Opportunities in IME as an AI Researcher

Sangwoo Mo

Assistant Professor
POSTECH IME

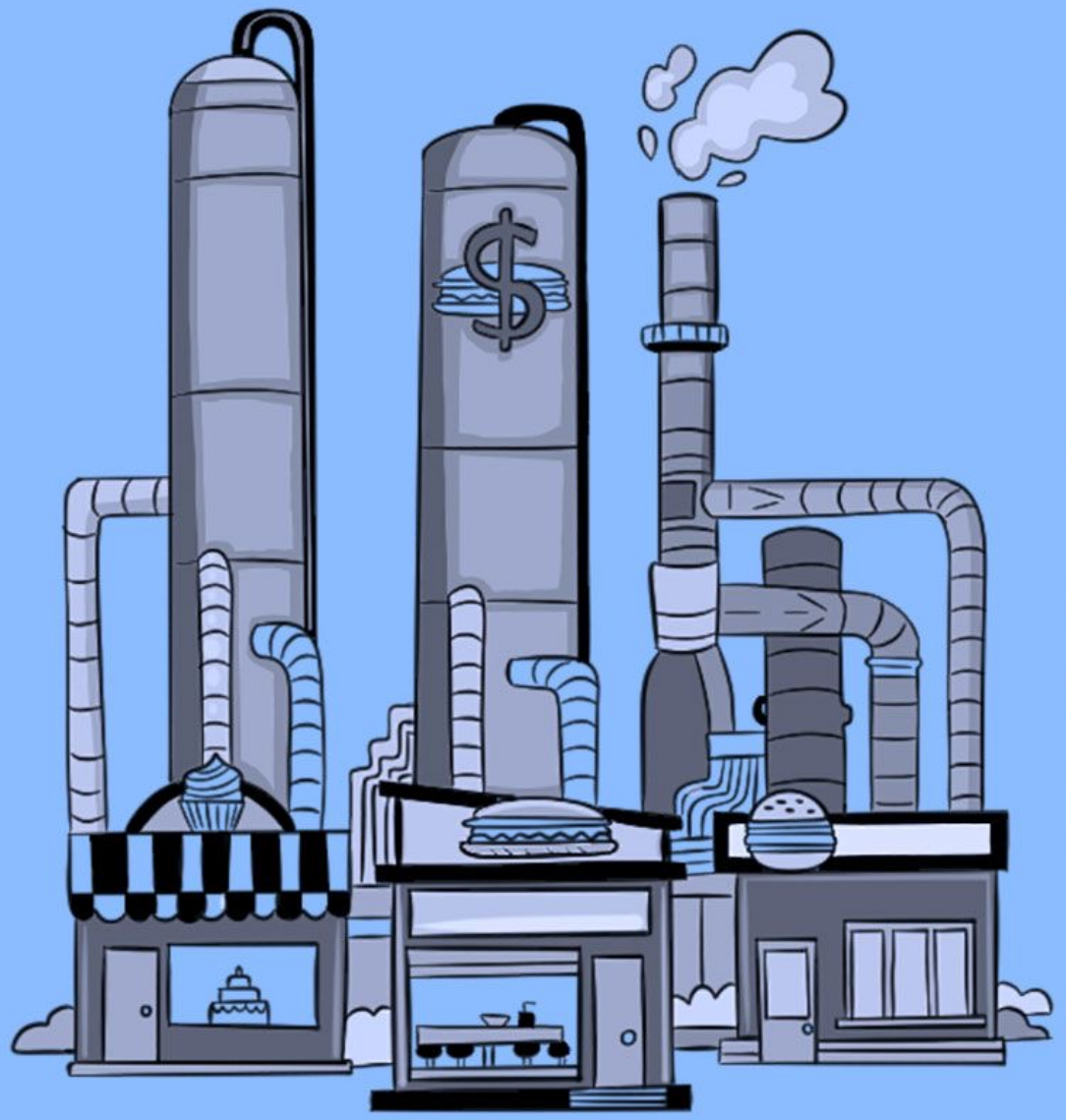
Opportunities in IME as an AI Researcher (...and Vice Versa)

Sangwoo Mo

Assistant Professor
POSTECH IME

Part I. Opportunities in IME as an AI Researcher

What is Industrial Engineering?



Industry

['in-(,)də-strē]

A group of companies that are related based on their primary business activities.

Investopedia

U.S. GDP BY INDUSTRY

2023

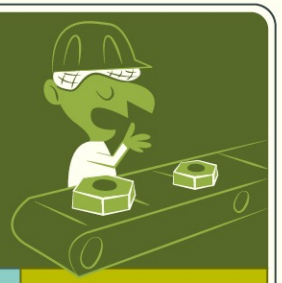
Private Industries Total: $23.5T

$3.5T
Professional, business services

Services-producing private industries like business services, real estate, and finance account for over 70% of U.S. GDP.



$2.9T
Manufacturing



$2.3T
Health, Social, Education Services



$2.0T
Finance, Insurance



$3.3T
Real Estate



$1.7T
Wholesale Trade



$1.5T
Retail Trade



$1.1T
Construction



$2.6T
Resource, Agriculture, Transportation Utilities, Other Services



$1.5T
Information



$1.2T
Arts, Food, Hospitality



$0.9T
Federal



Federal spending on national defense makes up 2% of GDP.

$2.1T
State & Local

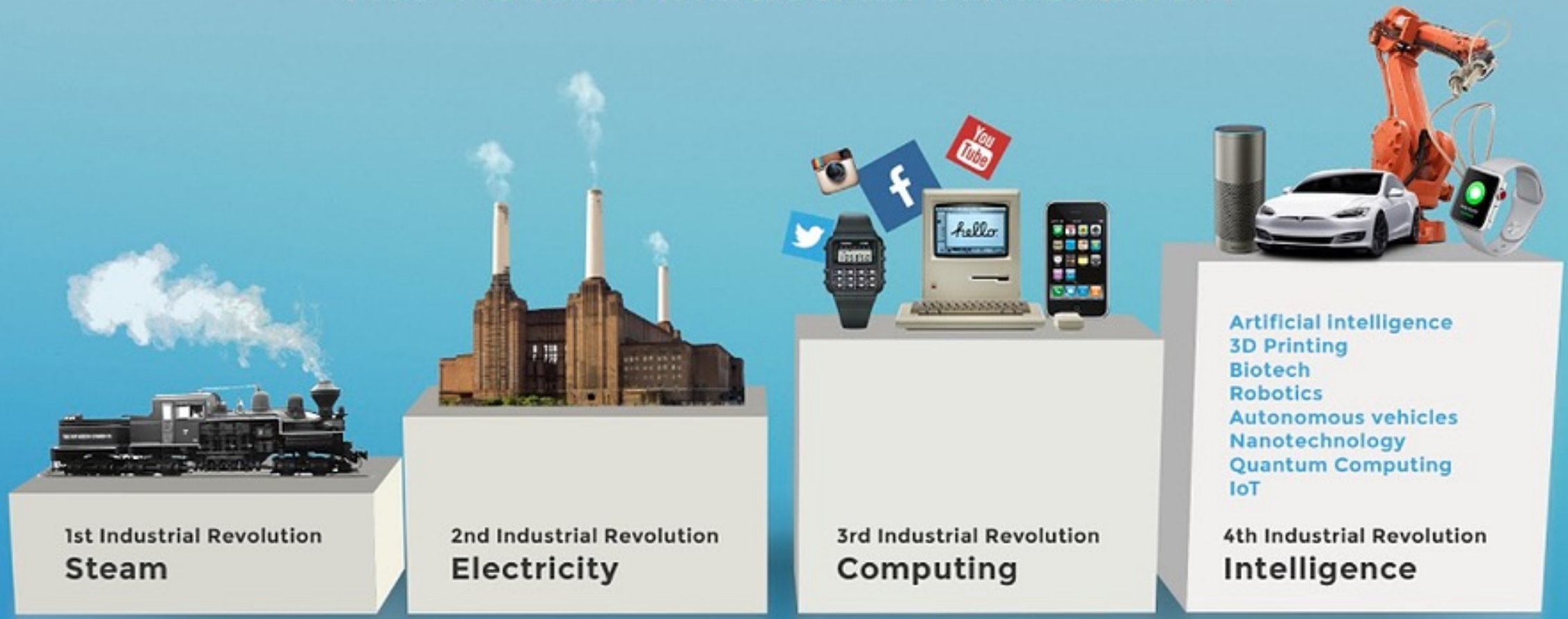


Government Total: $3.1T

VISUAL CAPITALIST

Figures may not add up to the total due to rounding | *Source: U.S. Bureau of Economic Analysis* | *Visualcapitalist.com*

The Fourth Industrial Revolution



Startup GRIND powered by Google for Entrepreneurs | Global Conference 2018

AI is the New Electricity

Dr. Andrew Ng



— “Software is eating the world, but AI is going to eat software“

Jensen Huang in 2017



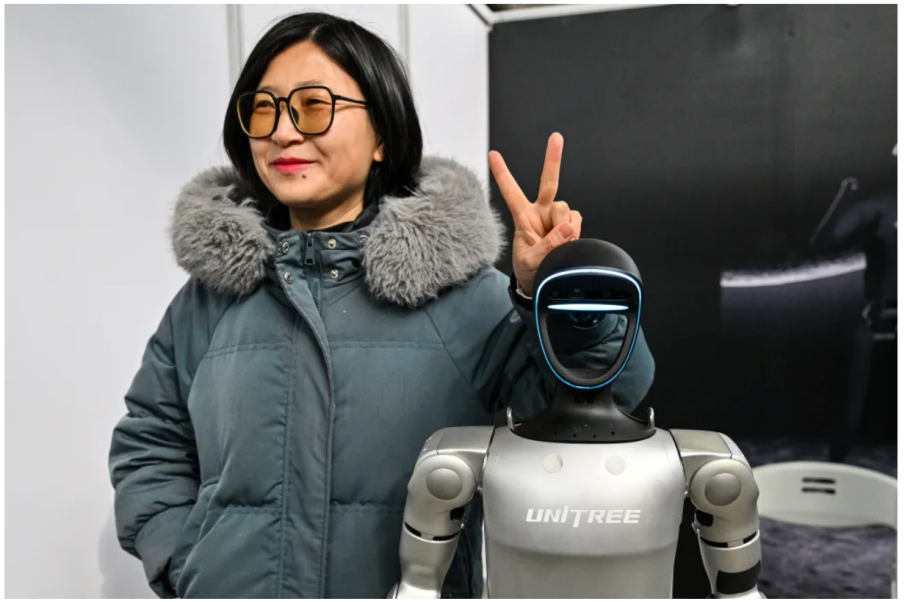
Innovation

Every business is becoming an AI company. Here's how to do it right

By Leigh Cuen

June 15, 2025

What's propelled your business to this point won't necessarily guarantee your future success. Here's what you need to know to move forward.



A woman poses next to a humanoid robot from Unitree Robotics during the Global Developer Conference

Future of IME = AI+X

U.S. GDP BY INDUSTRY

2023

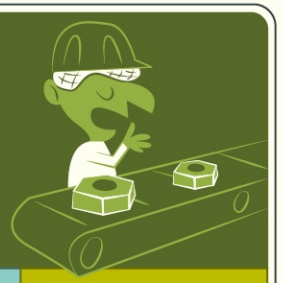
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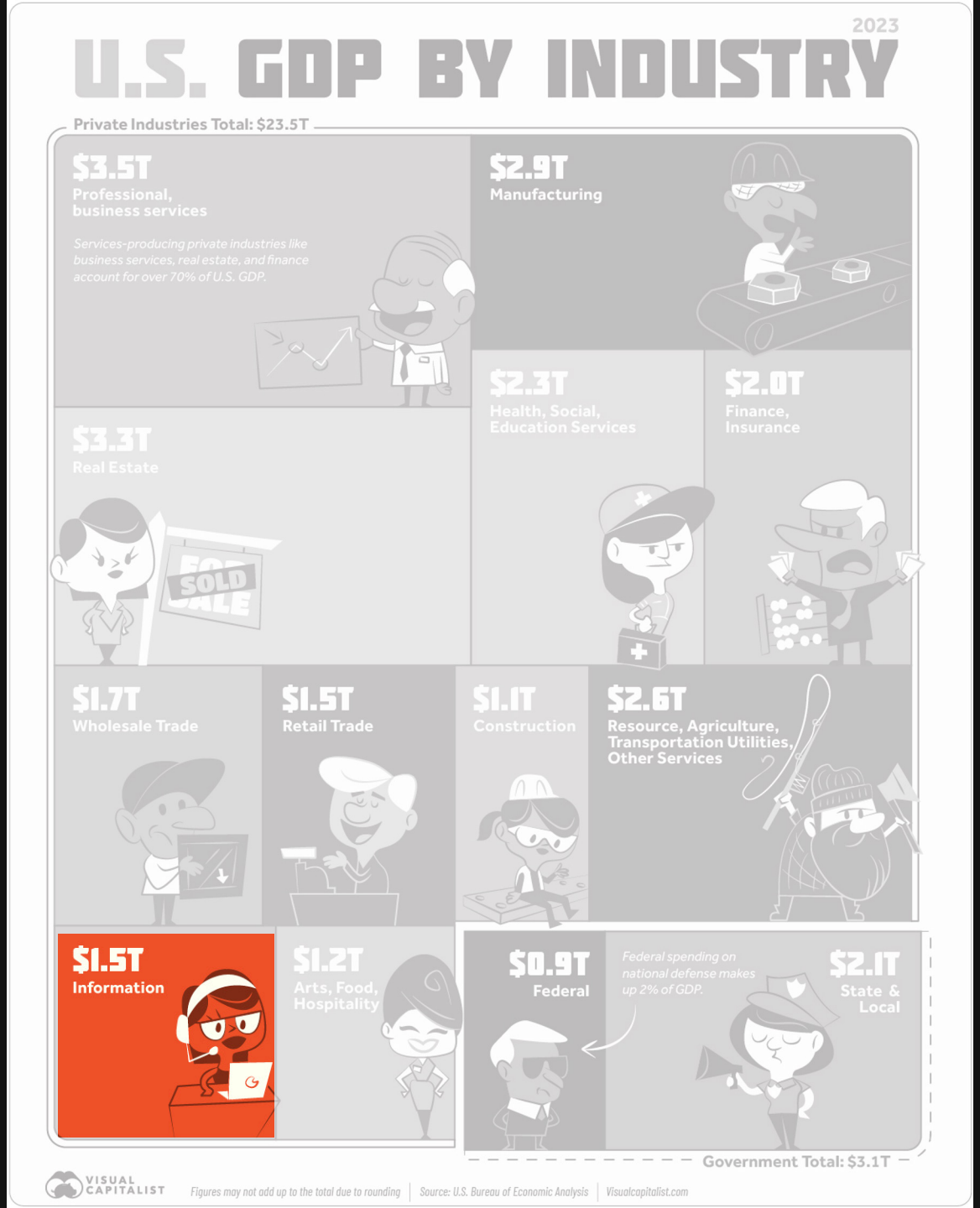


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AI graduates' area



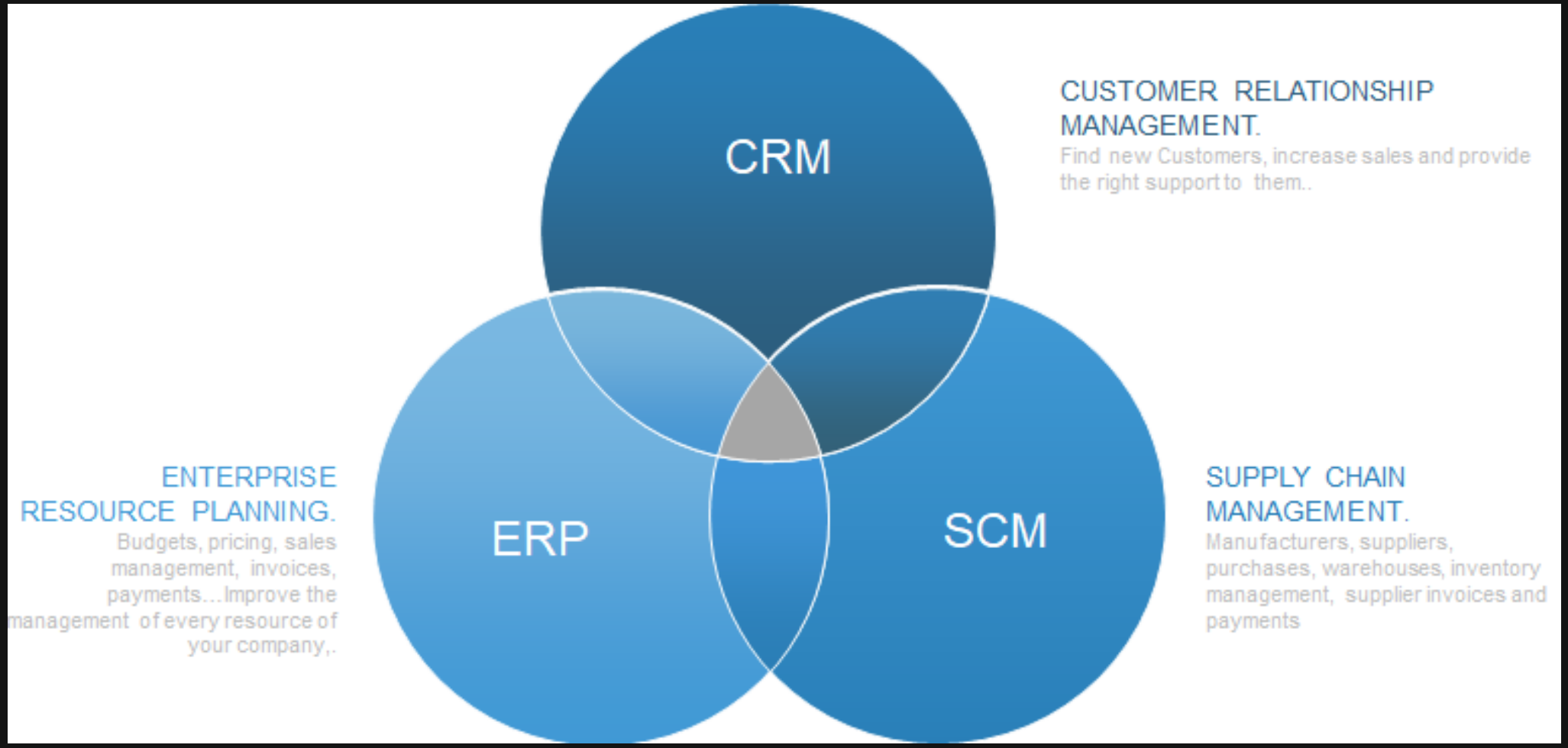


IME graduates' area

My Research Inspired by IME

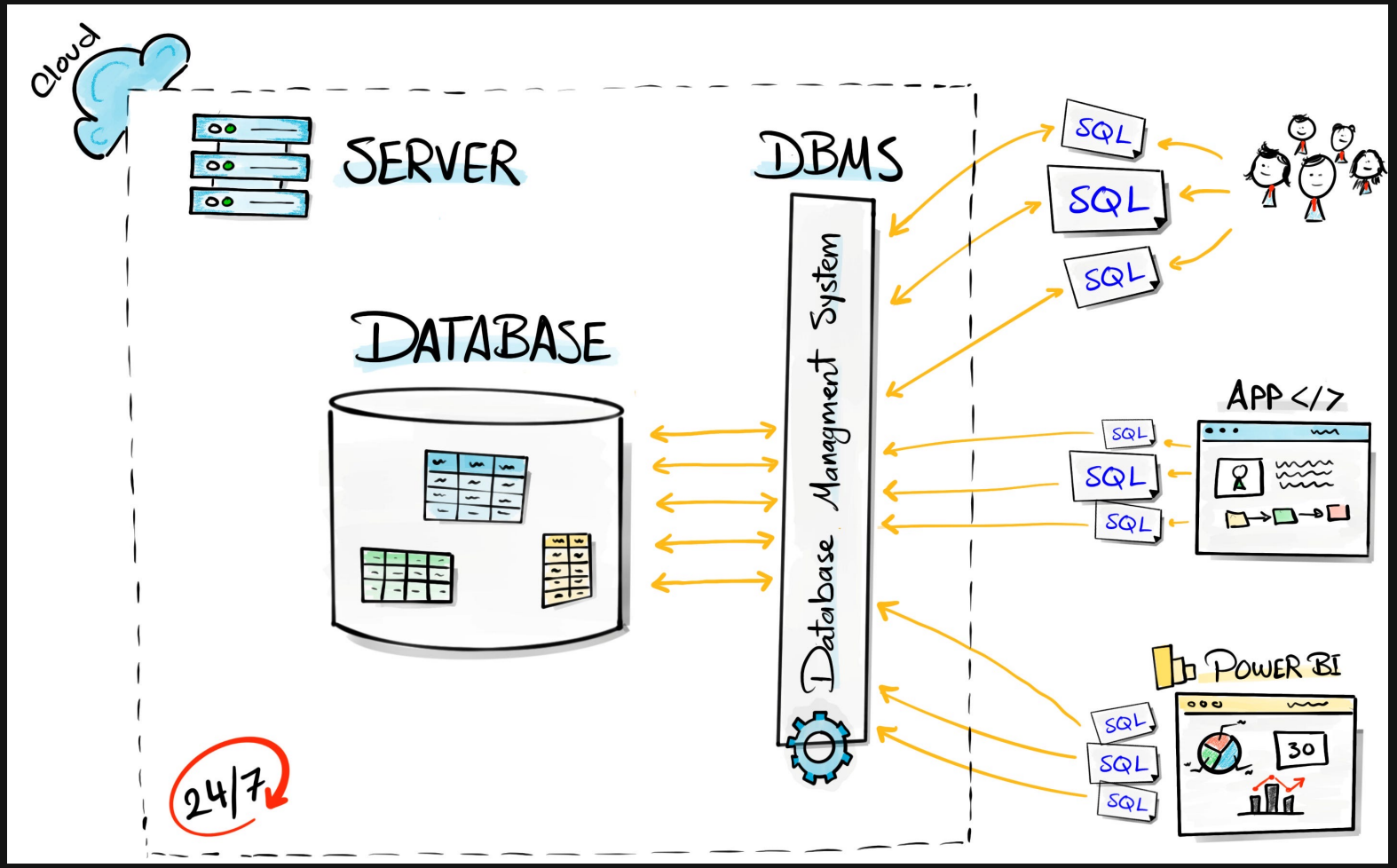
My Research Inspired by IME

1. AI for Management Information Systems (MIS)



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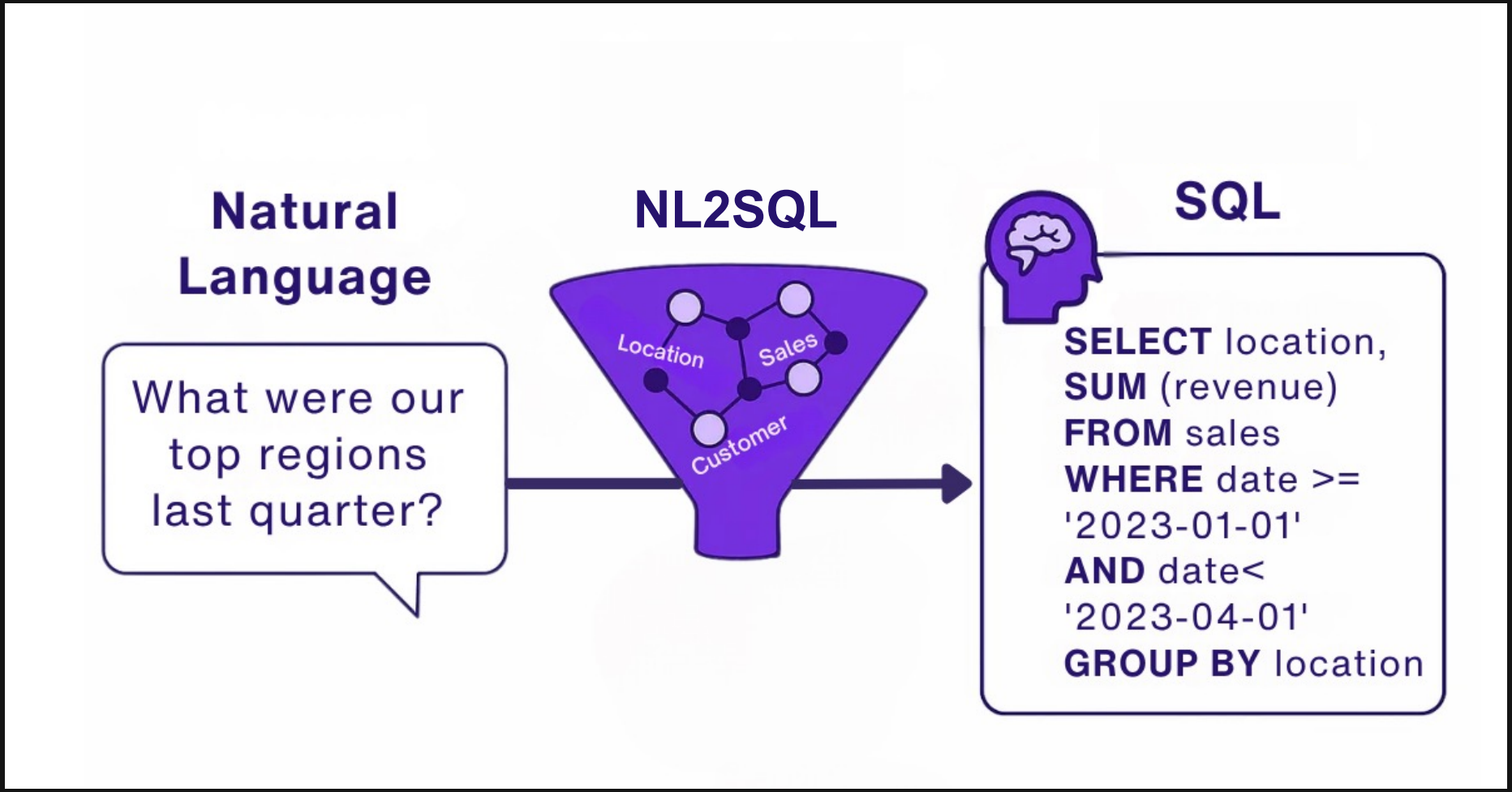
SQL Code Generation w/ 이수찬



Knowing Why Matters: Structural Reasoning for Code Repair via Error Taxonomy in NL2SQL. Under Review

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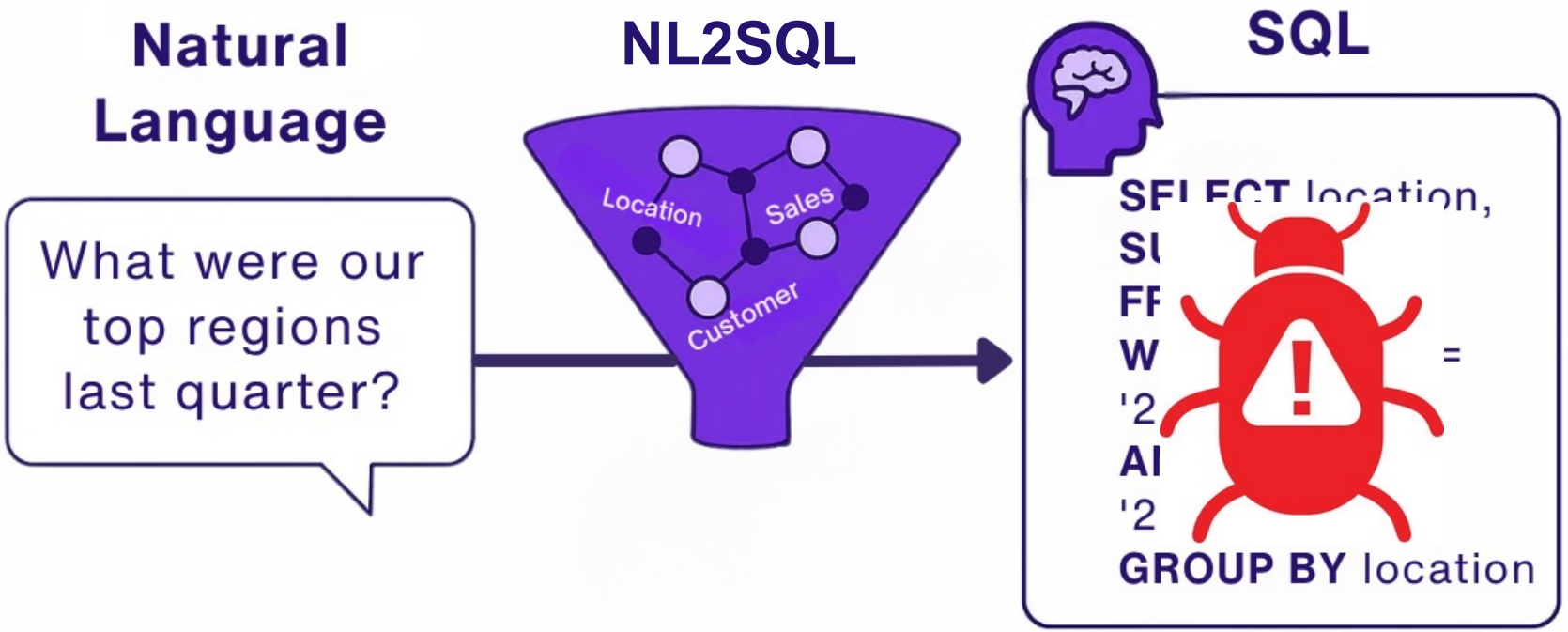
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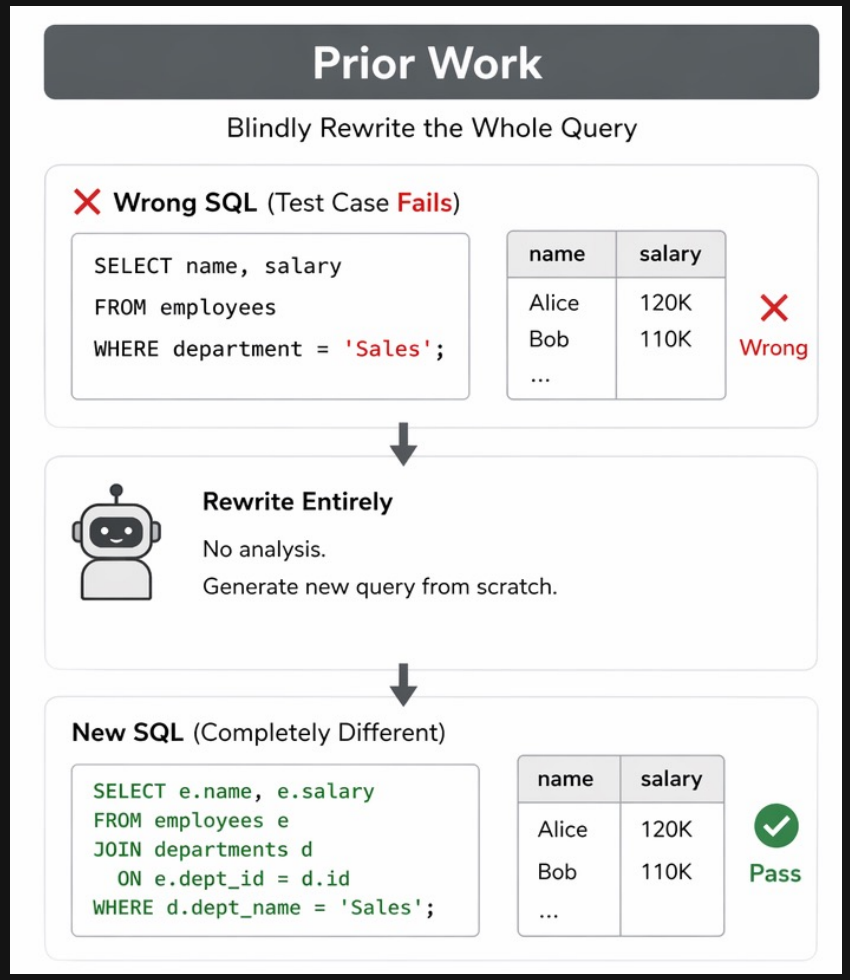
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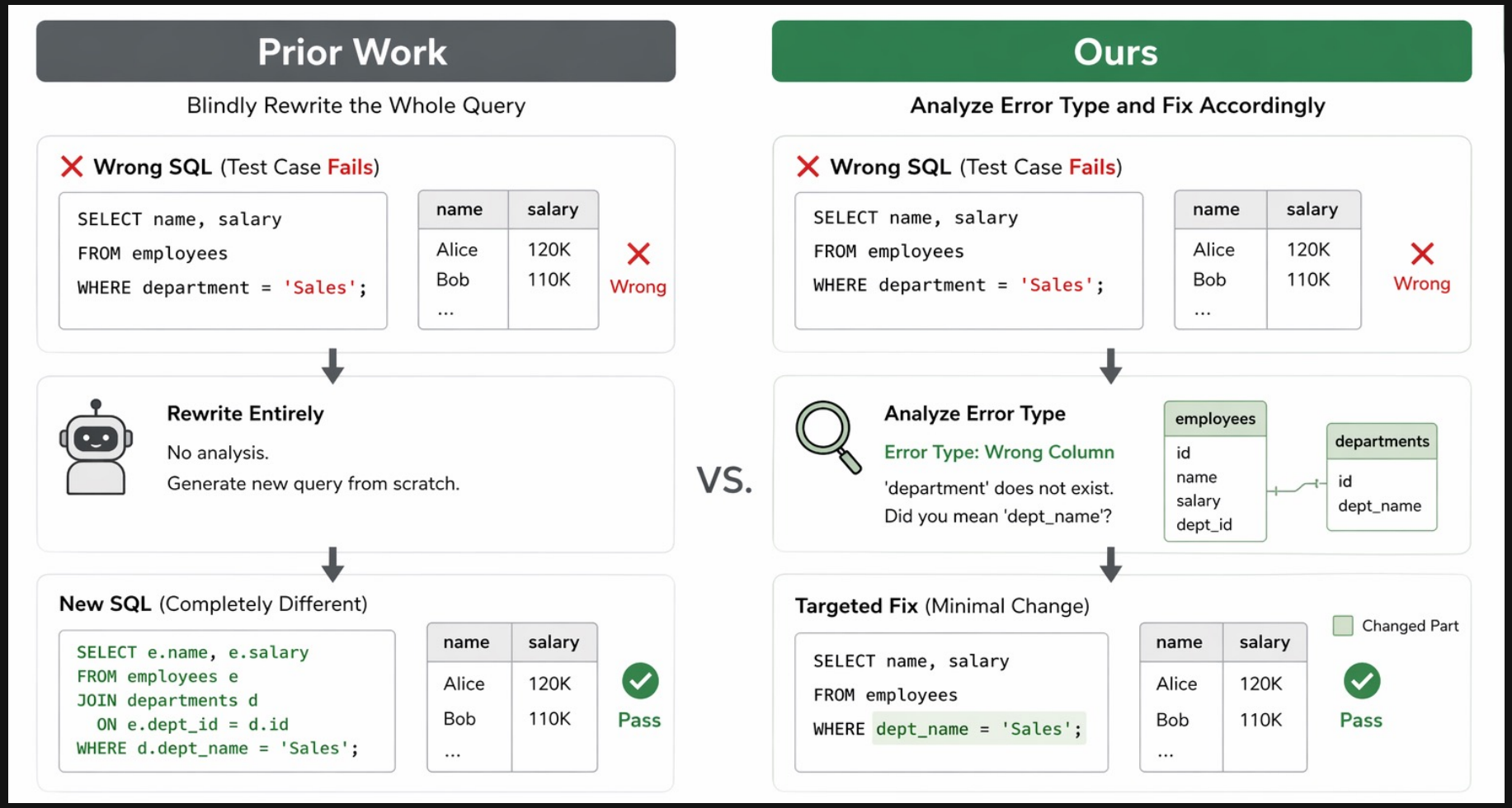
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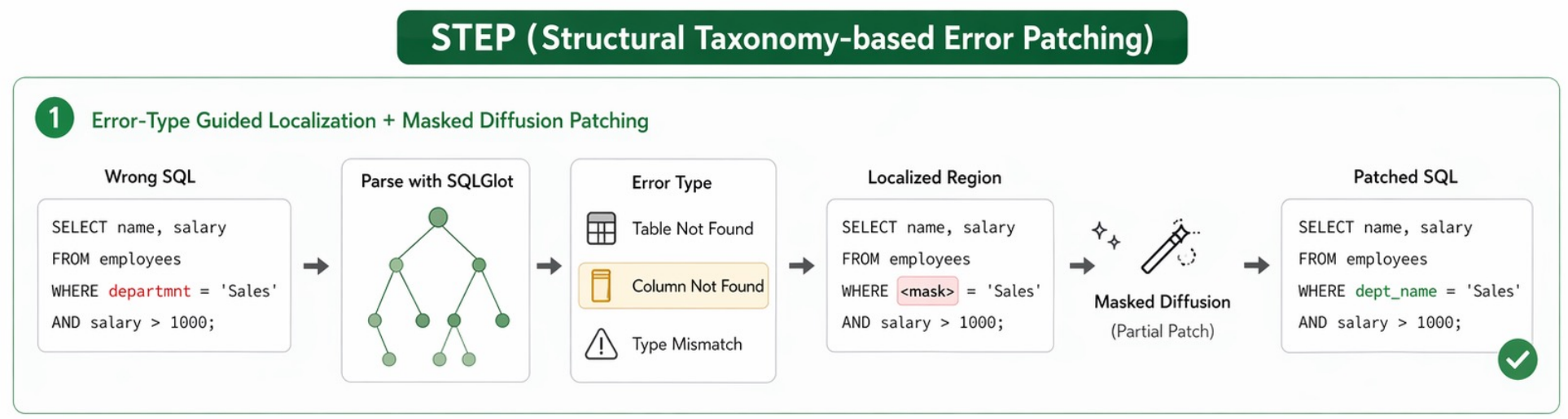
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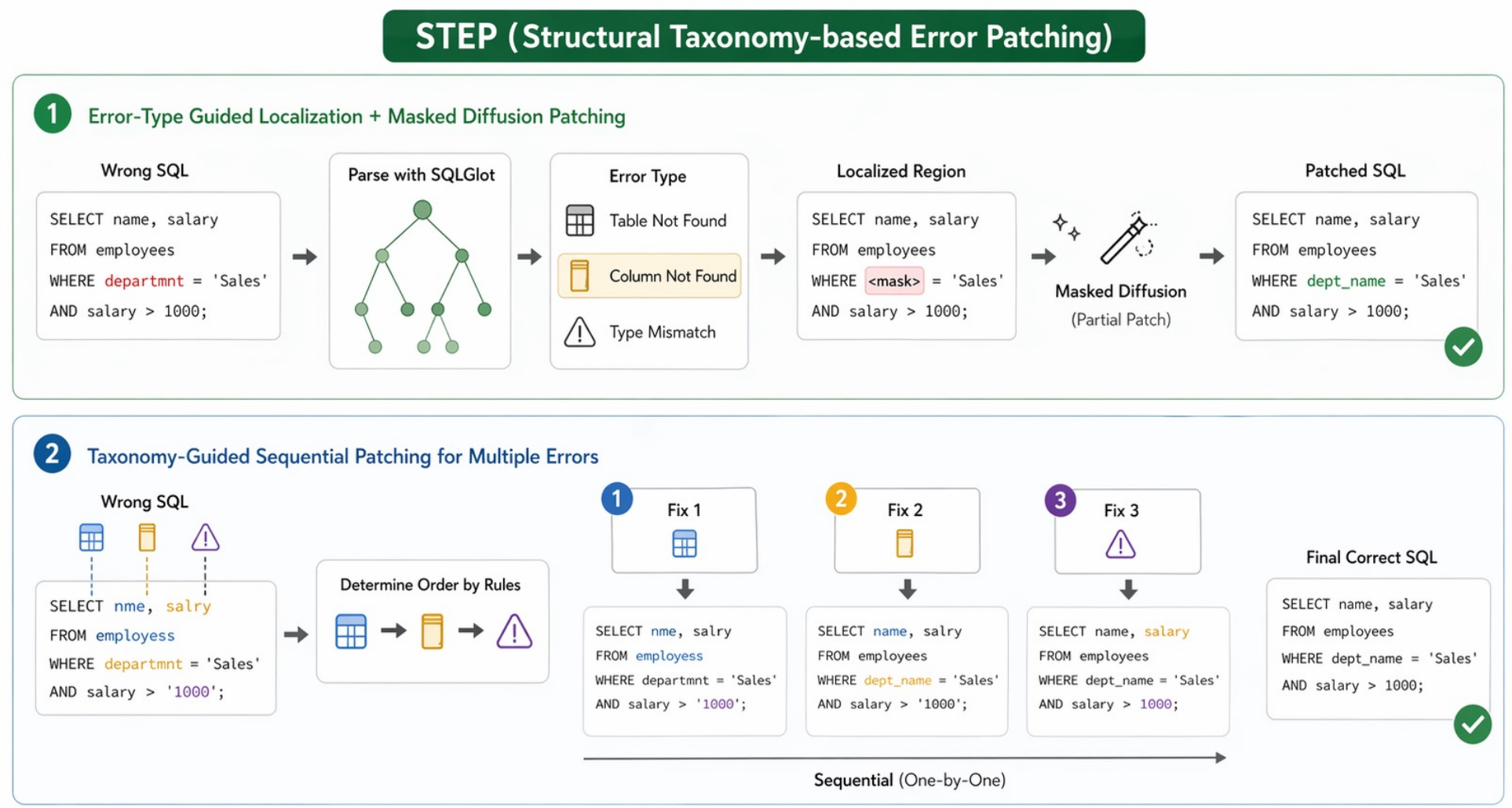
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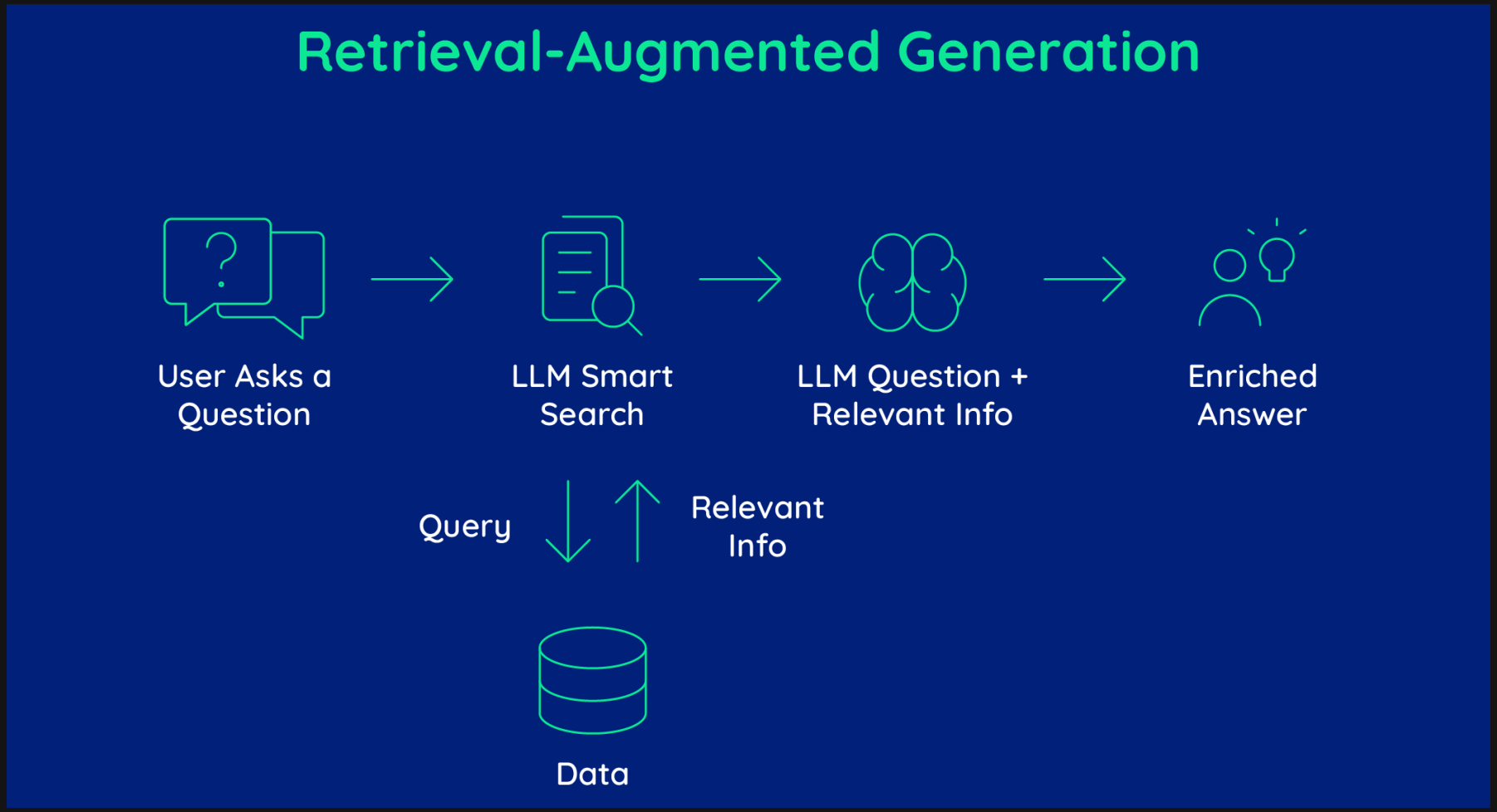
SQL Code Generation w/ 이수찬

Method	Attribute	Table	Value	Condition	Others	Overall
Qwen2.5-7B	24.3	33.3	41.4	29.4	16.7	30.0
+ CoT	35.1	26.7	37.9	**52.9**	16.7	35.5
+ STEP (ours)	**40.5**	**73.3**	**44.8**	**52.9**	16.7	**45.5**
Qwen2.5-14B	27.0	40.0	37.9	41.2	**41.7**	35.5
+ CoT	24.3	66.7	37.9	35.3	**41.7**	37.3
+ STEP (ours)	**40.5**	**73.3**	**51.7**	**52.9**	33.3	**49.1**
Qwen2.5-32B	32.4	66.7	48.3	35.3	**33.3**	41.8
+ CoT	40.5	**80.0**	37.9	47.1	**33.3**	45.5
+ STEP (ours)	**56.8**	**80.0**	**51.7**	**52.9**	25.0	**54.6**

Knowing Why Matters: Structural Reasoning for Code Repair via Error Taxonomy in NL2SQL. Under Review

1. AI for Management Information Systems (MIS)

Multimodal RAG w/ 조은찬, 장승현



Ongoing Work

1. AI for Management Information Systems (MIS)

Multimodal RAG w/ 조은찬, 장승현

PDF page (image)



Come sempre vi invito al dialogo ed al confronto eradito, invito alla critica costruttiva, a farci partecipi dei Vostri studi e degli approfondimenti.

Le prove antropologiche

L'arte è risaputo attinge per manifestarsi da forme creative definibili come: la realtà (ciò che ci circonda e che fa parte del nostro quotidiano vivere), gli stati d'animo (la tristezza, la gioia, lo stupore, eccetera), la fantasia dell'artista (l'immaginazione), la trasfigurazione di qualcosa di conosciuto e evaluato da particolari). Questo meccanismo non si deve essere scostato molto in epoche remote del nostro passato. I nostri avi rappresentavano quindi le loro opere ispirandosi ad una di queste fonti.

Quello che incuriosisce nella Filosofia Paleo S.e.t.i., ma in generale anche in colui che si appassiona di misteri e civiltà antiche, è il fatto che gli artisti del passato rappresentassero delle figure antropomorfe particolareggiate di elementi che destano curiosità in chi li osserva al giorno di oggi con le recenti conoscenze scientifiche. Di pari passo abbiamo poi degli indizi antropologici che, assieme alle rappresentazioni di meglitti con fattezze antroporfe, a iconografie di esseri per metà umani e per l'altra definibili come un "incrocio di razze", finendo poi per ritrovare collegamenti trasversali con resoconti mitologici e con credenze legate da un filo sottile in tutto il mondo.
Quali sono questi particolari vi chiederete, e perché gli si attribuisce una valenza di "Prova"?

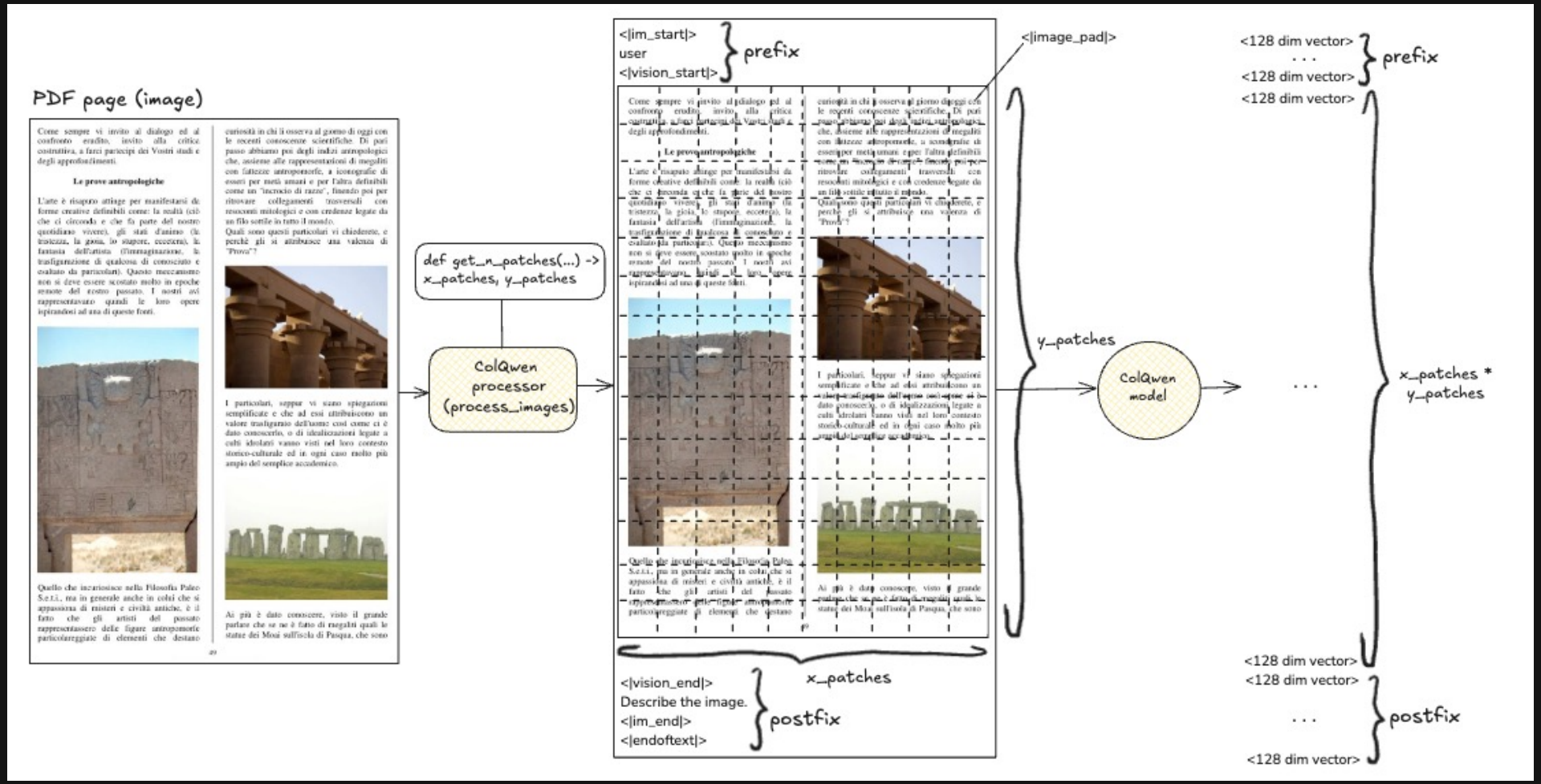
I particolari, seppur vi siano spiegazioni semplificate e che ad essi attribuiscono un valore trasfigurato dell'uomo così come ci è dato conoscerlo, o di idealizzazioni legate a culti idolatri vanno visti nel loro contesto storico-culturale ed in ogni caso molto più ampio del semplice accademico.

Ai più è dato conoscere, visto il grande parlare che se ne è fatto di raegalti quali le statue dei Moai sull'isola di Pasqua, che sono

Ongoing Work

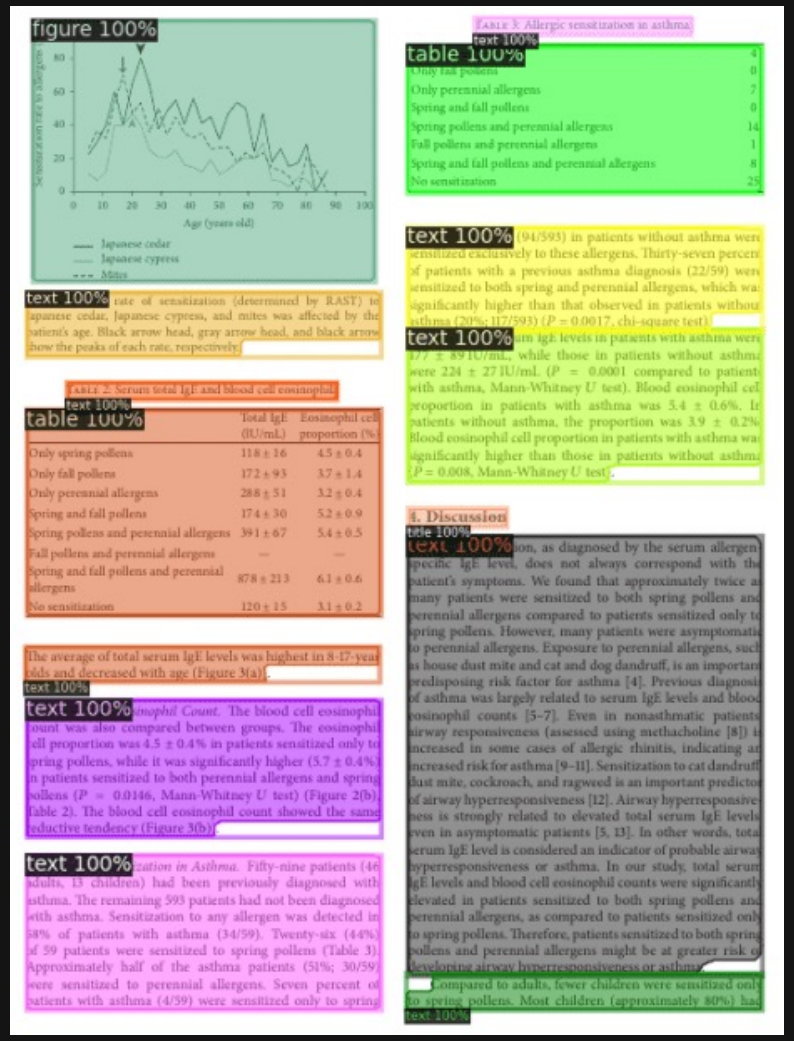
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Multimodal RAG w/ 조은찬, 장승현



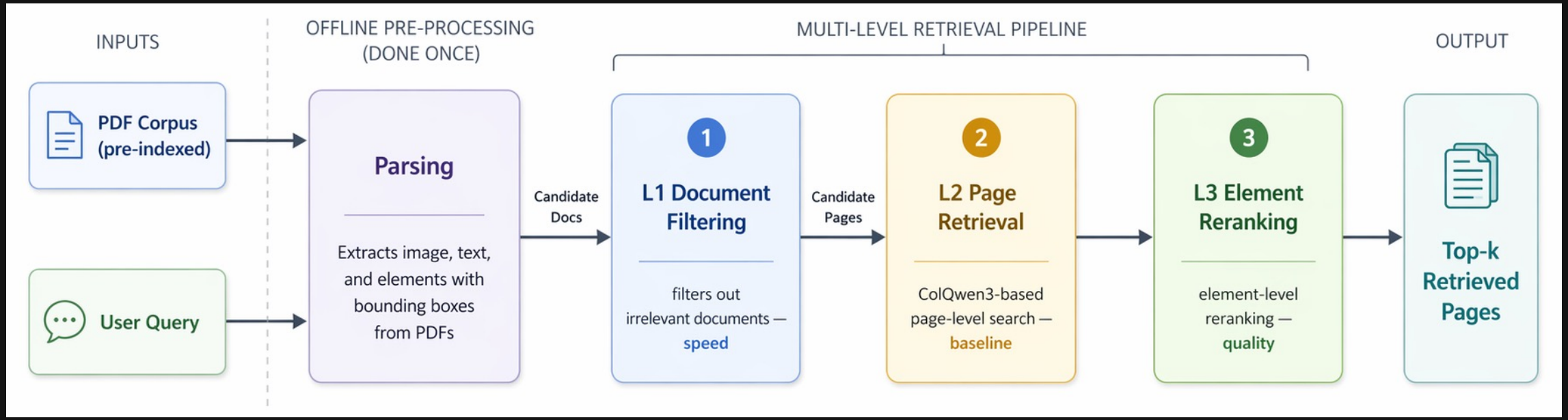
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Ongoing Work

1. AI for Management Information Systems (MIS)

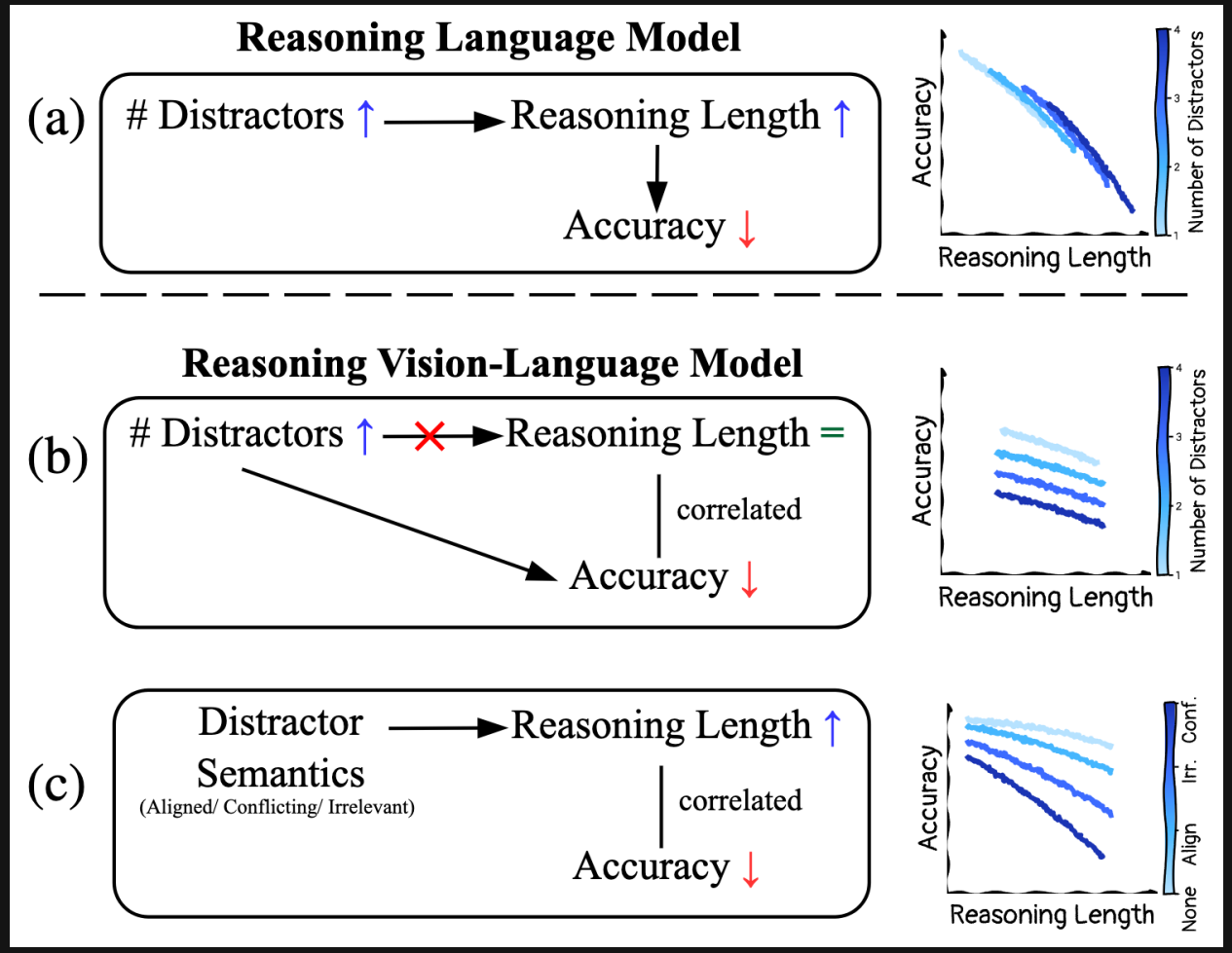
Multimodal RAG w/ 조은찬, 장승현

Method	Latency ↓	NDCG@5 ↑	NDCG@10 ↑	Recall@5 ↑	Recall@10 ↑
Baseline	1.77	75.5	78.8	79.2	87.1
Ours	**0.87**	**77.5**	**80.7**	**80.6**	**88.5**

Ongoing Work

1. AI for Management Information Systems (MIS)

VLM Reasoning w/ 배지윤 (Prof. 이재호)



Do Reasoning Vision-Language Models Inversely Scale in Test-Time Compute? A Distractor-centric Empirical Analysis. Under Review

My Research Inspired by IME

2. AI for Human Factors and Ergonomics



2. AI for Human Factors and Ergonomics

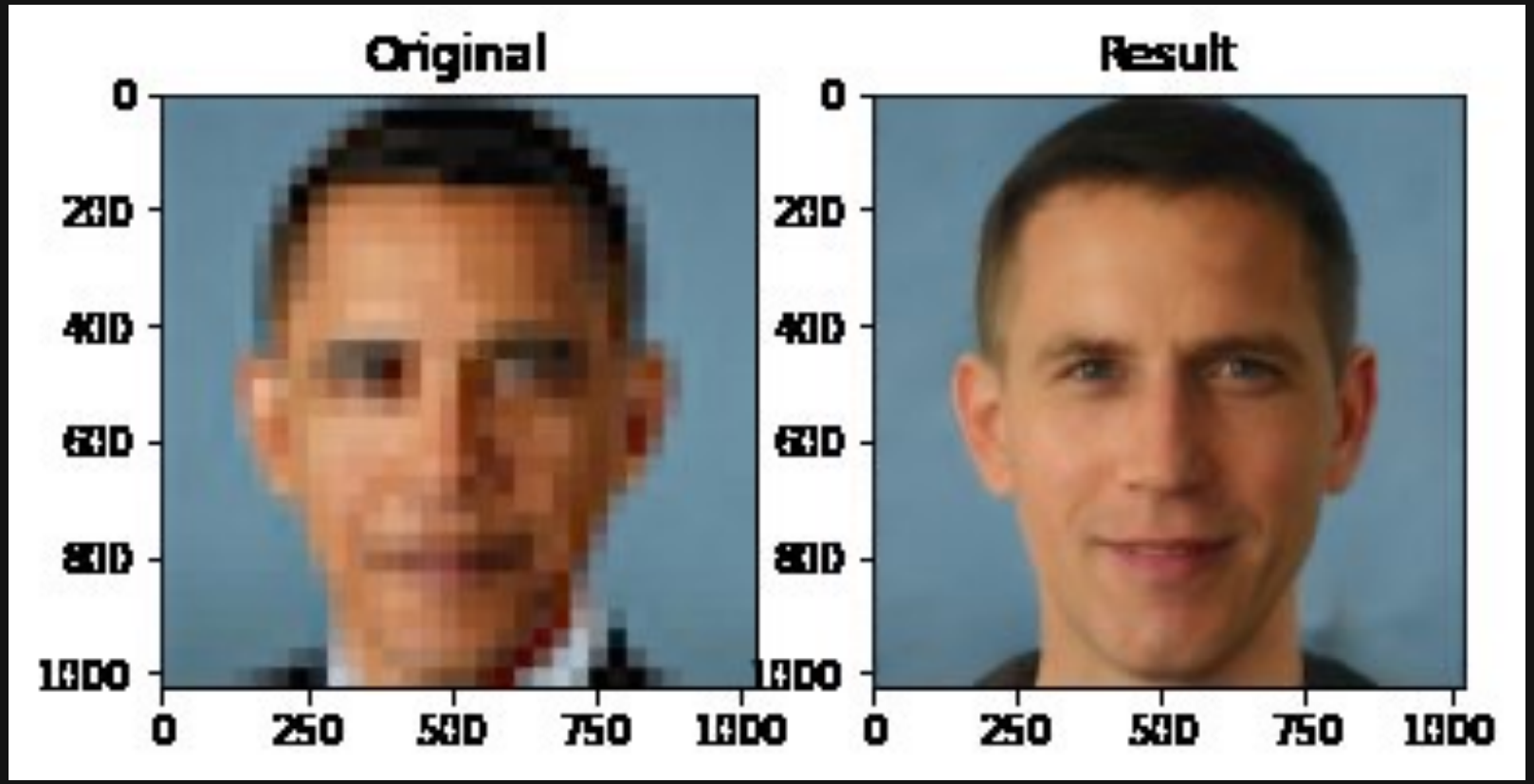
UX for Visual Generation w/ 김명수



Stay Fair! Ensuring Group Fairness in Diffusion Models Across Guidance Scales. Under Review

2. AI for Human Factors and Ergonomics

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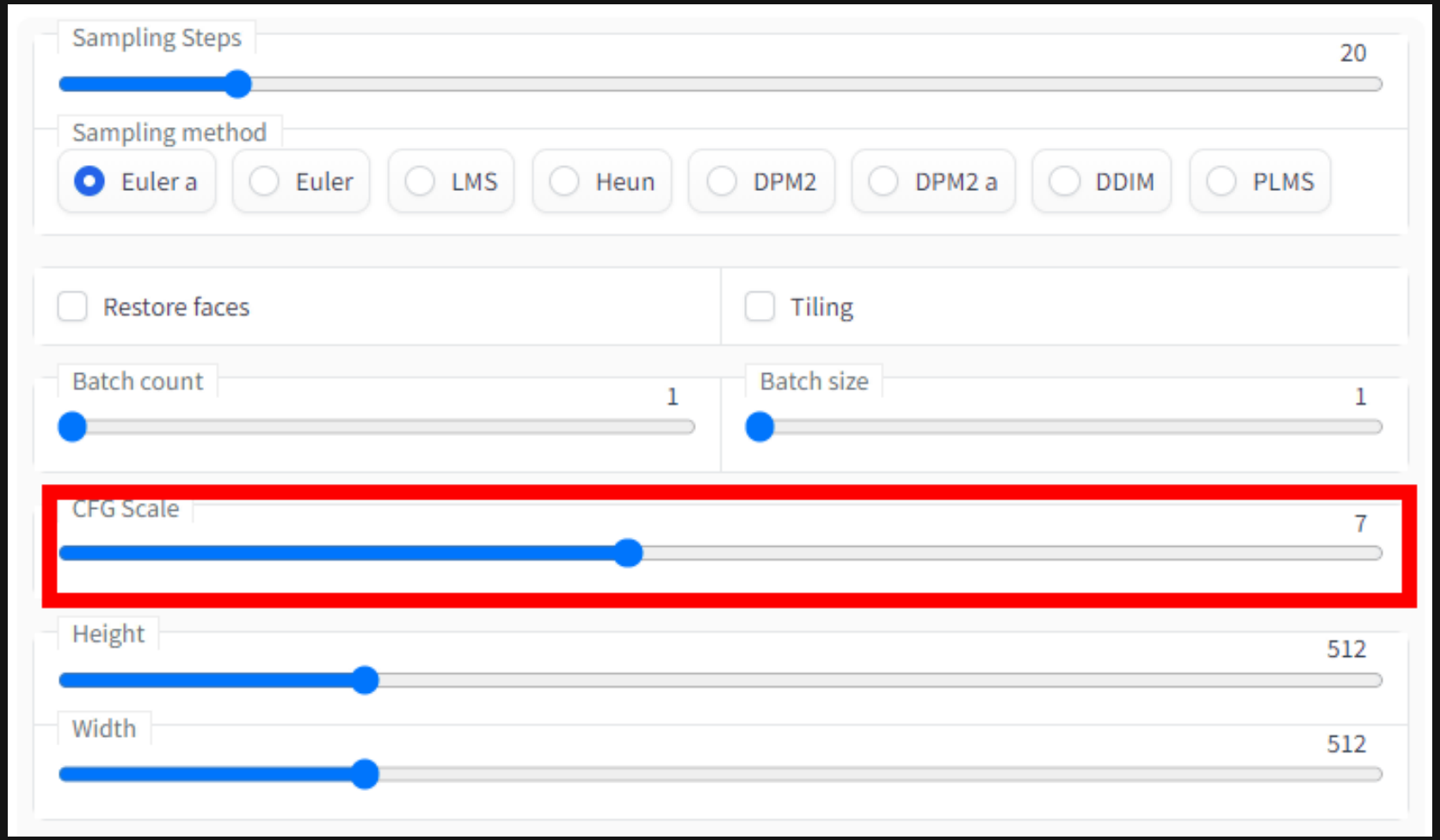
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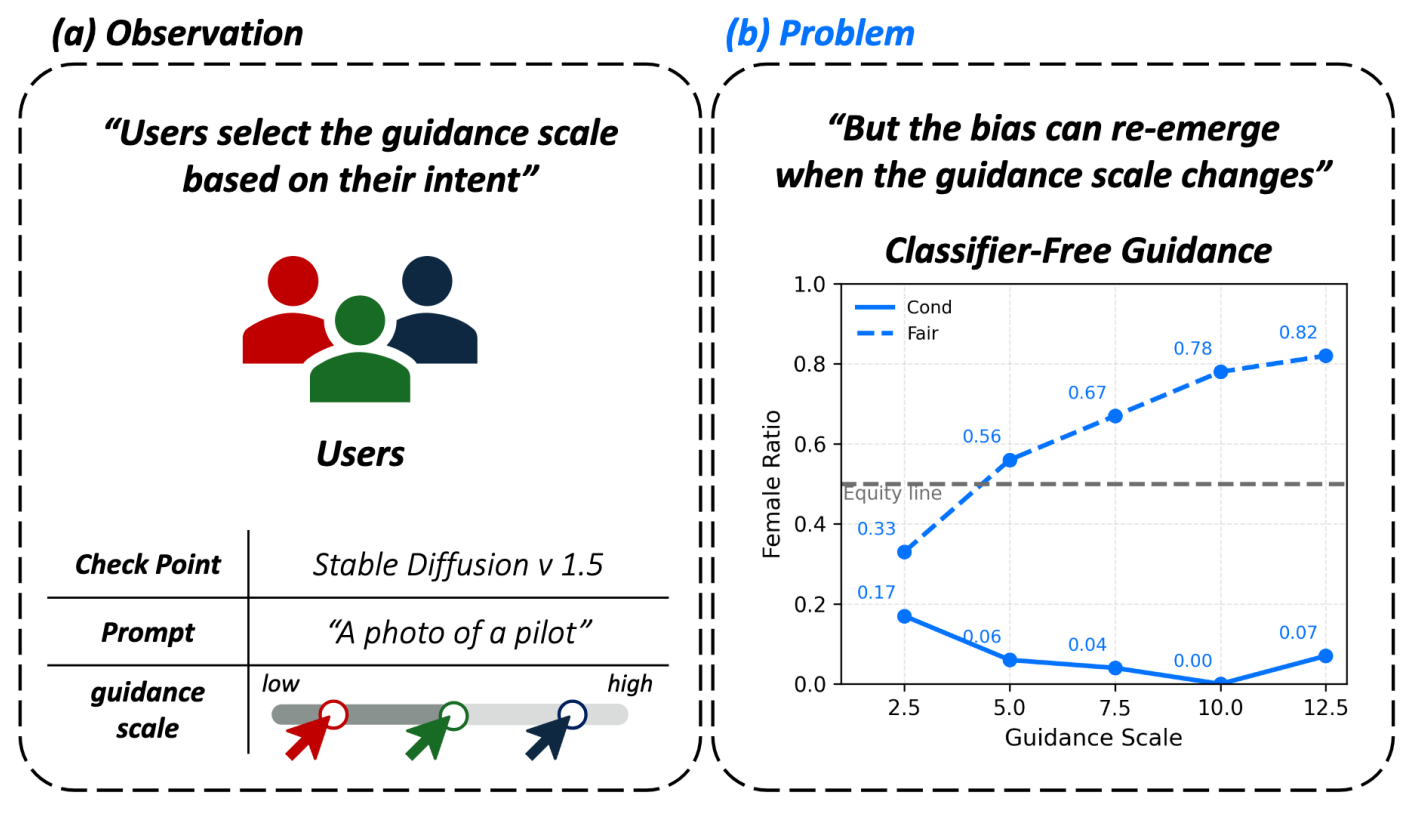
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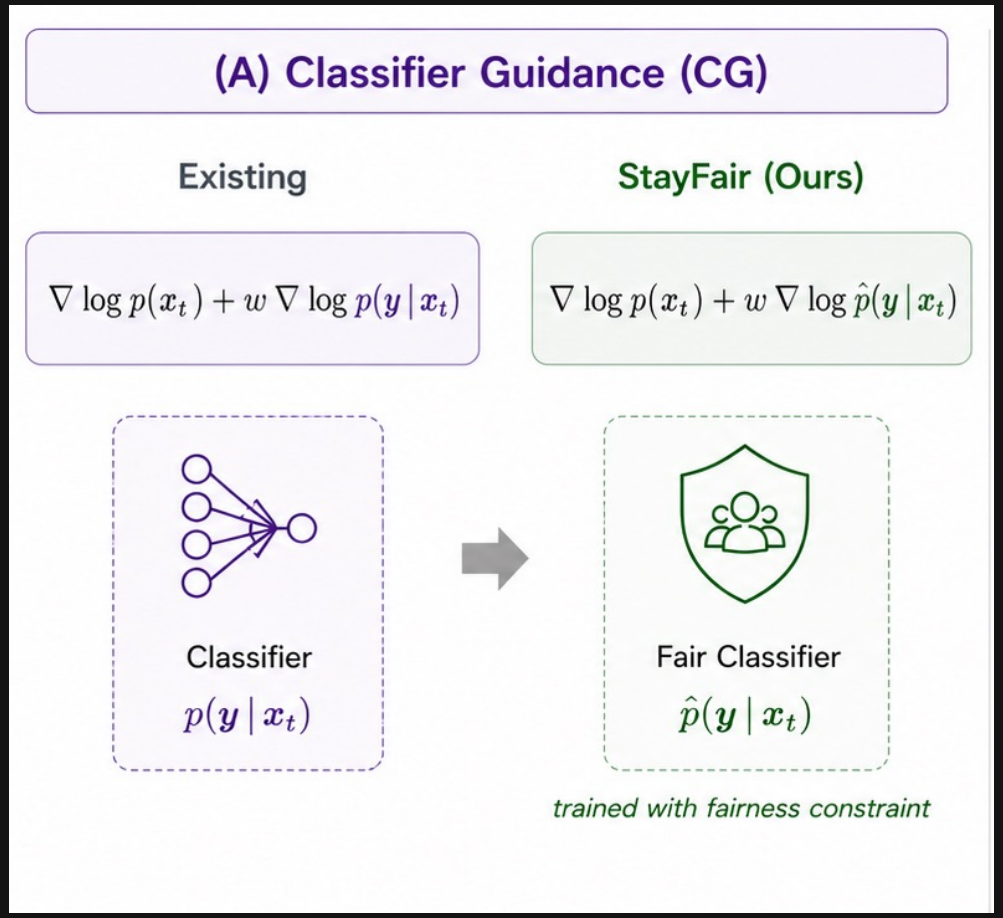
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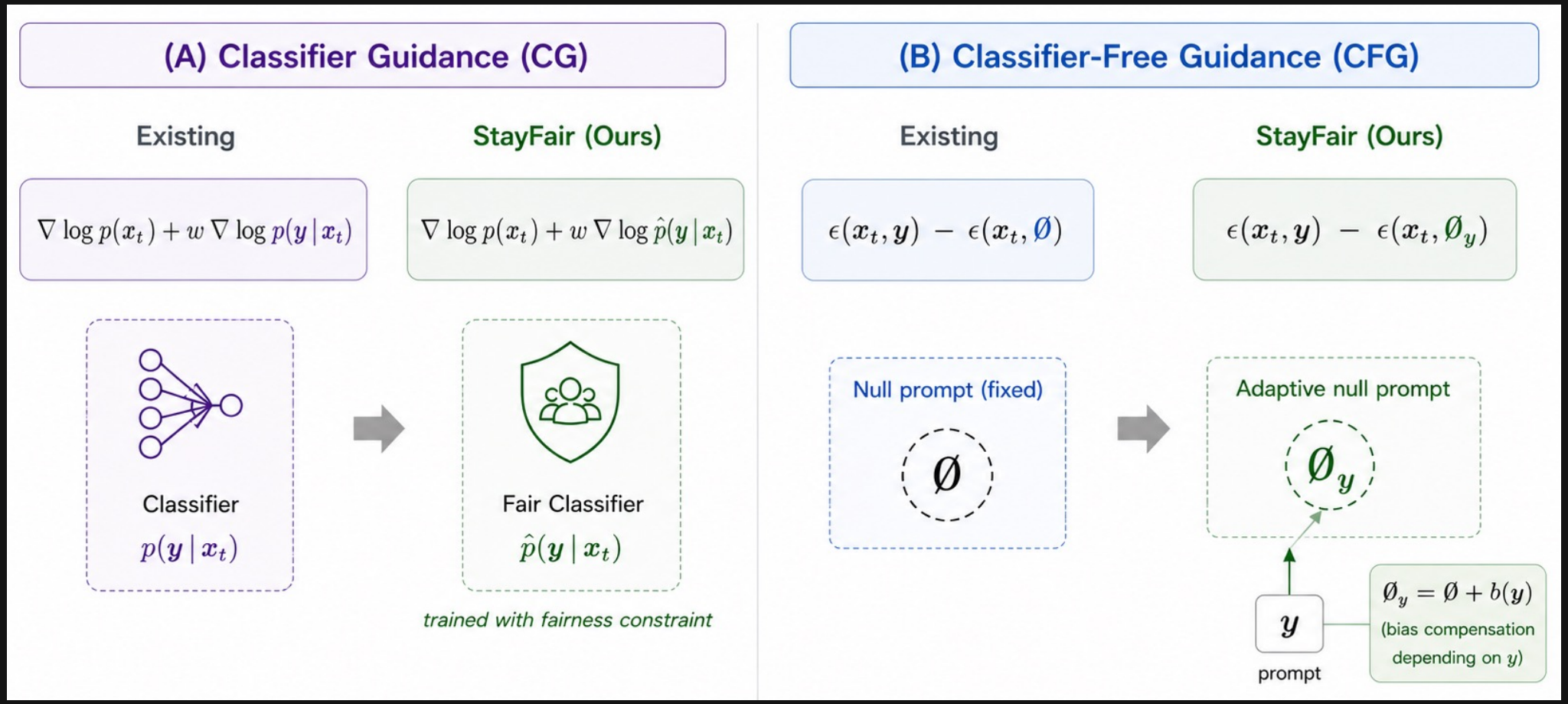
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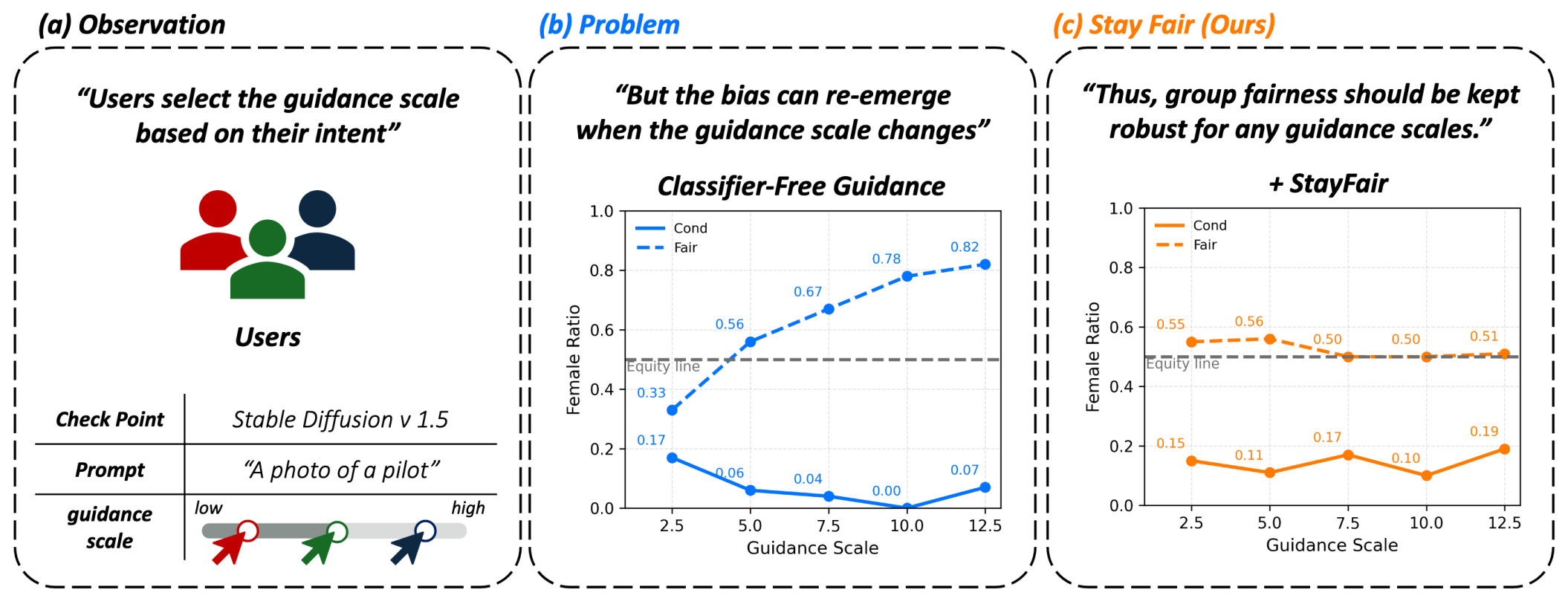
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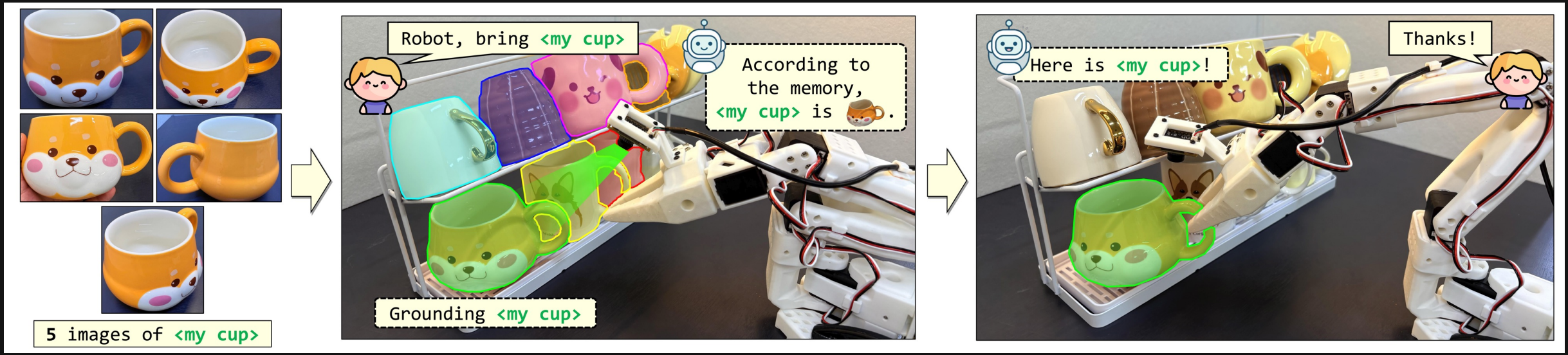
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2. AI for Human Factors and Ergonomics

Personalized Robots w/ 이상오 (Prof. 한욱신)



Bring My Cup! Personalizing Vision-Language-Action Models with Visual Attentive Prompting. Under Review

2. AI for Human Factors and Ergonomics

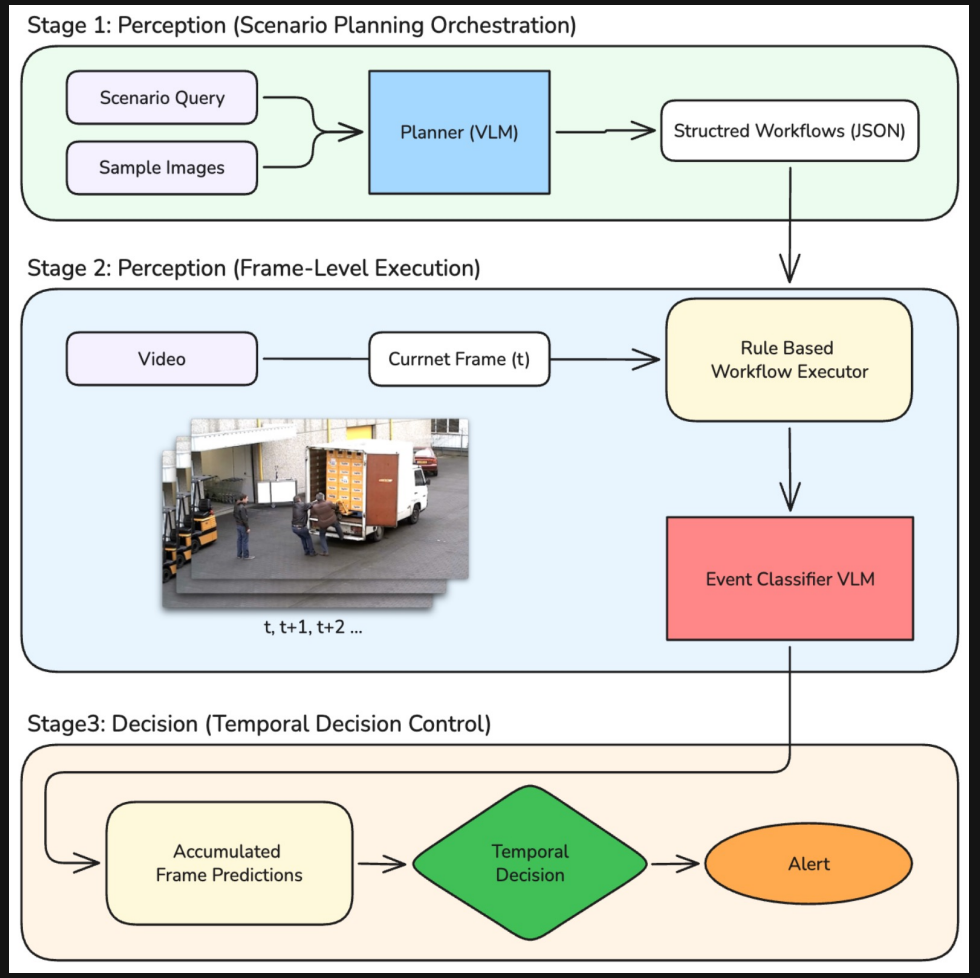
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2. AI for Human Factors and Ergonomics

Safety Monitoring VLM w/ 신요엘 (Prof. 김병인)



Temporal Orchestration of Vision-Language Models for Decision-Level Video Safety Monitoring. Under Review

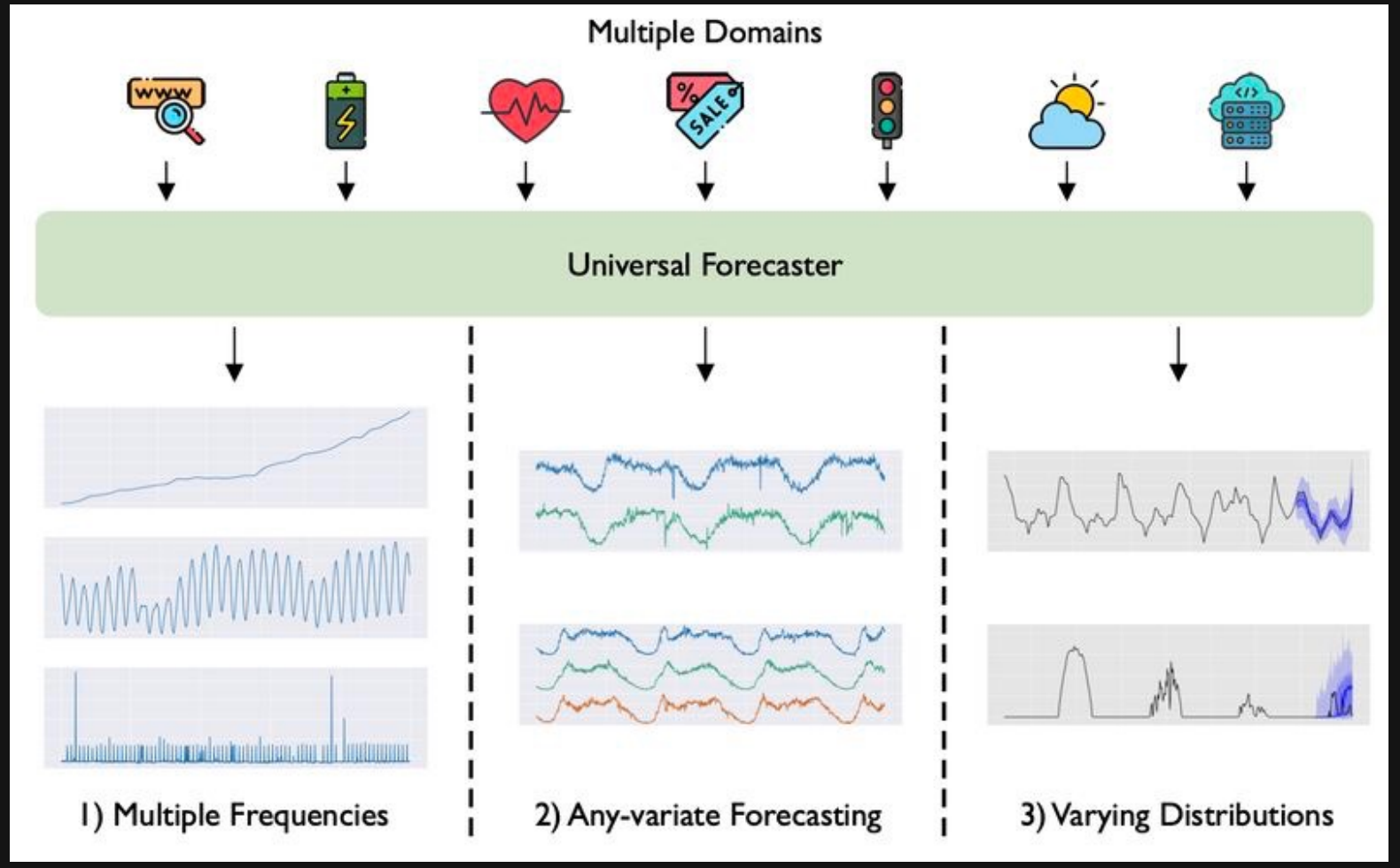
My Research Inspired by IME

3. AI for Manufacturing & Vertical Domains



3. AI for Manufacturing & Vertical Domains

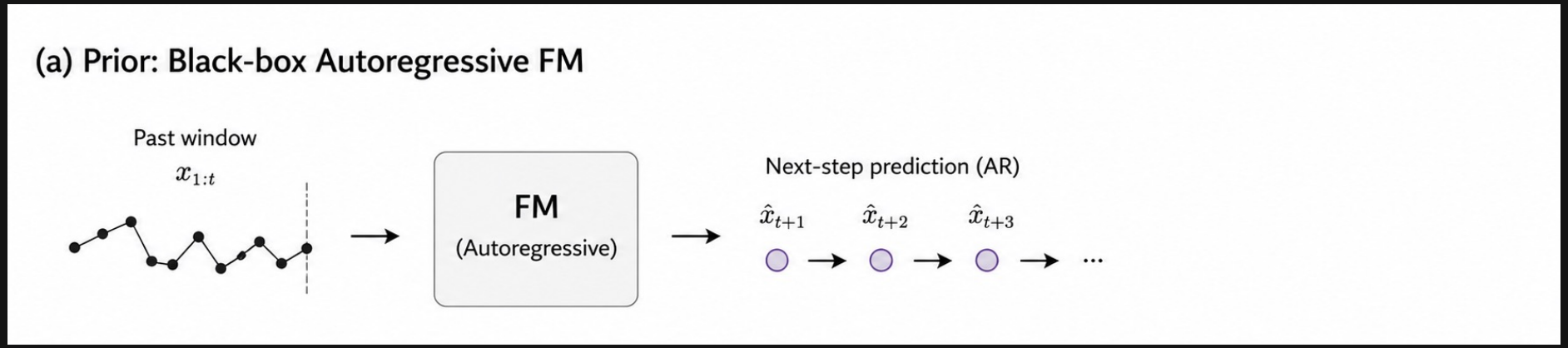
Manufacturing FM w/ 박채원



Ongoing Work

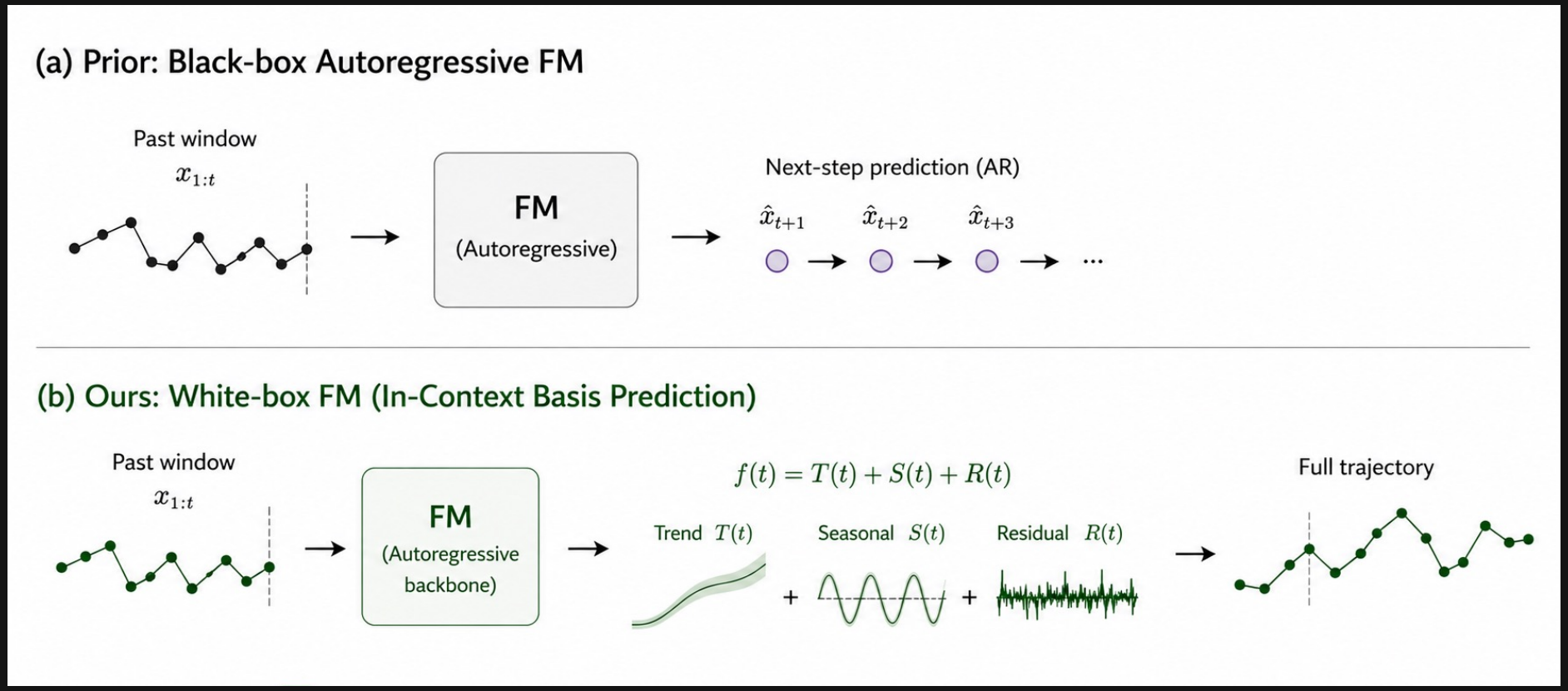
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Manufacturing FM w/ 박채원



3. AI for Manufacturing & Vertical Domains

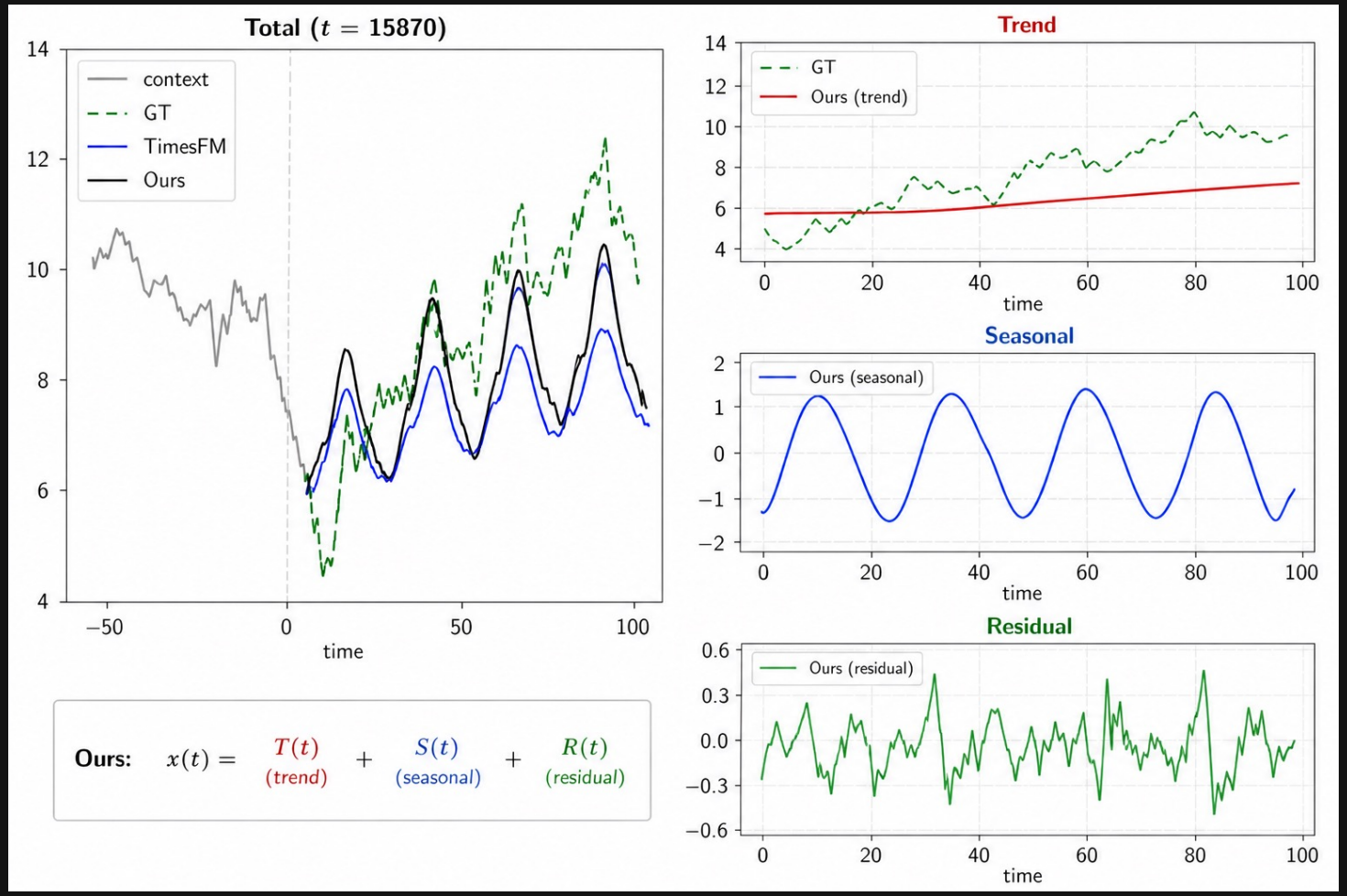
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Ongoing Work

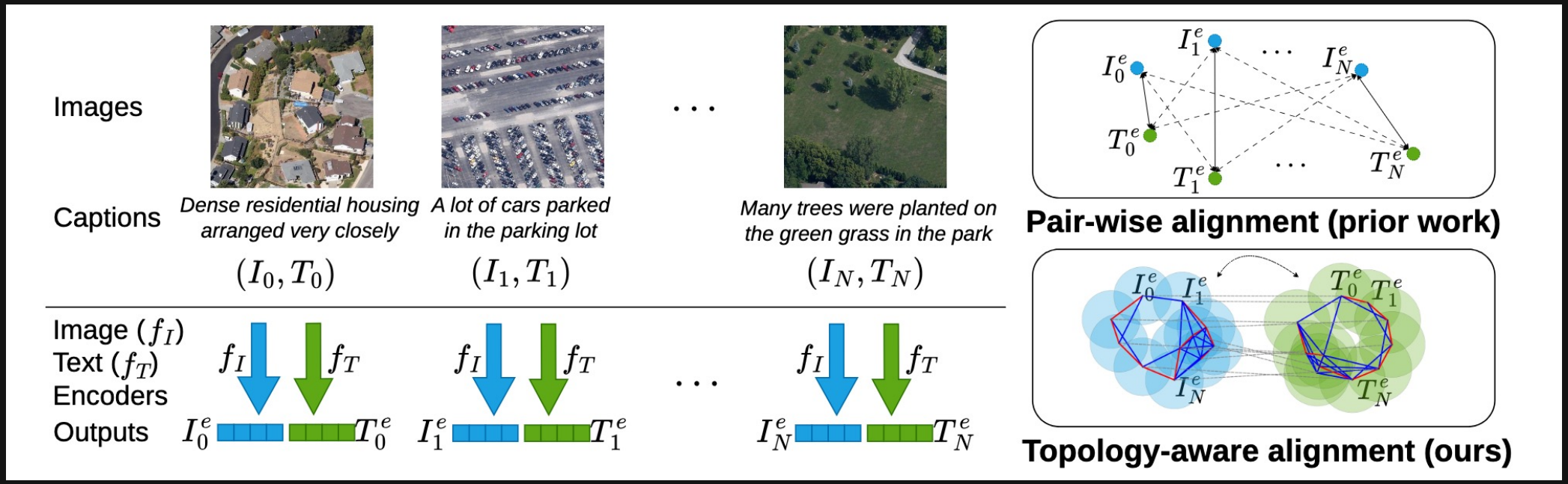
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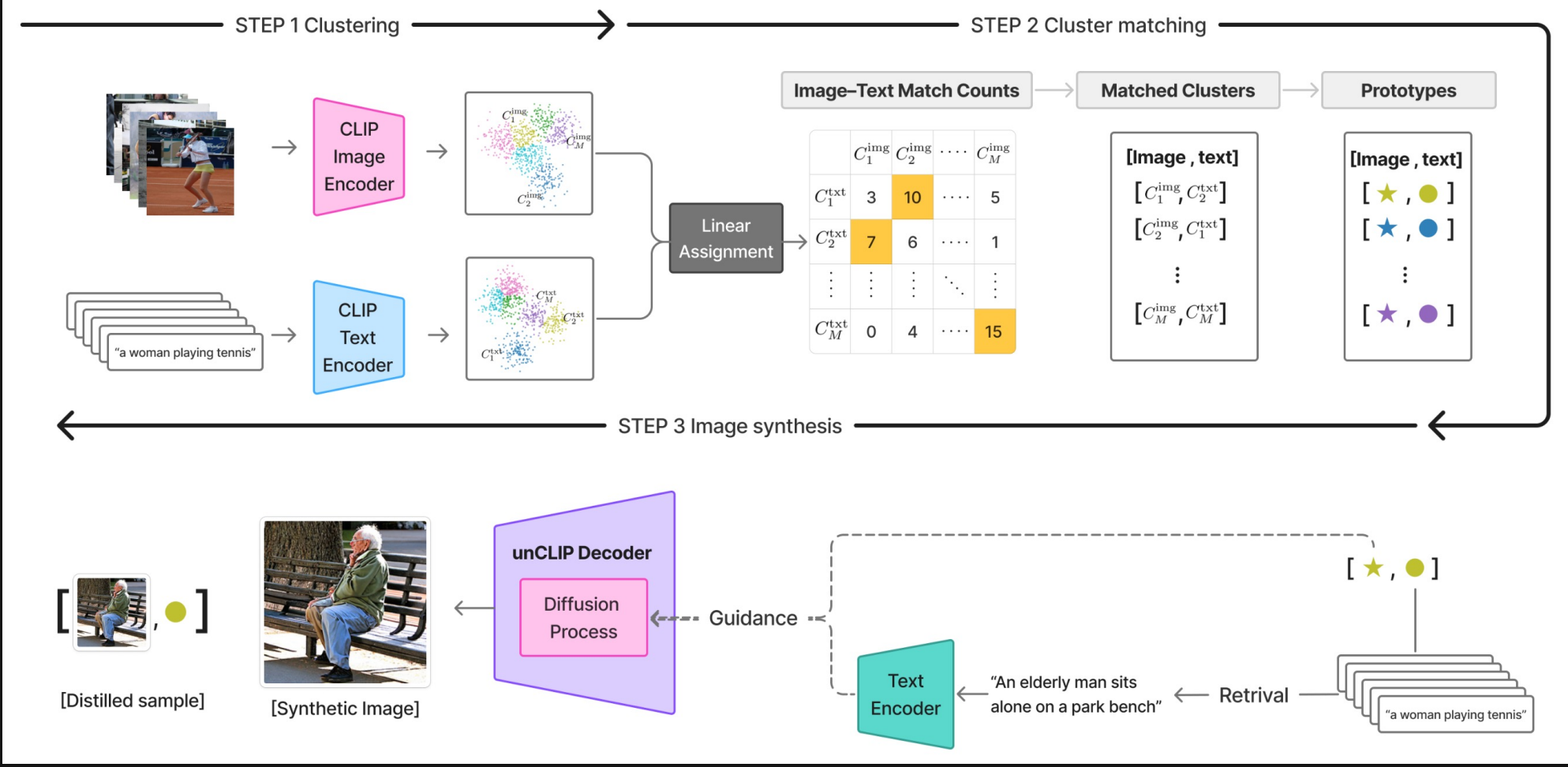
Vertical Domain VLM w/ 유준원 (Prof. 정재훈)



Topology-Aware Representation Alignment for Semi-Supervised Vision-Language Learning. Under Review

3. AI for Manufacturing & Vertical Domains

Efficient VLM Training w/ 최준혁 (Prof. 채민우)



Multimodal Dataset Distillation Made Simple by Prototype-Guided Data Synthesis. **ICLR 2026**

My Research Inspired by IME

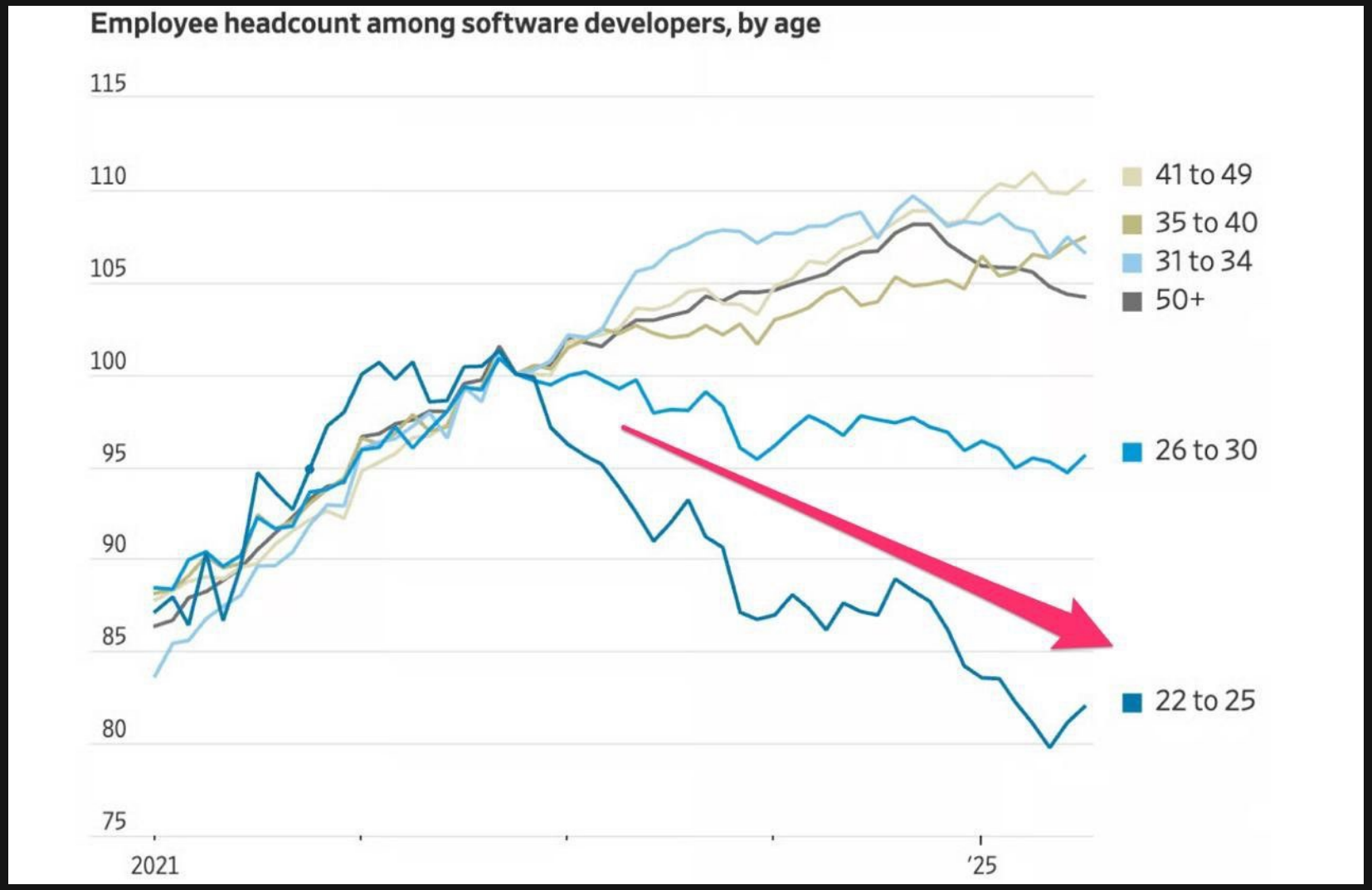
1. AI for Management Information Systems (MIS)
   - SQL Code Generation w/ 이수찬
   - Multimodal RAG w/ 조은찬, 장승현
   - VLM Reasoning w/ 배지윤 (Prof. 이재호)

2. AI for Human Factors and Ergonomics
   - UX for Visual Generation w/ 김명수
   - Personalized Robots w/ 이상오 (Prof. 한욱신)
   - Safety Monitoring VLM w/ 신요엘 (Prof. 김병인)

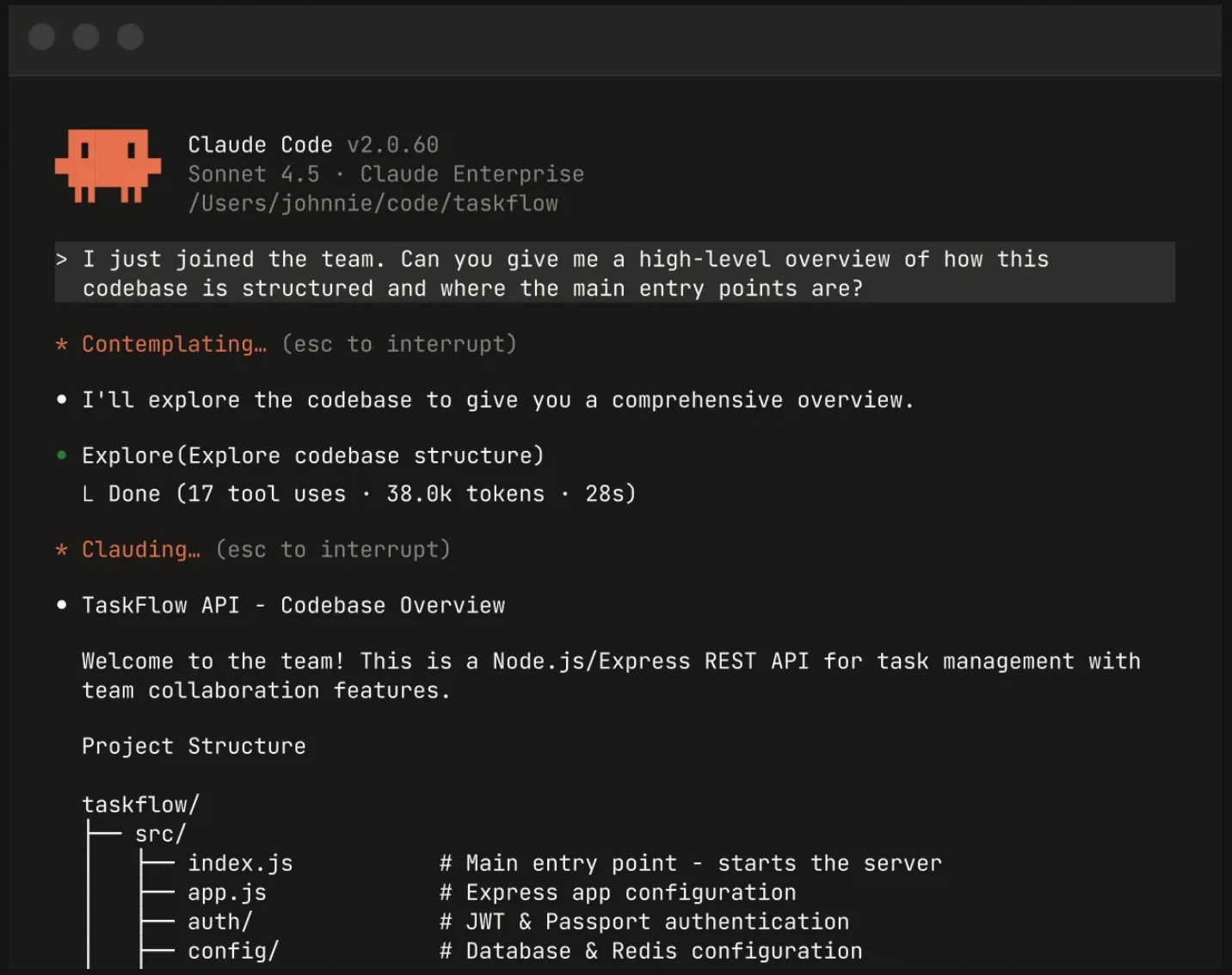
3. AI for Manufacturing & Vertical Domains
   - Manufacturing FM w/ 박채원
   - Vertical Domain VLM w/ 유준원 (Prof. 정재훈)
   - Efficient VLM Training w/ 최준혁 (Prof. 채민우)

Part II. Opportunities in AI as an IME Researcher

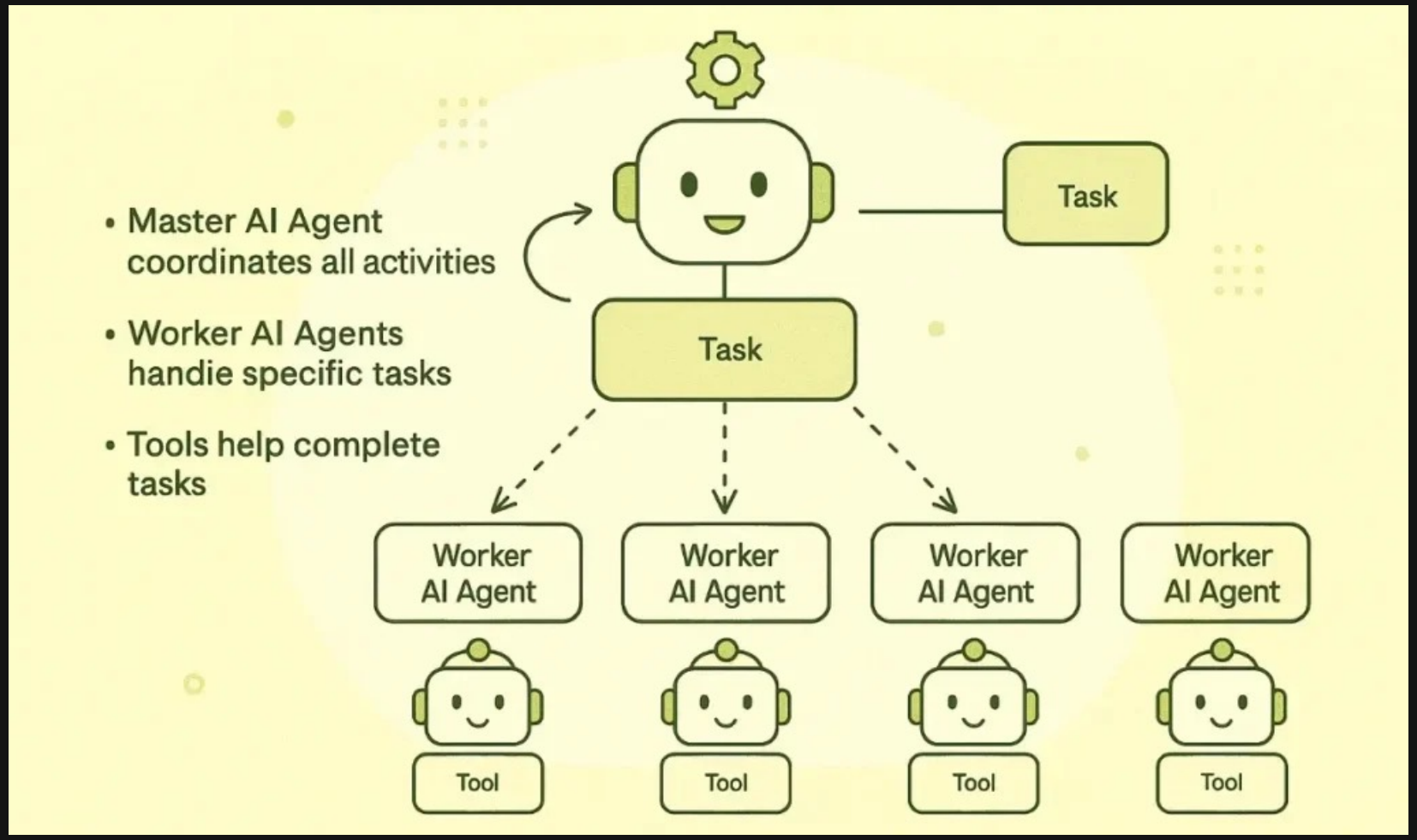
Technical Skills are Being Commoditized



The Next Core Skill: Managing AI Agents



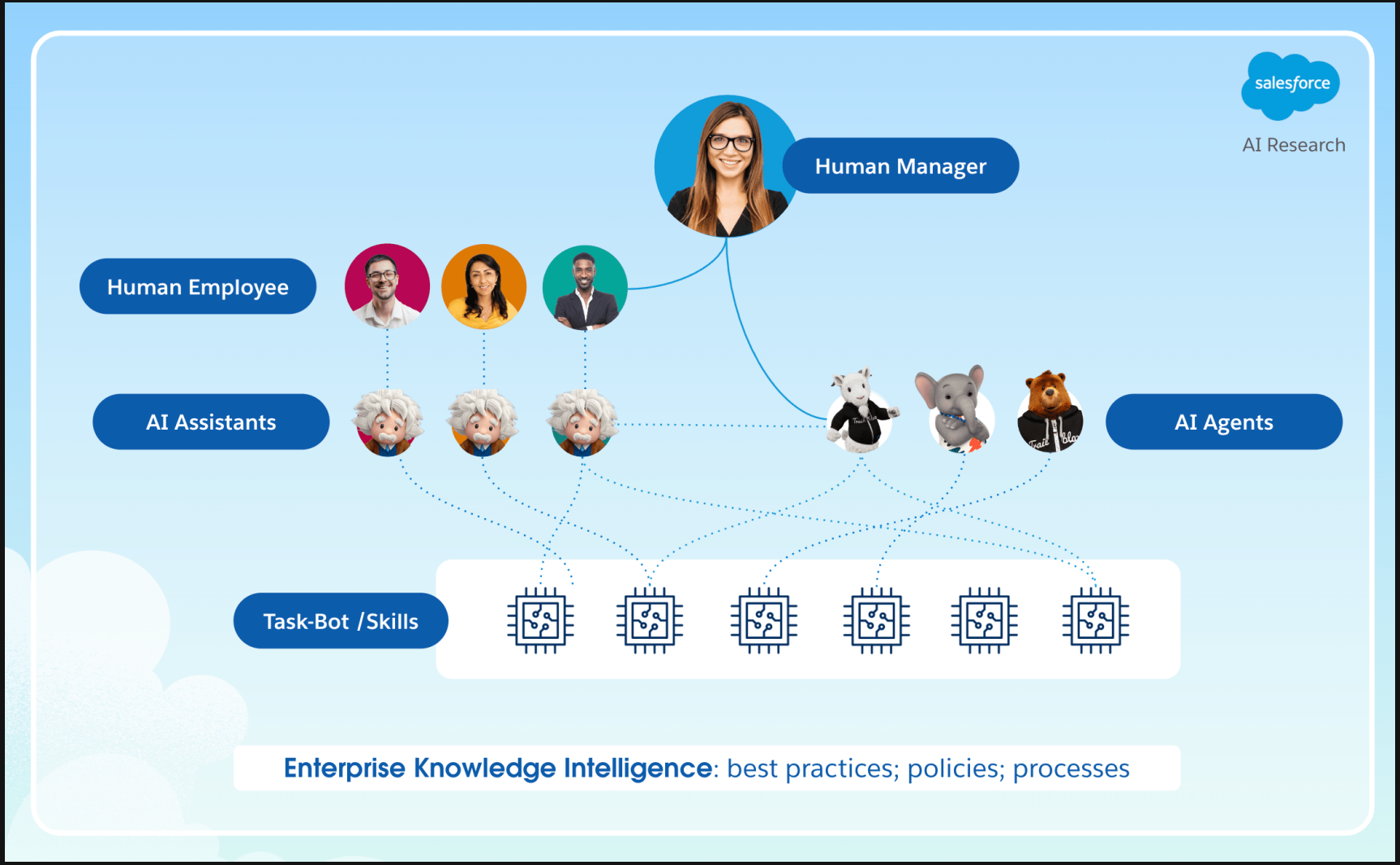
AI Agent = Orchestration



IME = Orchestrator



Future of IME = Orchestrator for Both Human and AI



My Research Vision:

Multimodal Orchestration of Artificial Intelligence (MOAI) Lab

Opportunities in IME ⇔ AI Researcher

Thank you for listening! 😀