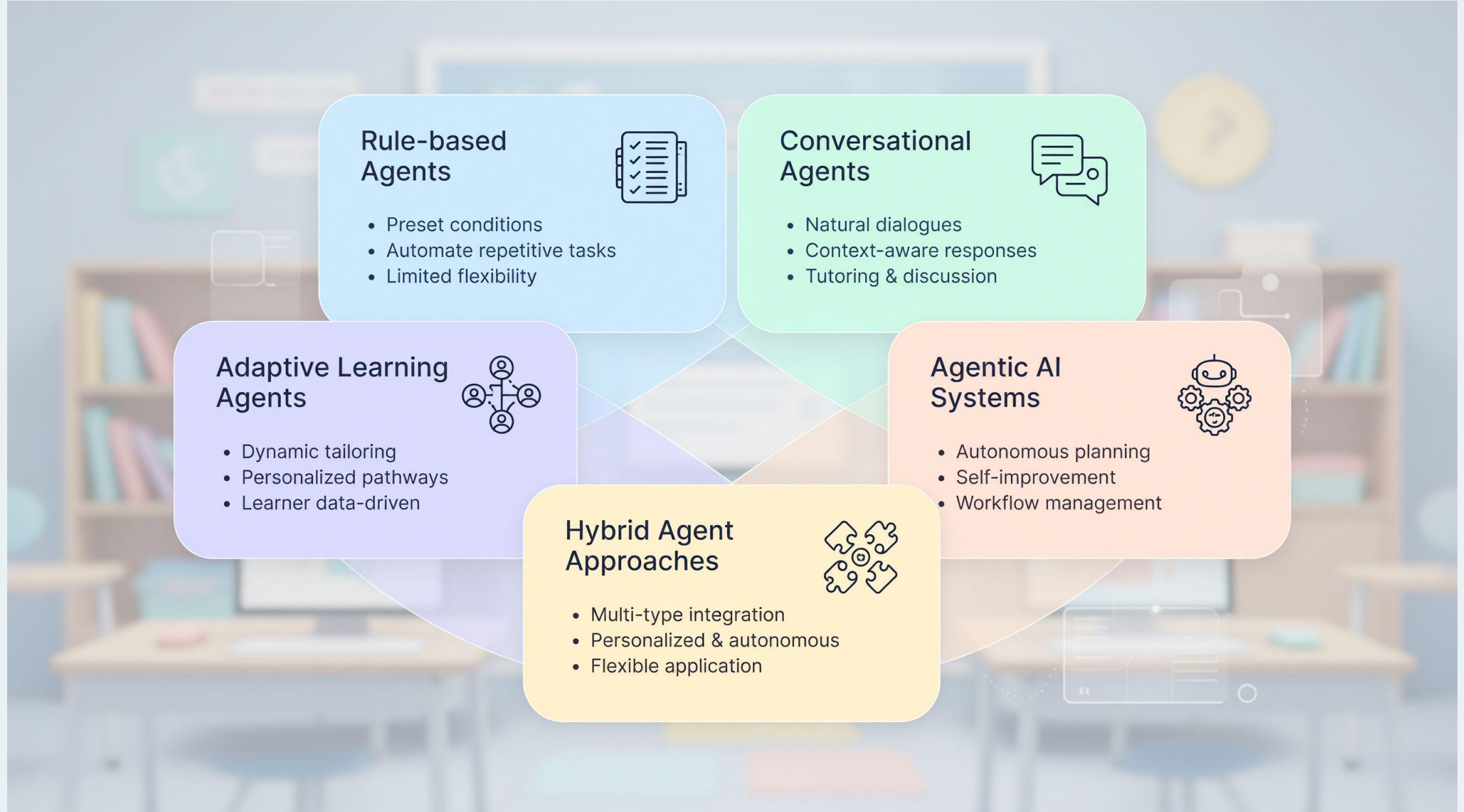


Building Interactive AI Agents for Education Applications

Ir Prof Alan Lam, JP



Types of Interactive AI Agents



Examples of Classroom AI Agents

Manus AI:
Autonomous Educational
Content Creator



University Programs:
Practical Agent
Design Education

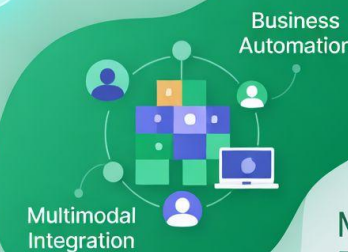


Autonomous Classroom
AI Ecosystem

Claude AI:
Custom Tool Builder for
Higher Education



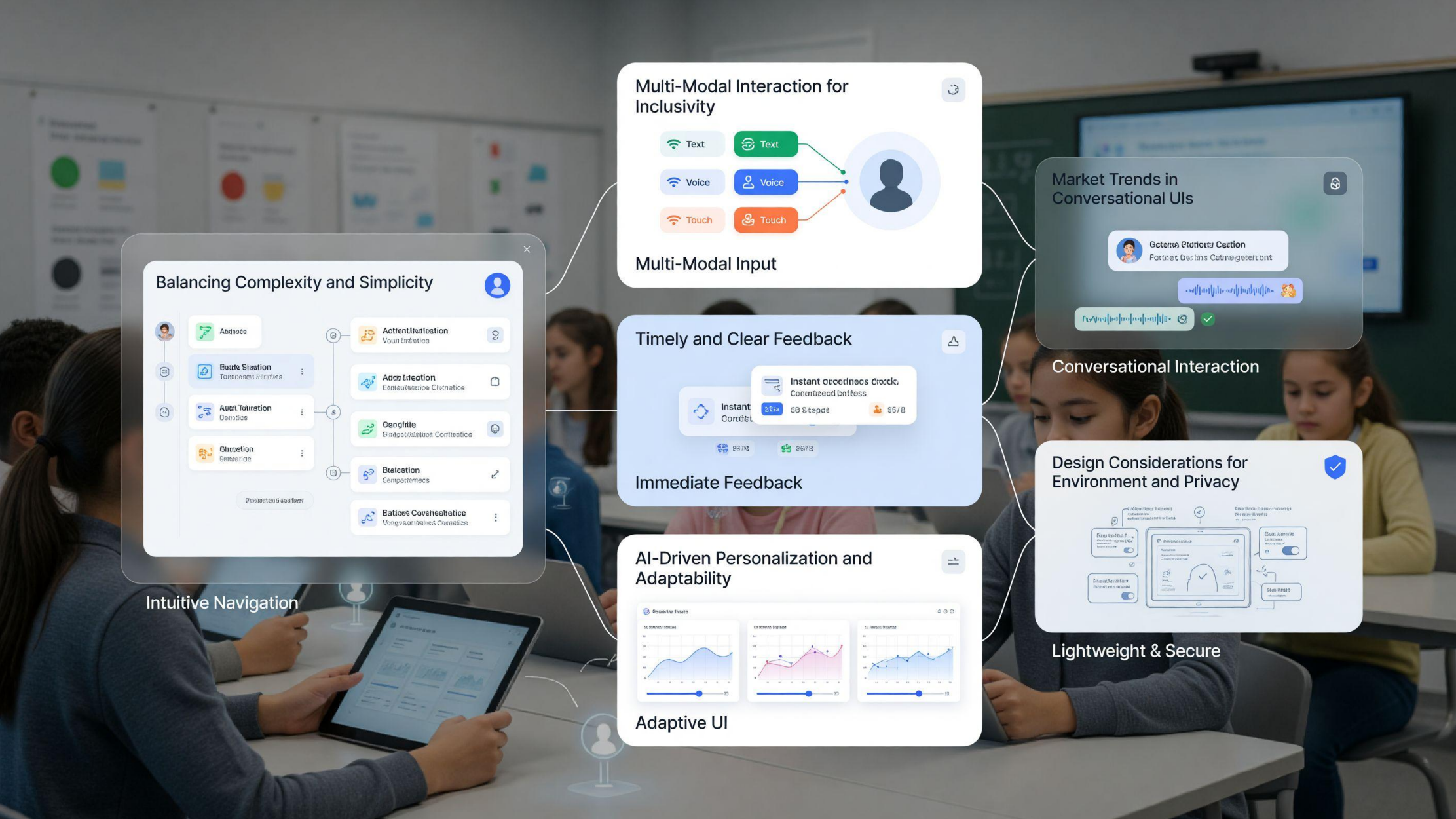
Microsoft AI Learning Hub:
Enterprise-Level AI
Agent Platform



From Static Chatbots

To Autonomous Collaborators

Designing User Interfaces for Engagement



Incorporating Feedback Mechanisms



Real-world Application Examples



Step-by-step Agent Building Process

Needs Analysis



Content & UI



Adaptive Feedback



Testing & Deployment



Collaboration & Context



Evaluation Metrics for Education Agents

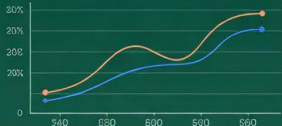
Engagement and Learning Effectiveness



Interaction Frequency

Session Duration

Learning Progress



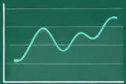
Accuracy and Responsiveness



Error Rates



Correctness



Response Time

Personalization and User Experience



Adaptation Quality



User Feedback

Operational Efficiency and Ethical Compliance



Workload Reduction

Automation

Data Privacy

Fairness

Integrated Evaluation for Continuous Improvement



Real-World Impact:
Time Savings &
Resource Quality

Practical Exercise

1. Keep this note confidential. You must NOT share to others or release to public.
2. Login <https://poffices.ai/>
3. Based on your idea and follow the whole course technique to develop multi-agent education Agent with digital assets for domain specific GenAI Agent system
4. Test the overall system and prepare the demo and presentation for demo day



(2) Enter your input with new prompt, check click generation.

(1) Click **Agent Master** to choose your domain-specific multi-agents education system

End of Presentation

Thank You