



Upstage:

Insights from training global LLM
and implementing industrial use cases



Upstage is an AI startup based in Korea and the US

- **Founding AI team** from Line (No 1. messenger in Japan) / Naver (Google of Korea) Clova AI
 - Founded in October, 2020
 - Shipped AI-powered products for 200M+ active users ([Clova AI](#), [Papago](#), etc)
- Current number of employees: 122 (75 top AI/SW engineers)

CEO
Sung Kim



- Former Naver/Line (Clova) founding AI Head, Professor at HKUST
- UCSC PhD in Computer Science, MIT postdoc
- 4 SIGSOFT Distinguished Paper Awards & Most Influential Paper of the Decade Award (ICME, Bug Prediction)

CTO
Hwalsuk Lee



- Former Samsung Techwin leader
- Former NCSoft AI leader
- Former Naver Clova AI vision leader
- KAIST PhD

cso
Lucy Park



- Former AI leader of Naver Papago (over 30M users)
- MIT Innovators Under 35 (IU35) Korea
- SNU PhD

Key Milestones of Upstage



Global pre-unicorn recognized for its AI expertise



Bloomberg the Company & Its Products | Bloomberg Terminal Demo Request | Bloomberg Anywhere Remote Login | 8

Bloomberg

Live TV Markets Economics Industries Tech Politics Businessweek Opinion

BREAKING: Anglo Rejects BHP Takeover Proposal as Significantly Undervalued [Read more](#)

AI Startup Upstage Secures \$72 Million for US, Asian Expansion

By [Yoolim Lee](#)

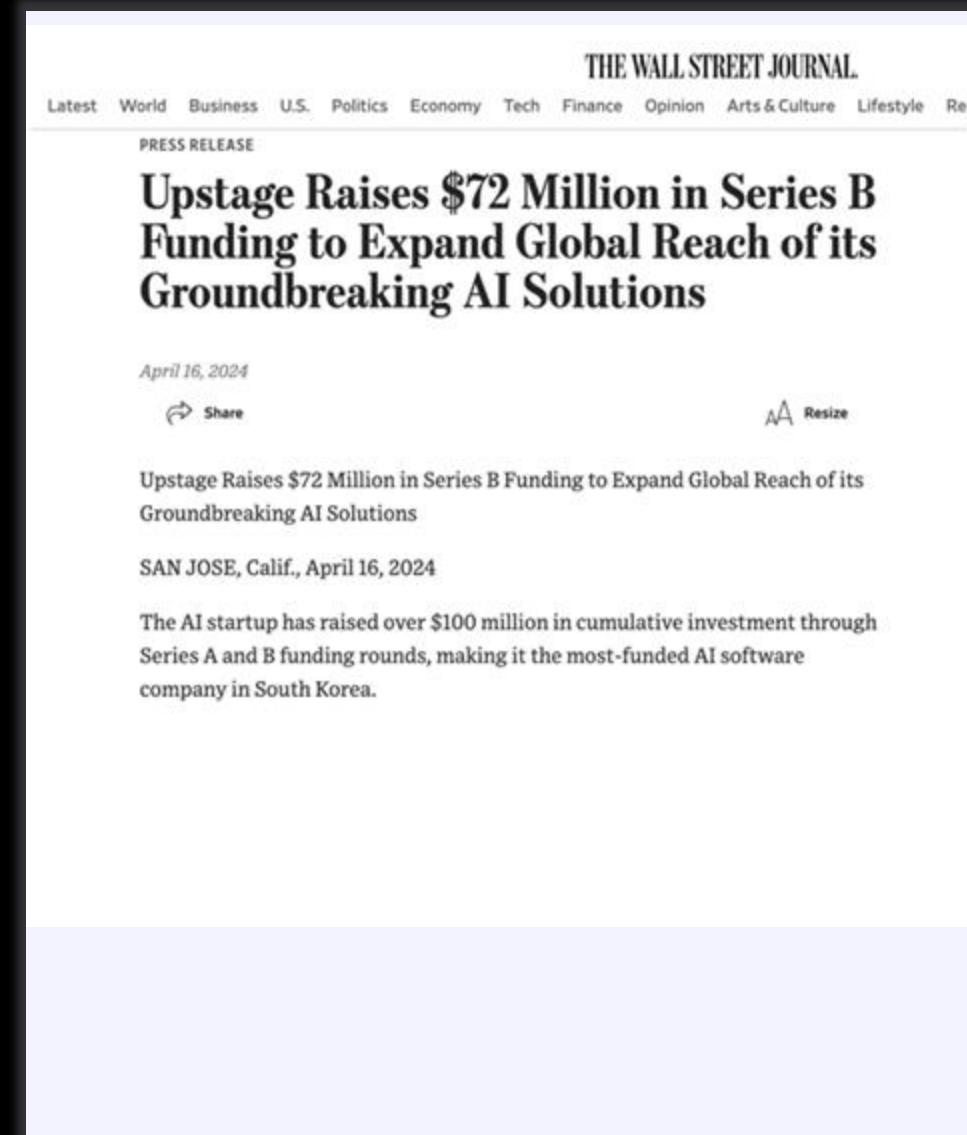
April 16, 2024 at 10:00 AM GMT+9

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Artificial intelligence startup Upstage secured 100 billion won (\$72 million) from investors including SK Networks Co. and KT Corp. to bankroll an expansion in the US, Japan and Southeast Asia.

The South Korean startup has closed a Series B financing, tripling the amount raised in a previous funding round in 2021, the company said on Tuesday. New backers including Korea Development Bank and Shinhan Venture Investment Co. as well as existing investors such as SBVA, formerly known as SoftBank Ventures Asia, took part in the latest financing.

Upstage was co-founded in 2020 by Sung Kim, who previously led an AI development team at Naver Corp., South Korea's largest internet company. Its enterprise customers use its document processing engines and large-language model Solar to try and boost work efficiency. Upstage now plans to break into overseas markets.



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PRESS RELEASE

Upstage Raises \$72 Million in Series B Funding to Expand Global Reach of its Groundbreaking AI Solutions

April 16, 2024

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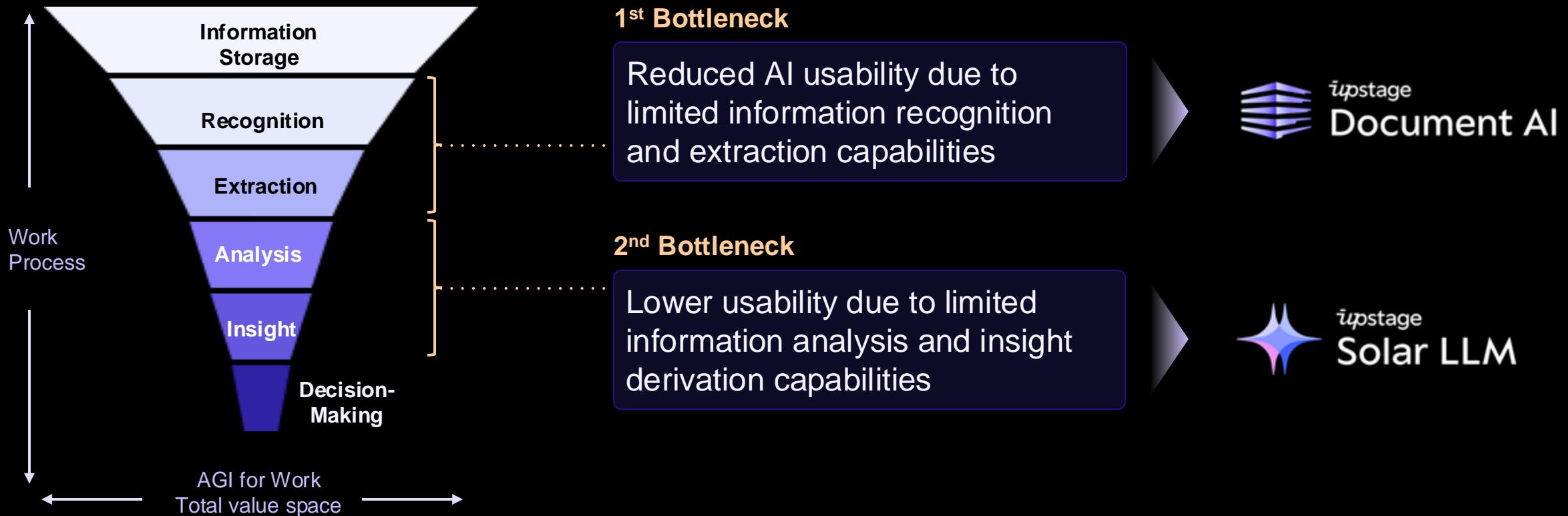
Upstage Raises \$72 Million in Series B Funding to Expand Global Reach of its Groundbreaking AI Solutions

SAN JOSE, Calif., April 16, 2024

The AI startup has raised over \$100 million in cumulative investment through Series A and B funding rounds, making it the most-funded AI software company in South Korea.

To achieve “*AGI for work”, two bottlenecks arise, and Upstage effectively resolves them

*AGI: Artificial General Intelligence



Upstage plans to achieve its vision of "AGI for Work"



Upstage Document AI

- Deep learning-based optical character recognition technology
- Ranked 1st in 4 categories of global top competition 2023
- Being used by top companies in finance, insurance, and logistics industries in KR
- KR / EN / JP supported, expanding to support Arabic/CN and other APAC



Upstage Solar LLM

- Global No.1 sLLM
- Fewer parameters but proven to perform on par with GPT-4
- Demonstrated scalability by implementing specialized sLLMs for Thai and Japanese
- Expand models for different languages, industries, and tasks



Upstage “AGI for Work”

- Digitalization of all structured & unstructured data of enterprises
- Performing business automation based on LLM
- Supporting business decision-making



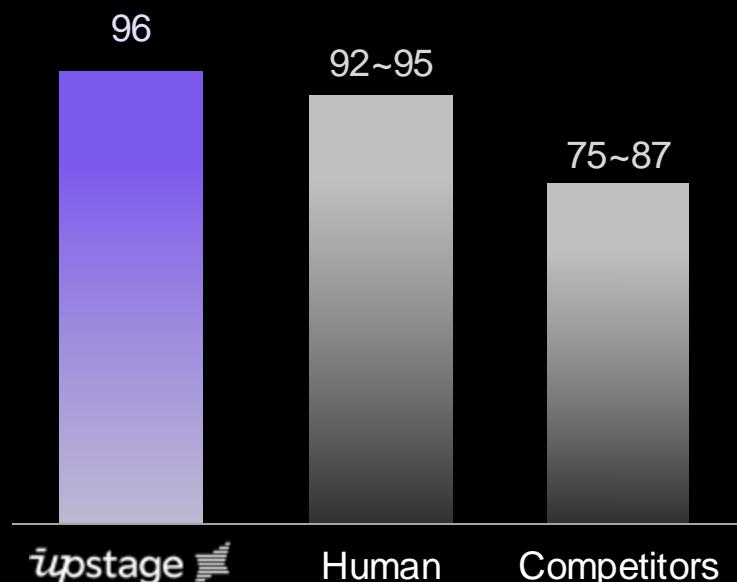
Upstage Document AI

Achieves higher-than-human accuracy in recognizing and extracting unstructured information



Performance for Medical expense statement

% of entity level accuracy



Customer testimony

"Achieved a score exceeding 95% on the 5 types of documents, exceeding the previous human works"
- Hanwha Life

"Tested 7 difficult documents with highly unstructured data, achieving over 95% solid result"
- Samsung Life

"We consistently use the Upstage universal OCR model, which has close to 98% accuracy"
- POSCO

"We are introducing OCR tasks to innovate franchise business opening and ID verification processes" – Samsung Securities & Samsung Card

Clients



Upstage's OCR technology has been recognized for its world-class performance



ICDAR 2023 Competition
(14 April 2023)

User	Method	Rank	Task 1 metric		Word					Line					Paragraph				
			H-PQ	PQ	F	P	R	T	PQ	F	P	R	T	PQ	F	P	R	T	
YunSu Kim	Upstage KR	1	76.55	79.80	91.88	94.73	89.20	86.85	76.40	88.34	91.32	85.56	86.48	74.54	86.15	87.40	84.94	86.52	
DeepSE x Upstage	DeepSE hierarchical detection model	2	70.96	75.30	88.49	93.50	83.99	85.10	69.43	82.43	82.65	82.21	84.23	68.51	81.39	81.69	81.10	81.17	
zlm	hypertext_submit_0401	3	70.31	76.71	88.18	92.71	84.08	86.99	71.43	83.32	89.32	78.07	85.73	63.97	74.83	81.25	69.35	85.48	
Mike Ranzinger	NVTextSpotter	4	68.82	73.69	87.07	95.10	80.29	84.63	67.76	80.42	93.87	70.35	84.25	65.51	78.04	81.82	74.60	83.94	
gsm	Ensemble of three task-specific Clova DEER detection	5	68.72	71.54	92.03	93.82	90.31	77.74	69.64	89.04	91.75	86.49	78.21	65.29	83.70	84.17	83.23	78.01	
xswl	Global and local instance segmentations for hierarchical text detection	6	68.62	76.16	90.72	93.45	88.16	83.95	68.50	82.22	80.24	84.31	83.31	62.55	75.11	74.00	76.25	83.28	
Asaf Gendler	Hierarchical Transformers for Text Detection	7	67.59	70.44	86.09	88.47	83.83	81.82	69.30	85.23	87.83	82.78	81.31	63.46	78.40	77.84	78.97	80.94	
JiangQing	SCUT-HUAWEI	8	62.68	70.08	89.58	89.79	89.37	78.23	67.70	86.20	90.46	82.33	78.53	53.14	69.06	74.03	64.72	76.96	
Jiawei Wang	DQ-DETR	9	27.81	61.01	77.27	80.64	74.17	78.96	26.96	35.91	26.81	54.39	75.07	18.38	24.72	15.99	54.41	74.36	
ZiqianShao	test	10	21.94	27.45	41.75	51.82	34.95	65.76	25.61	39.04	51.50	31.43	65.59	16.32	24.52	35.61	18.70	66.57	

User	Method	Rank	Word				
			PQ	F	P	R	T
YunSu Kim	Upstage KR	1	70.00	79.58	82.05	77.25	87.97
DeepSE x Upstage	DeepSE End-to-End Text Detection and Recognition Model	2	67.46	77.93	88.05	69.89	86.57
gsm	Ensemble of three task-specific Clova DEER	3	59.84	76.15	77.63	74.73	78.59
Mike Ranzinger	NVTextSpotter	4	63.57	74.10	80.94	68.34	85.78
JiangQing	SCUT-HUAWEI	5	58.12	73.41	74.38	72.46	79.17
kuli.cyd	DBNet++ and SATRN	6	51.62	71.64	82.76	63.15	72.06
Dang Quang Vinh	keba	7	44.87	54.30	68.37	45.03	82.64

Upstage won the first place in an international competition for OCR technology excellence held every two years, opening up a significant 10% lead over its competitors
(Notable competitors: NVIDIA, AWS, Alibaba, Ant Group, Huawei, and Naver)

THE KOREA ECONOMIC DAILY

Companies Korean Investors Deals Markets Culture & T

Artificial intelligence

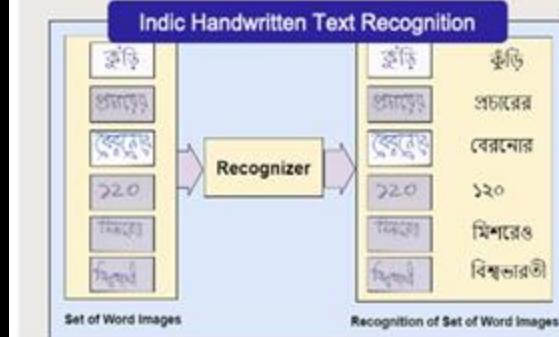
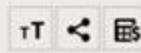
Upstage beats Amazon, Nvidia to rank first in global AI competition

S.Korea's startup swept four categories at the Int'l Conference on Document Analysis and Recognition in California

By [Joo-Wan Kim](#)

■ Apr 25, 2023 (Gmt+09:00)

① 1 Min read



South Korea's artificial intelligence startup Upstage on Monday said it ranked first in four categories at the International Association for Pattern Recognition's International Conference on Document Analysis and Recognition (ICDAR) in San Jose, California.

ICDAR is one of the world's most prestigious expos in optical character recognition (OCR), which detects and recognizes characters on digital images and videos. In four categories including hypertext, Upstage beat out global tech giants such as Amazon, Nvidia, Alibaba and Huawei in receiving the highest scores.

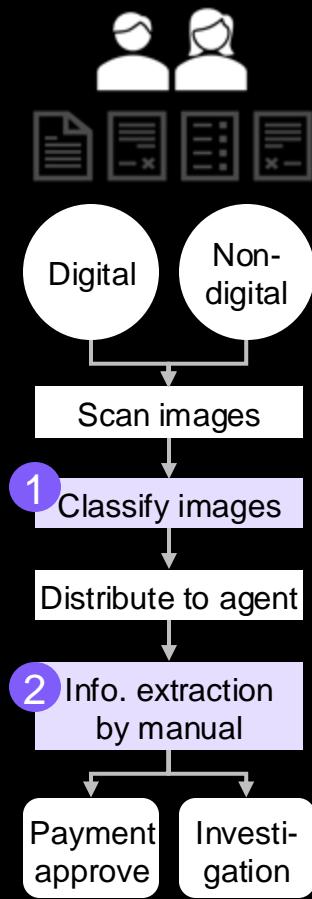
"Upstage's AI OCR, which is proven to have the world's best technology, will help digital transformation and AI global innovation in all industries that require document automation," Upstage CEO Kim Seong-hoon said.

Upstage's OCR technology has been recognized for its world-class performance

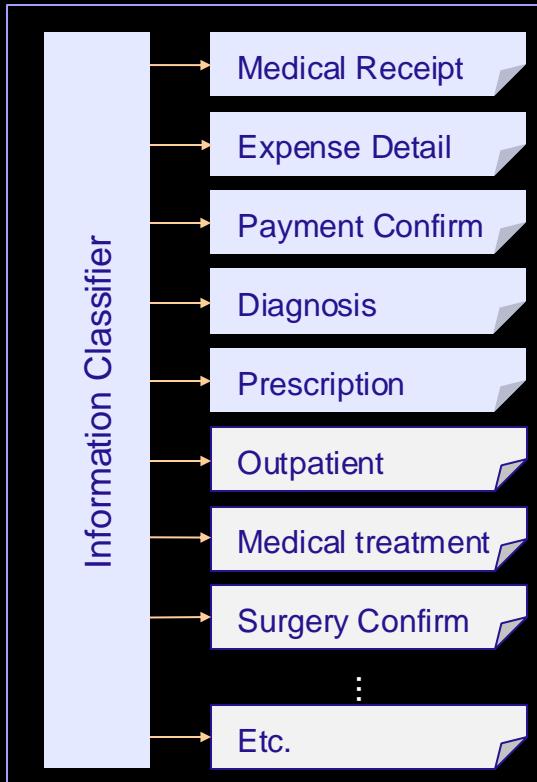
이미지 선택	
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한자정보.한자이름.content	이경미 (confi : 0.971) (refined) 이경미
한자정보.진료시작일.content	202111228 (confi : 0.953) (refined) 2021-12-28
한자정보.진료종료일.content	202111229 (confi : 0.964) (refined) 2021-12-29
한자정보.병실.content	W7/13/01 (confi : 0.801) (refined) W7/13/01

Hanwha Life: Digitalizing 5 types of claim documents via classifier and OCR, processing 10+ years of data

Claim Process

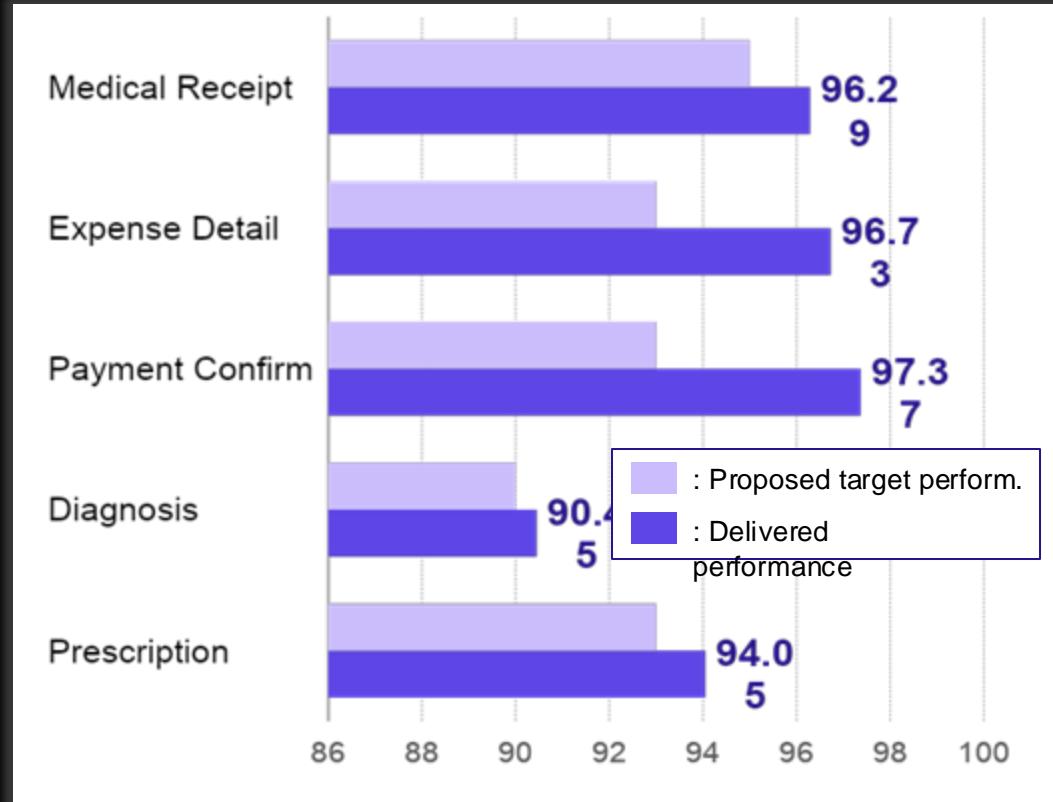


1 Accurately classify images



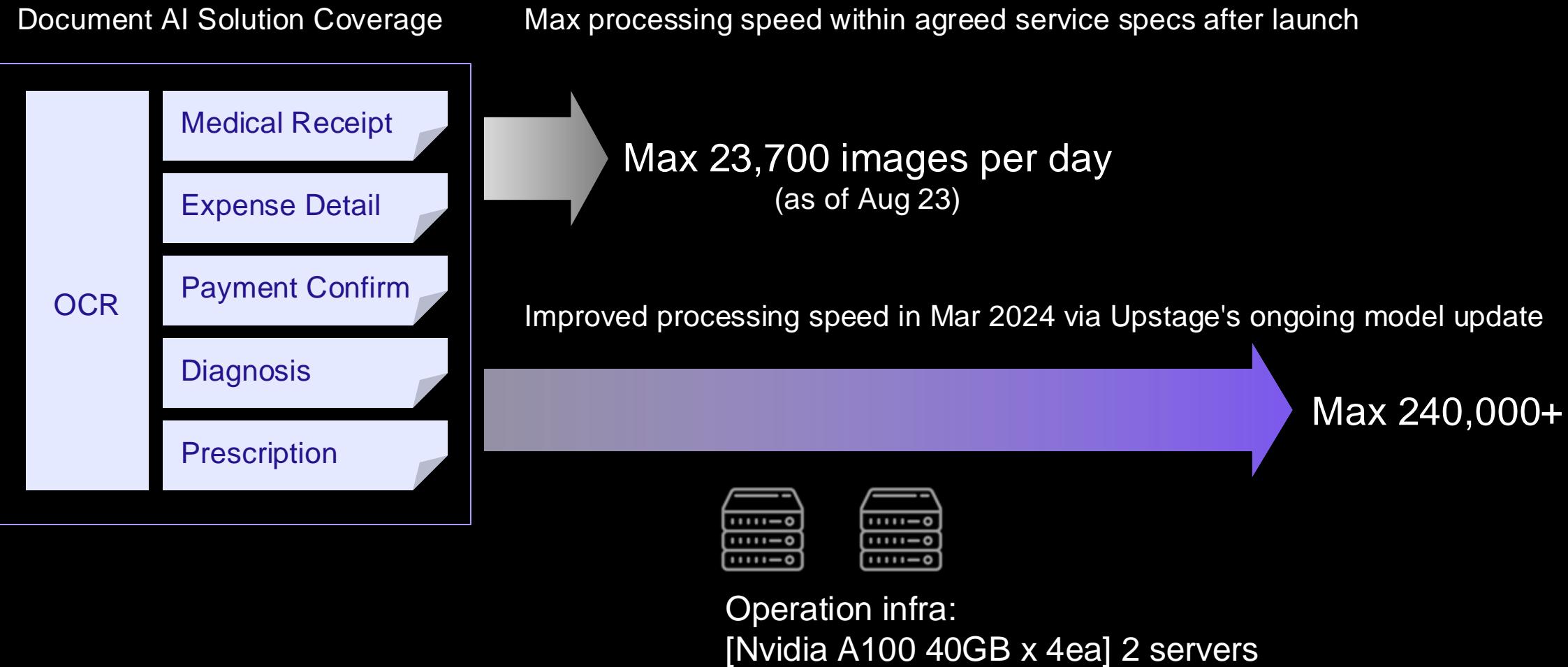
Desired accuracy (client) 95%
Delivered model accuracy **97%+**
Avg. speed **0.1 sec / sheet**

2 Extract targeted information from each document



Developed high-accuracy AI models for document processing in insurance, outperforming human efficiency

Hanwha Life enjoys 10x faster service through Upstage's continuous OCR model updates



Digitize 10 years of insurance documents to derive new insights and connect them to actual product development



In the development of special terms, 'AI OCR' technology was utilized. This technology allows AI to classify medical expense details and extract text, automatically dataizing the number, cost, etc. of medical institutions and treatment behaviors.

In particular, Hanwha Life Insurance worked with AI specialized startup 'Upstage' and analyzed medical expense details for the first time in the industry using AI OCR. This is because medical expense details have different forms and writing methods depending on the hospital, making recognition difficult. A company official said, "Existing OCR technology only read documents that were standardized like medical bills." Now, through deep learning, AI can judge and learn documents on its own, and AI is now used to calculate experience statistics for product development.

Hanwha Life Insurance selected the top 3 major cancers (stomach, liver, and lung) that customers often claim based on this statistic and added them as special terms to 'Hanwha Life Insurance Signature Cancer Insurance 3.0'.

The most notable guarantee revealed by Hanwha Life Insurance is '3 major specific cancer chemotherapy drug radiation cancer outpatient fund'. This is because the statistics secured through 'AI OCR' analyzed by the company confirmed that there were many cases where high costs occurred for chemotherapy. Hanwha Life Insurance also newly developed '3 major specific cancer salary NGS gene panel examination cost' to allow patients to select a treatment that is well suited to them when choosing an anticancer drug, and '3 major specific cancer resection surgery fund' to ensure resection surgery when diagnosed with stomach cancer, liver cancer, and lung cancer.

Gu Chang-hee, general guarantee team leader of Hanwha Life Insurance, said, "This new special term is meaningful because it provides necessary funds to customers by closely observing what actually happens to customers through our own statistical DB applied with AI solutions." "We developed special terms for the top 3 major cancers (stomach, liver, and lung) with a high incidence rate as the first case, and we will expand the scope of application in the future to provide practical guarantees for a wider range of diseases."

Upstage Layout Analyzer

- **Key functionality:** Extracts layouts, tables, and figures from any document
- **Current Performance:** Top Performance in terms of accuracy

Upstage Layout Analyzer

Layout Element Detection

Recognize Header, Footer, Paragraph, Caption, Table, Image, and detect text.



Shipper

POSCO
International

Destination

Gemlik,
TURKEY

Analyze document structure and segregate content into meaningful units.

Context-aware Serialization

Extract data in the natural reading order for contextual accuracy



Shipper

POSCO
International

Destination

Gemlik,
Turkey

Detect relationships between tables-captions, images-captions for contextual understanding.

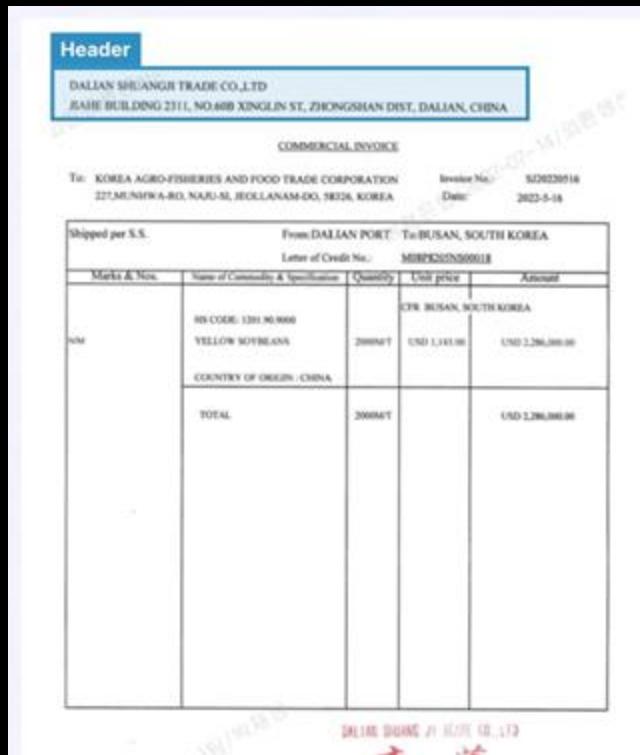
Relation Extraction

Traditional OCR extracts results line by line, from left to right.

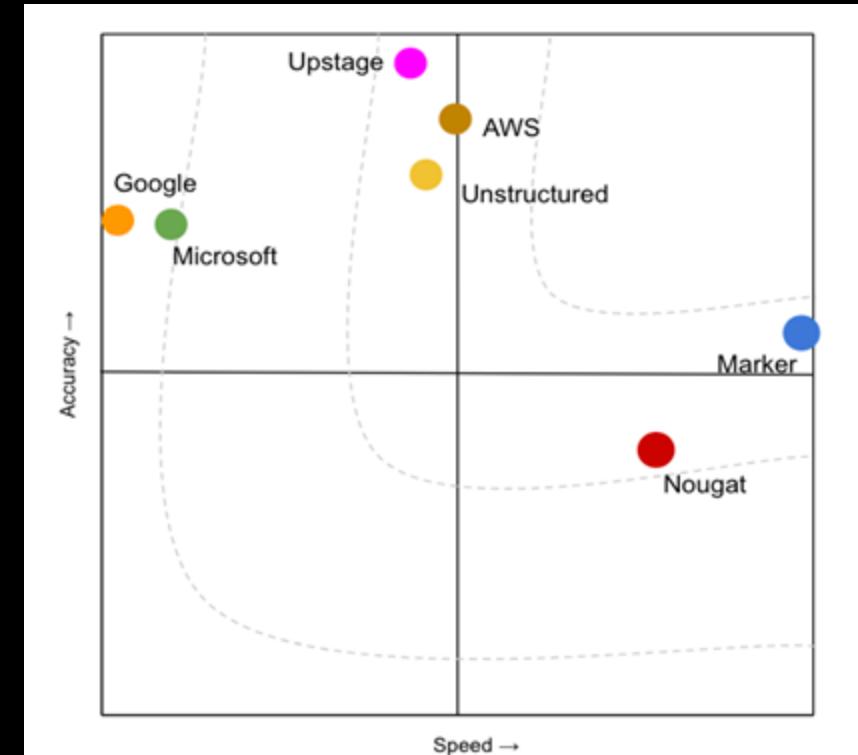
A crucial element for utilizing unstructured data when discussing the adoption of generative AI in the financial sector recently.

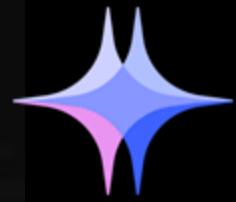
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Upstage LLM: Solar

Solar is small yet powerful LLM which can surpass GPT4o in specific use-case

Small

Solar-mini(<11b model)
Solar-pro(<23b model)

Easy to install with entry-level GPU

Fast speed

Powerful

Best performance among LLM less than 13b

Robust linguality in Korean, English, Japanese

(TBU) Solar-pro achieving 80+ MMLU score

Well fine-tunable

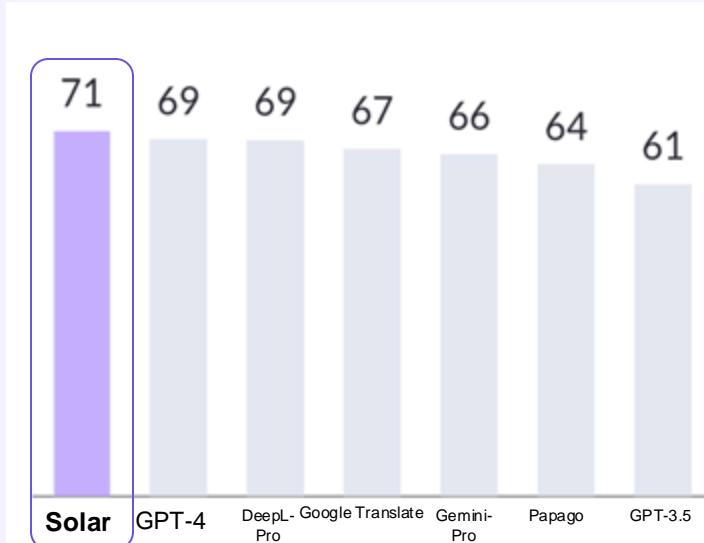
Larger performance improvement when fine-tuned

Surpassing gpt4o level in specific use-case when fine-tuned

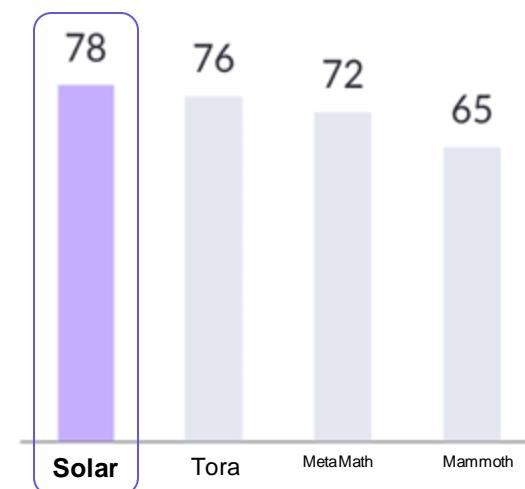
Solar: The Best LLM for Fine-Tuning that beats GPT-4

We've already delivered best-in-class customized models for our enterprise customers

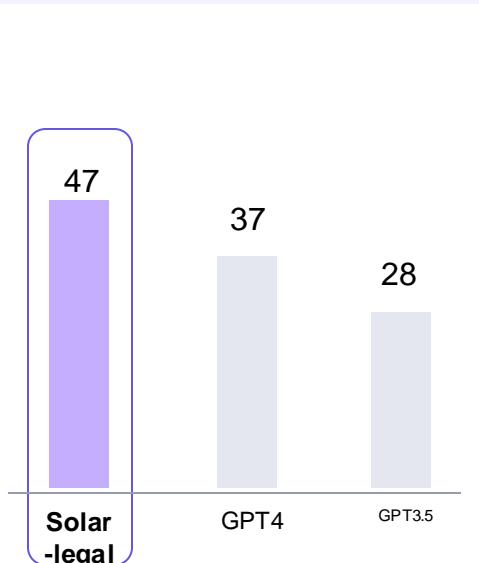
Solar translate (EN < > KO)



Education (MathGPT)



Legal(Bar exam)

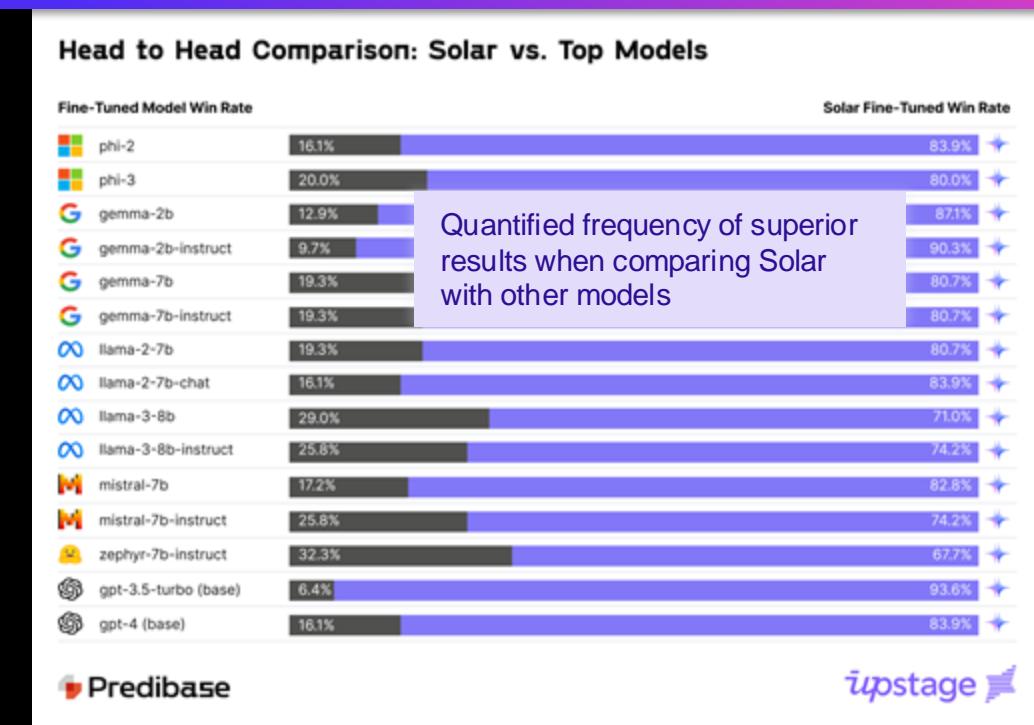
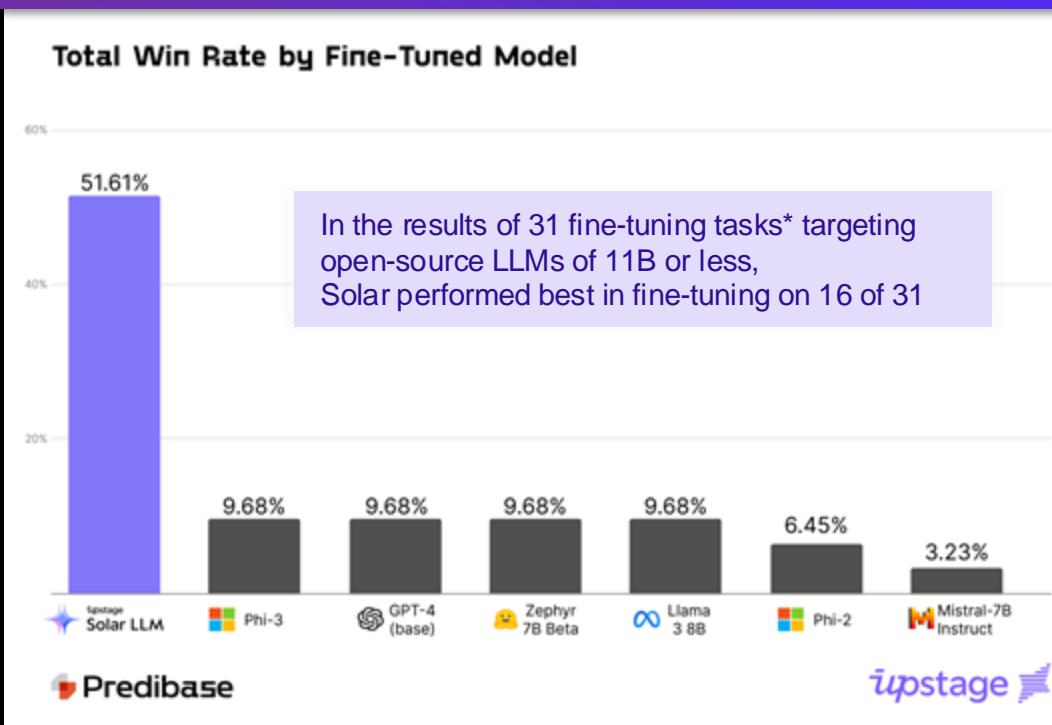


Benchmark for machine translation from Meta <https://ai.meta.com/tools/flores/>

Benchmark for Math, <https://github.com/hendrycks/math/>

Solar: The Best LLM for Fine-Tuning that beats GPT-4

Among models of 11B or less, Solar LLM performs the best when fine-tuned



*31 diverse task datasets spanning 5 categories: Natural language understanding, coding, knowledge, reasoning and math.

<https://predibase-dev.netlify.app/blog/introducing-solar-llm-on-predibase-the-best-llm-for-fine-tuning-that-beats>

Solar LLM: Lightweight, compact yet powerful LLM

Speed

8 Times faster than 🟢 OpenAI GPT4-turbo,
2.5 times faster than 🟦 OpenAI GPT3.5-turbo,
1.45 times faster than 🔵 Azure GPT 3.5-turbo

Response time of LLM models

Results of AskUp log analysis from January 16th to 22nd:

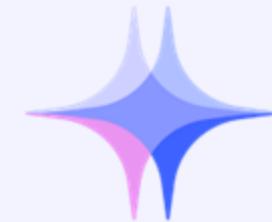


[source: an [internal evaluation report](#)]

Lightness

Light enough
to be used on-device (offline)

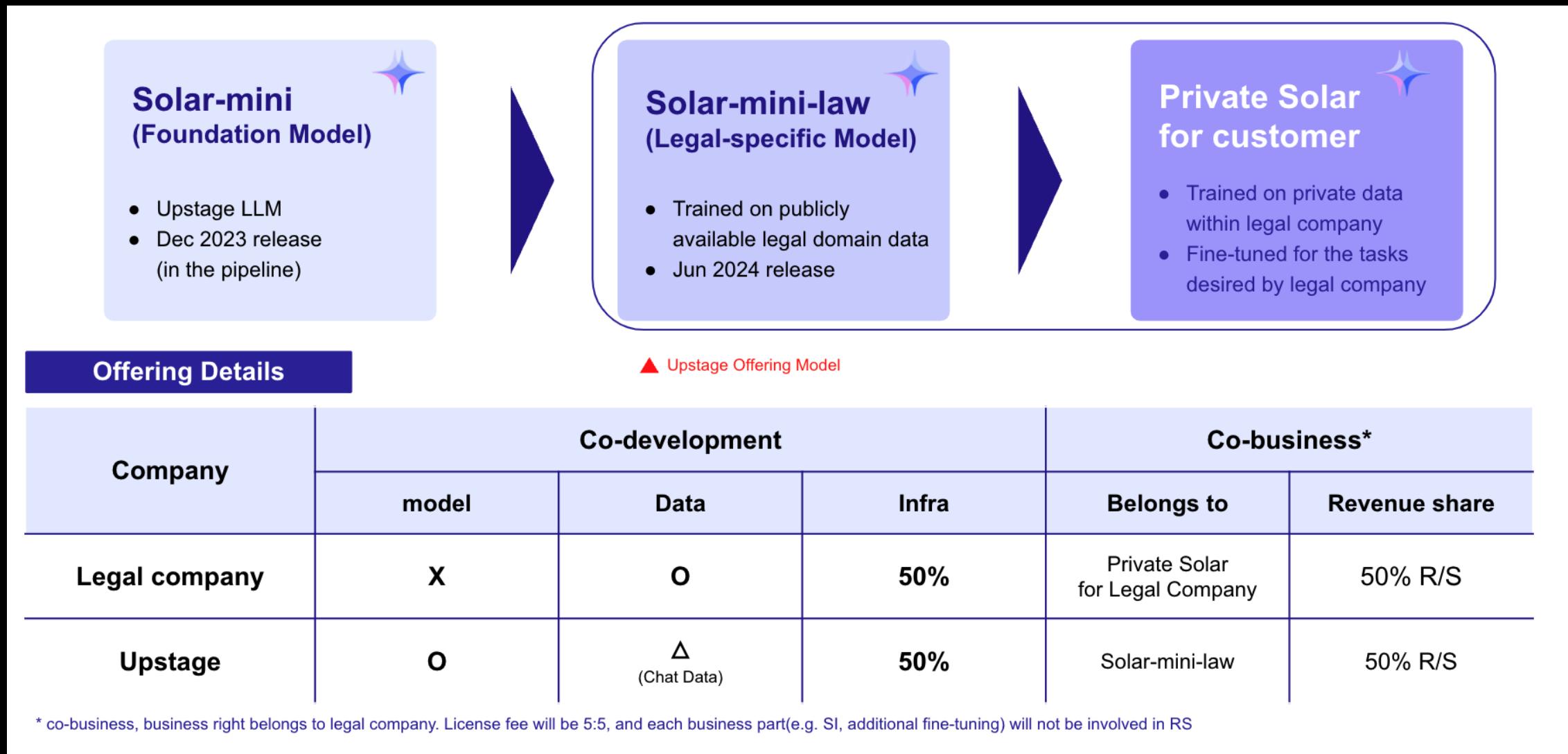
ipstage Solar LLM





Solar-Legal

Business case with Law & company



Developed LLM specialized in legal research, drafting, and summarization tasks

LLM Use-case: Legal



Research

Has skills to research legal info, covering case law, statutes, and legal procedures



Drafting

Able to draft legal document outlines in the correct format



Summarize

Can quickly summarize key points in documents by identifying facts and issues

Legal assistant based on a specialized legal LLM

Lawyers using SuperLawyer will experience innovative changes in their practice



Solo practitioner
lawyer

- Even individual lawyers with limited litigation and advisory experience can attain work coverage and capabilities on par with medium to large law firms



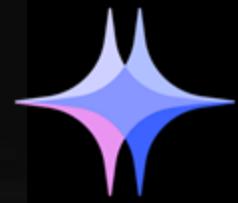
Law firm

- By maintaining the same number of affiliated lawyers, it's possible to significantly improve work productivity and capabilities, as well as increase client satisfaction



In-house
counsel

- By expanding capabilities, in-house counsel can reduce the cost of external legal consulting and efficiently monitor the handling of external litigation cases.



GTM Strategy

Language, Industry, Task

Upstage unfolds LLM business initiatives from 3 perspectives

APAC language
Expansion

Domain-Specific

Task-Specialized

Upstage currently has a wide range of use cases, both in terms of domains and languages

Country and language wise ↓

Domain and task wise →

e-Commerce



Developed private LLM specialized for attribute value extraction for commerce domain

Edu-tech



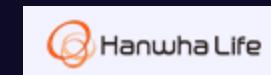
Trained a math-specialized LLM to achieve top global performance

Media



Developed a media-oriented RAG to remove hallucination issues and improve search reliability

Insurance



Completed a PoC to find accurate info. in insurance company documents, proving 98% accuracy

Finance



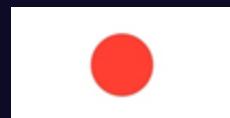
Developing a financial specialization LLM and RAG to enhance work efficiency

Healthcare



Developing LLM and RAG with data from the Ministry of Food and Drug Safety

Japanese



Developed a Japanese-specialized LLM surpassing current commercial models in performance

Thai



Collaborating with the Thai JTS Group to create a Thai LLM surpassing GPT-4

Arabic

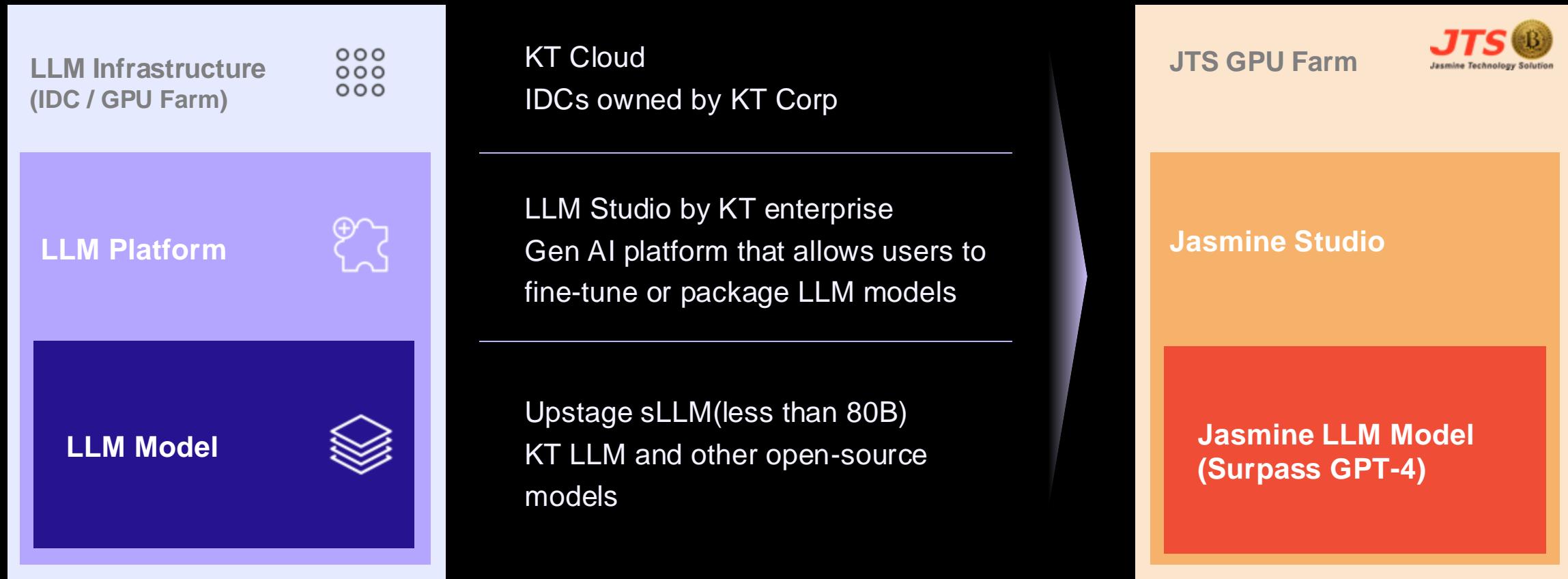


Working on an LLM that understands the culture and language of Arabic countries

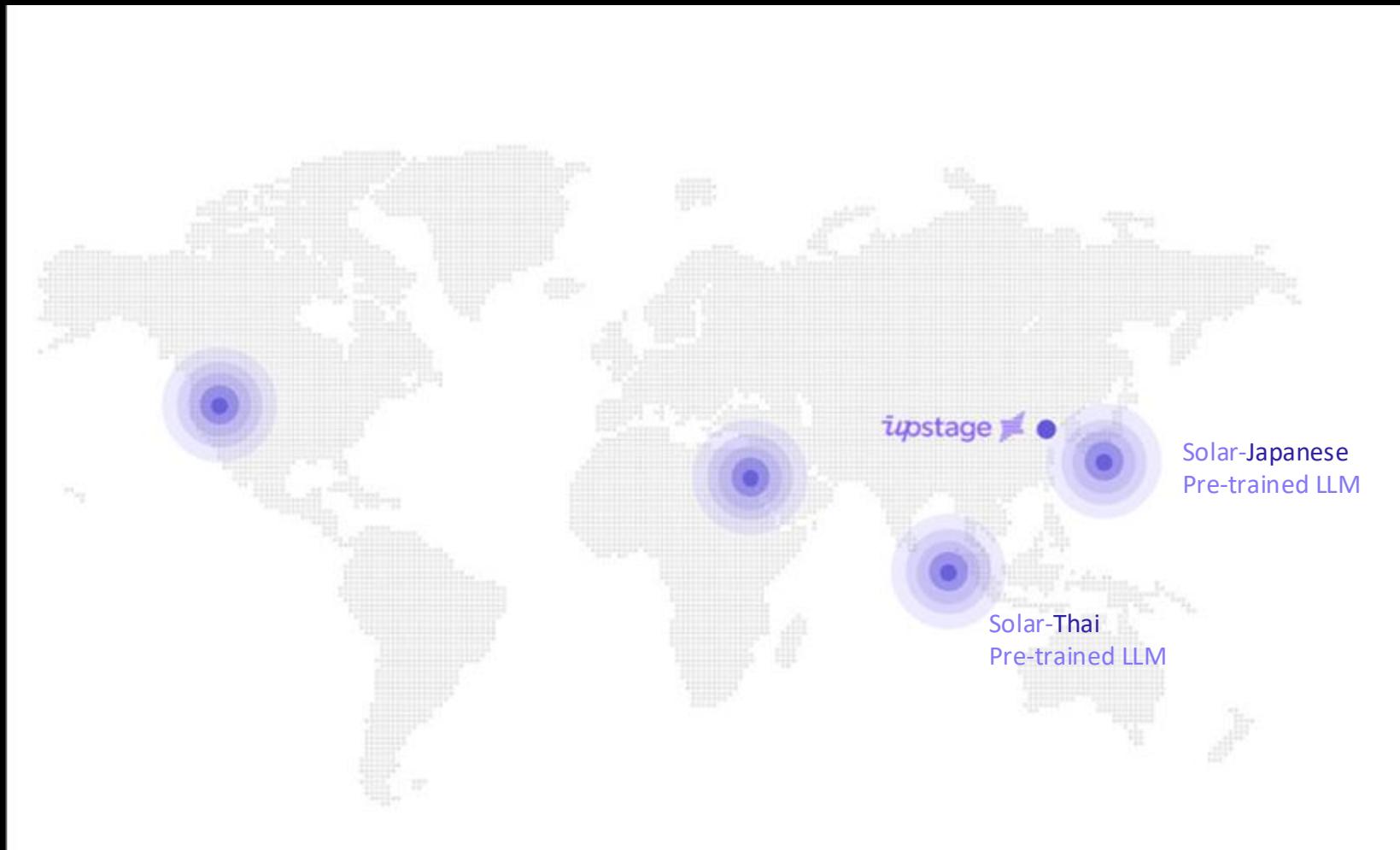


Develop a Thai LLM that surpasses GPT-4 performance along with collaborating with KT

Thai LLM Platform Architecture



Upstage is expanding LLM capabilities to APAC & MEA



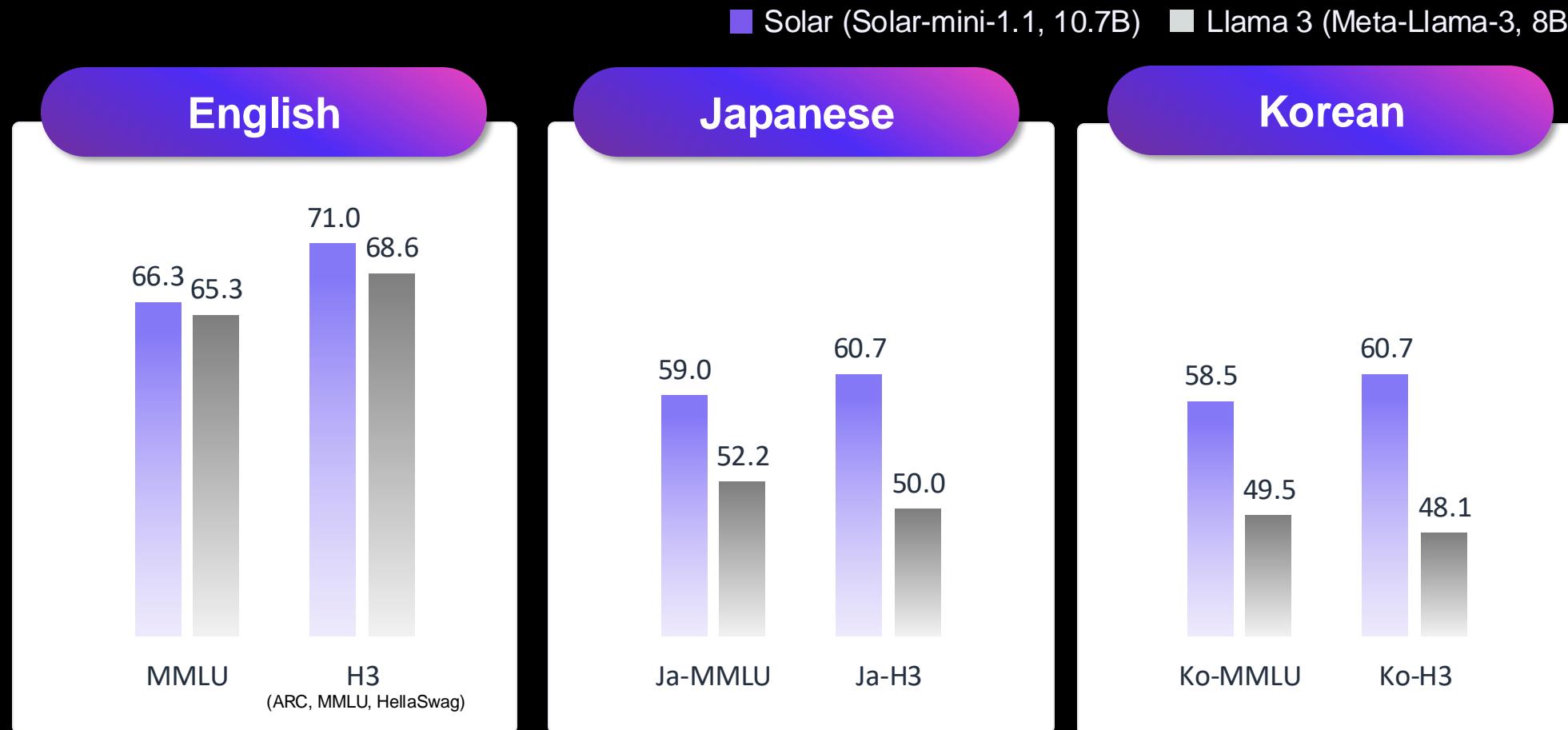
Solar Thai LLM

Upstage is developing a Thai LLM that surpasses GPT-4 performance for delivery to Thailand's Jasmin Group, along with collaborating with Korea's top telecom provider KT to provide infrastructure and studio as well

Solar Japanese LLM

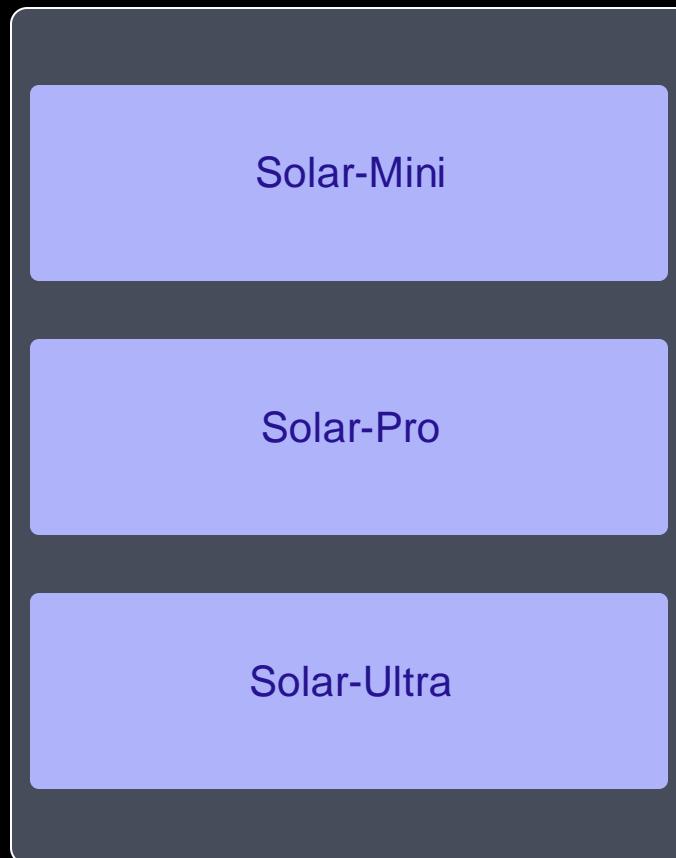
Upstage developed a Foundation LLM Model supporting Japanese, which demonstrated superior performance compared to Rakuten AI's renowned 7B model for Japanese language capabilities

Solar: Now world best foundation model especially for Asia



Upstage is creating a specialized LLM focusing on language expansion, industry, and task specificity, to be served via multi cloud service providers

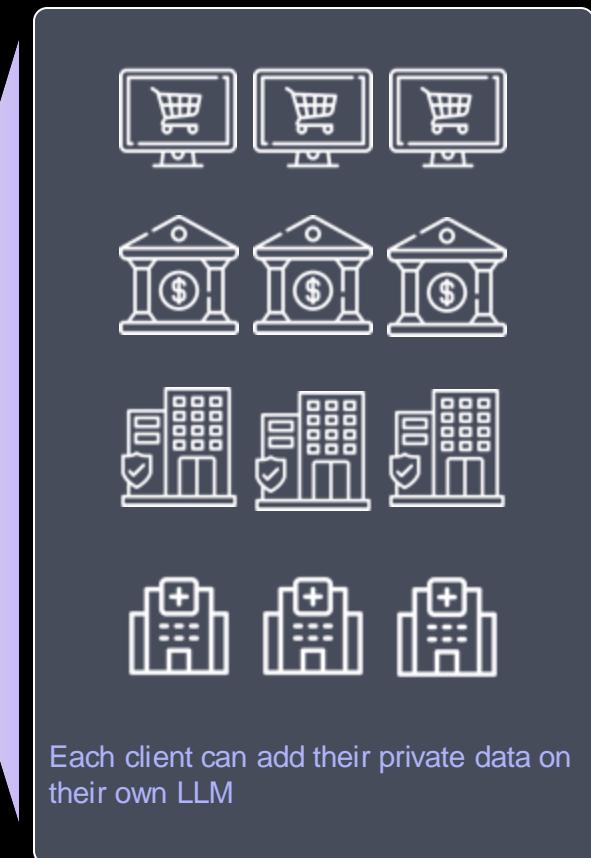
Pre-trained Model



Specialized LLM



PrivateLLM



Cloud

Cloud

Cloud / On-prem
Cloud / On-premise

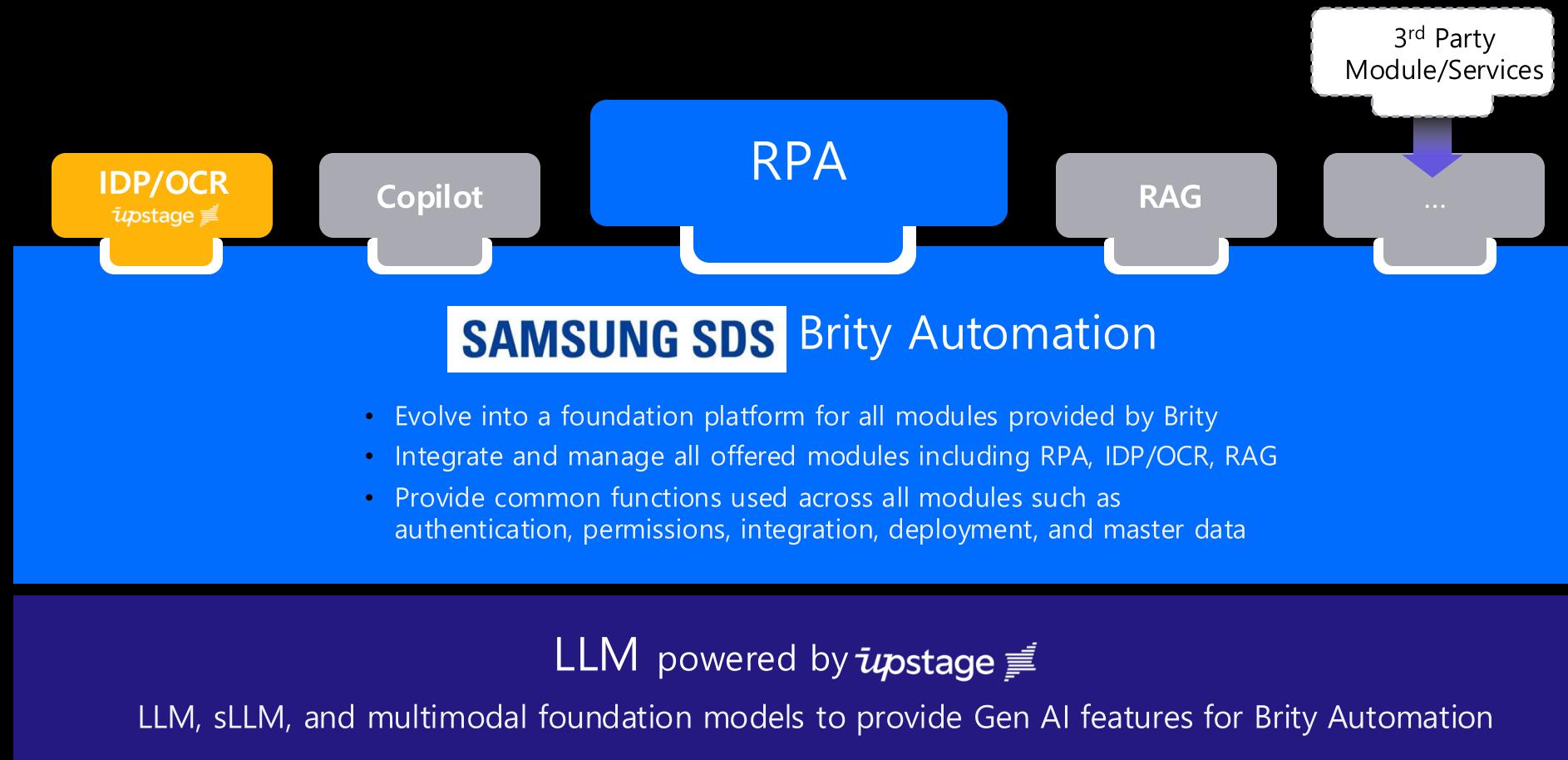
Solar LLM for JP, launched on AWS Jumpstart, is currently in market entry discussions with local partners (Jun '24)



APAC Market

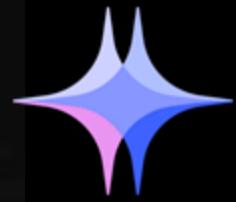
Finance
Insurance
Medical
Automotive
Logistics
Edu-tech
...

Samsung Brity, Korea's No.1 RPA, adapts Upstage's OCR & LLM models into its solution to provide advanced services





Making AI Beneficial



Appendix. Upstage use-case

Media can write articles utilizing accurate info from LLM

Service screen snapshot



1 케이뱅크가 최근 전만 고객을 달성했다고 하던데 그 이유가 뭐야?

케이뱅크 AI는 인공지능을 기반으로 학습한 정보를 제공할 수 있습니다.
답변은 한국언론진흥재단의 공식 의견이 아니라 정확한 정보는 출처로 함께 제공되는 기사들 통해 확인하실 수 있습니다.

2 케이뱅크가 최근 1000만 고객을 달성한 이유는 금리 경쟁력과 혜택을 통해 고객을 유치하고, 혁신적인 상품과 서비스, 편리한 이용 환경을 제공하여 고객들로부터 인정받았기 때문입니다. 1.서울신문 2.매일경제 3.매일경제
4.한국경제 5.아주경제 케이뱅크는 출범 7년 만에 1000만 고객을 돌파했으며, 특히 올해 들어 일평균 신규 고객 이 지난해 대비 3배 수준을 돌파하는 등 긍정적 성장을 이루었습니다. 1.서울신문 2.매일경제 3.매일경제
4.한국경제 5.아주경제 이러한 성장 배경에는 금리 경쟁력과 생활 속 혜택을 강화한 서비스가 큰 요인으로 작용했습니다. 4.한국경제 5.아주경제 최우형 케이뱅크 은행장은 "1000만 고객 달성을 놀라운 혜택과 혁신적인 상품·서비스, 편리한 이용 환경을 고객에게 인정받은 결과"라며 "외형과 내실 모두 다져 고객에게 믿음을 주는 은행, 고객의 금융 경험을 혁신하는 은행으로 성장하겠다"고 말했습니다. 5.아주경제

키워드 : 케이뱅크 전만 고객

3 키워드를 클릭하시면 하단에 관련된 분석을 보실 수 있습니다.

제작일	제작자	제작내용
2024-02-27	서울신문	케이뱅크, 출범 7년 만에 고객 1000만명 돌파
2024-02-06	매일경제	금리 경쟁력 앞세워... 케이뱅크, 7년만에 고객 1천만명
2024-02-06	매일경제	"주당대 율계 이자 140만원 아겠네"- 소문 자자한 '이곳' 1천만명 돌파
2024-02-26	한국경제	케이뱅크, 고객 1000만명 돌파
2024-02-26	매일경제	케이뱅크, IPO 앞두고 고객 1000만명 돌파

~에 대해 분석해줘'와 같은 질문을 통해 보다 차세한 답변을 받을 수 있습니다.

무엇이든 자유롭게 물어보세요.

케이뱅크 AI는 출처가 확인된 뉴스데이터 기반의 답변만 제공하며, 이는 한국언론진흥재단의 입장을 대변하지 않습니다. 개인정보처리방침

케이뱅크의 최근 이벤트는 무엇인가요? 천만 고객을 기념하는 케이뱅크의 특별 혜택은 무엇인가요?

- Natural language question

- Answer with natural language

- Provide source articles for answer

Background

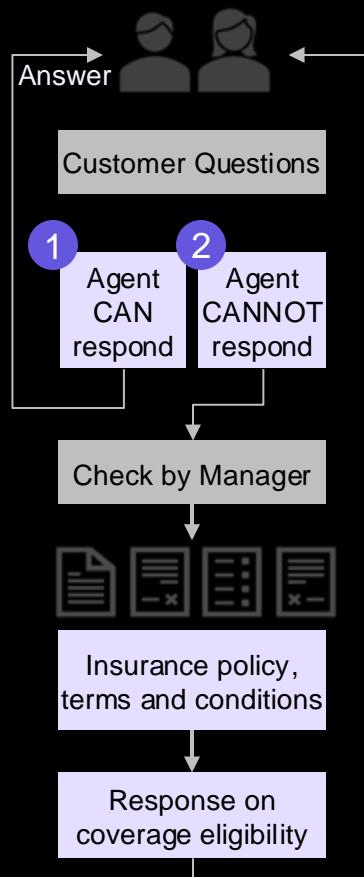
- Traditional keyword-based news searches made it impossible to respond to natural language queries when professionals were searching for relevant news, while generative AI for news searches was hindered by hallucinations making accurate searches impossible
- There was a desire to build a search engine that can search articles collected in real-time on news platforms and provide natural language explanations for the search results

Solution & effect

- Improve UX compared to existing news search engines by answering natural language questions
- Eliminate concerns about hallucinations and perform searches and answers based on real-time news articles through a news-specialized generative AI solution
- Increase article search traffic within the news platform

Solar solved challenges faced by insurance industry

Insurance enroll

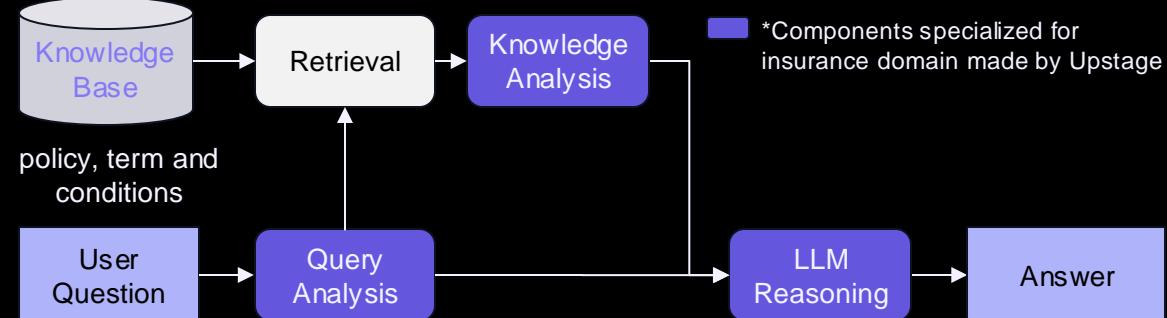


Pain-points & solutions

- Compared to the questions that insurance agents can cover ①, there are far more questions they cannot cover ②, resulting in a heavy workload for the design managers
- When enrolled customers ask questions about their insurance, it is difficult for them to expect an immediate answer
- Emerging need for a chatbot that can read insurance policies and terms & conditions to provide accurate answers

Conducted a PoC for an insurance-specialized generative AI-based chatbot that can answer coverage eligibility and covered items

Process



It classifies the question intent into 1. Coverage eligibility, 2. Definitions and explanations (glossary), 3. Cases where it cannot answer
 For questions falling under categories 1, 2, or 3, it answers through this pipeline
 For all other questions, it generates answers through a general LLM

Accuracy rate in responding to general queries with GPT

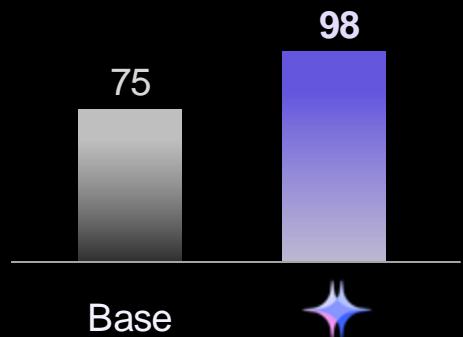
75%

Desired accuracy rate from the client

80%

Achieved accuracy rate by the end of PoC

98%

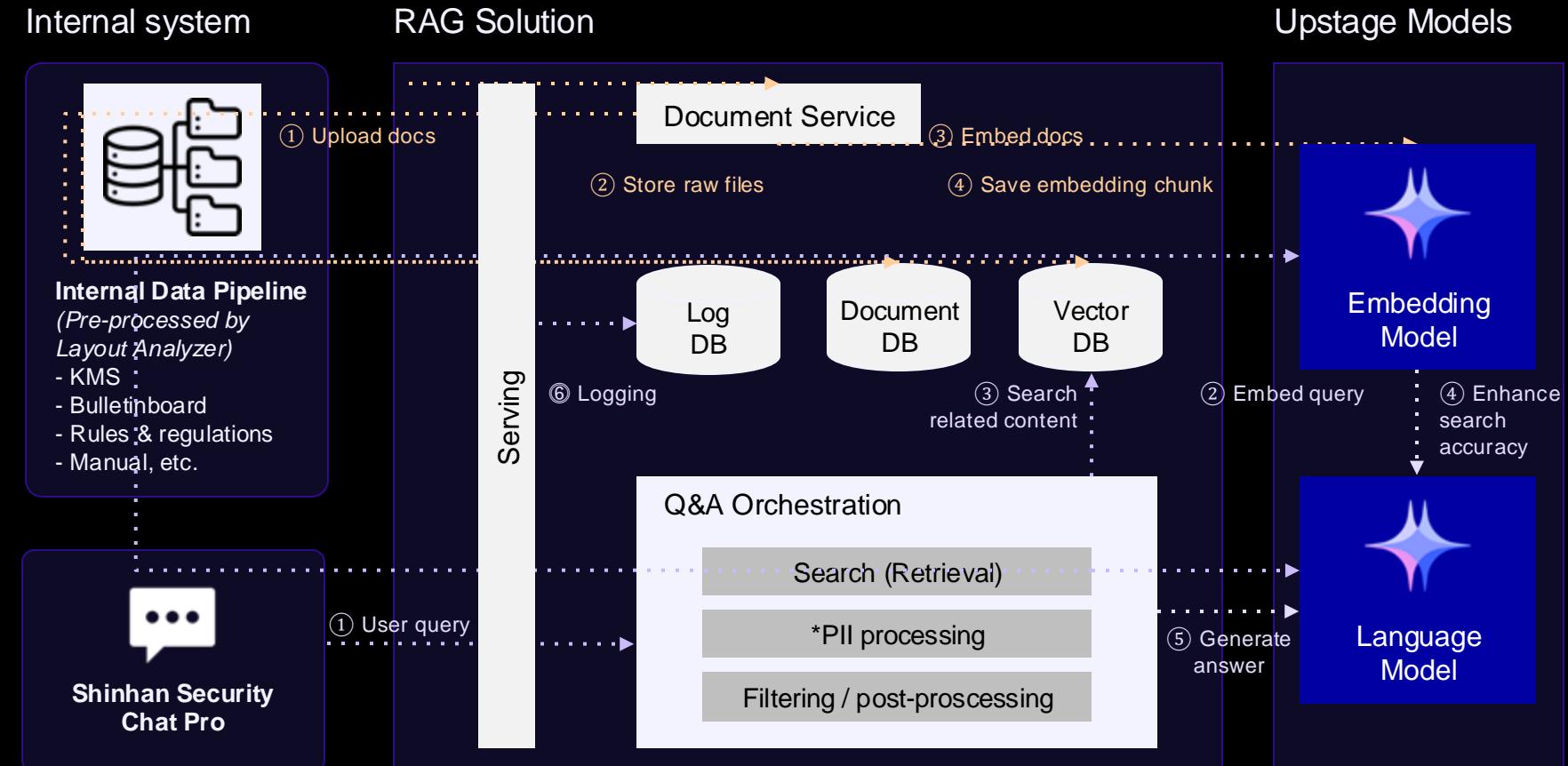


Develop a private LLM and RAG based on client's data

Pain-points & solutions

- Increased operational complexity due to the segmentation and personalization of securities products/services
 - Rising fatigue from repetitive tasks
 - Intensified competition in the financial market driven by generative AI
- Automating operations to handle the increasing complexity of products and services**
- Improving efficiency through internal staff operational innovation**
- Establishing a foundation for being a global securities leader**

Develop systems for private LLM & RAG



*PII: Personally Identifiable Information

Task-oriented LLM enables e-commerce work automation

Apple iphone 15 Pro 256GB



About this Item

- Apple 아이폰 15 Pro 자급제 256GB – 화이트 티타늄
- USB 3 규격 USB-C. 최대 29시간 동영상 재생이 가능함
- 초점 및 심도 제어 기능을 지원하는 한 차원 높은 인물 사진. 광학 줌범위(0.5 ~ 5x)
- 패스키부터 개인정보 보호 리포트 그리고 건강 앱까지, iPhone은 다양한 개인정보 보호 기능으로 무엇을 공유할지 오직 당신만이 결정할 수 있습니다.

Product Description

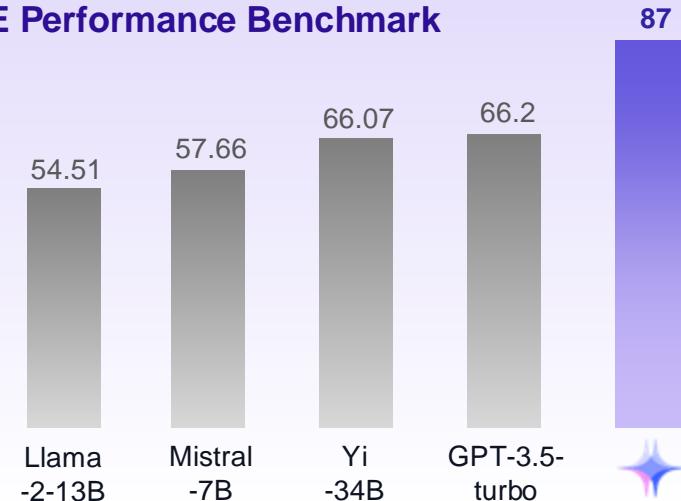
A17 Pro. 게임의 판도를 바꾸는 칩. 6.1인치. 획기적인 성능. 티타늄. 초강력. 초경량. 초프로. 한 차원 높은 인물 사진. iPhone 사상 가장 긴 광학 줌 초점 거리를 자랑하는 iPhone15 pro max. 저 멀리 내다보다. 동작 버튼. 즐겨 쓰는 기능을 빠르게 실행시켜 주는 단축키. 최대 20배 빠른 전송 속도. 최대 29시간 동영상 재생.

Attributes: Brand, Chipset, Screen size, Memory, Cable type

Pain-points & solutions

- Across multiple e-commerce platforms, in-house content managers spend significant manual effort extracting designated properties and their corresponding attributes from product metadata, and mapping them to customer data schemas
- Build a private LLM specialized for attribute value extraction(AVE) and apply it to product metadata and reviews to preprocess unstructured data, enabling its use from a planning perspective

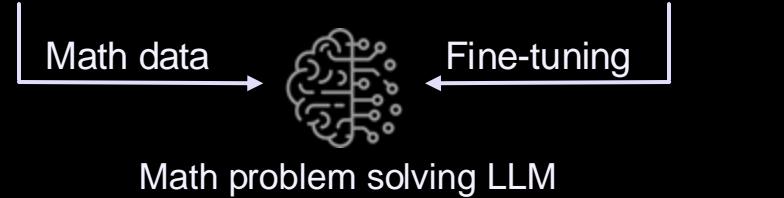
AVE Performance Benchmark



Math-oriented fine-tuned LLM proved its performance

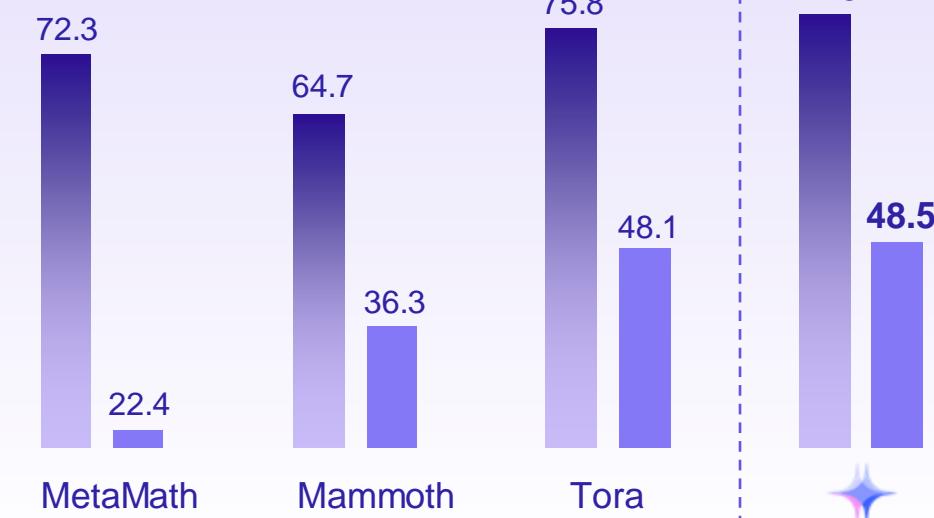
LLM Use-case: Edu-tech

Mathpresso by **Quanda**
(MAU 13M, Education application)



Fine-tuned math LLM performance benchmark

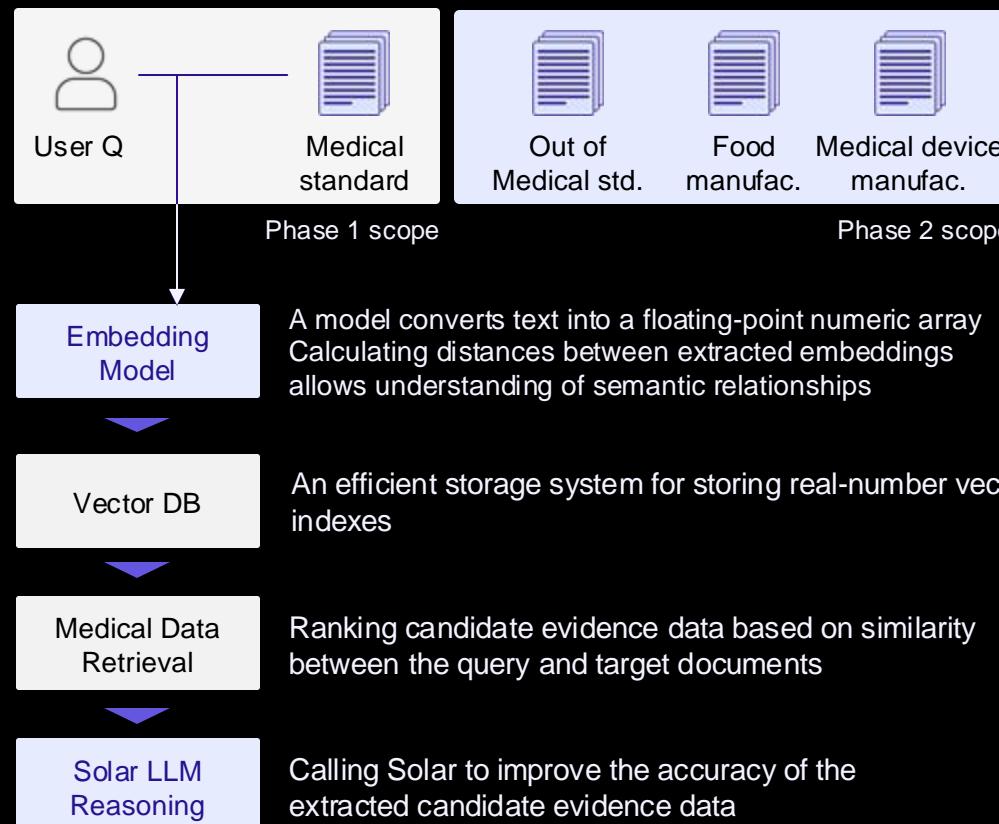
■ GSM8K ■ Math



- Quanda, which operates an AI-based math education solution, and Upstage fine-tuned LLM specialized for math
- Upstage achieved the state-of-the-art (SoTA) performance among models under 13B on important math model evaluation metrics like 'GSM8K' and 'MATH'
- This performance surpassed Microsoft's 'Tora 13B' model, evaluated as an outstanding achievement
- As a case of building a private LLM for the edu-tech domain, Upstage fine-tuned a small LLM specialized in solving math problems to meet the customer's needs and provided it

Solved medical industry issues through LLM and RAG

RAG based on Food & Drug Safety



RAG Demo

[UPSTAGE x 식품의약품안전처] Test API Demo

Q. Explain the standard manufacturing practices for drugs related to vitamins and minerals.

A. The standard manufacturing practices for vitamins, minerals, etc. are standards for oral multi-ingredient pharmaceutical preparations containing one or more vitamins intended for use in alleviating symptoms and providing vitamins and minerals for which the efficacy of vitamins and minerals is expected by supplying them ...

Q. Tell me the maximum single dose and maximum daily dose of sodium salicylate

A. The maximum single dose of sodium salicylate is 1,000mg, and the maximum daily dose is 3,000mg

For domain of food & drug, which is difficult to address with general data learning, **Upstage implemented RAG based on data from Ministry of Food & Drug Safety**, thereby improving response range and accuracy of basic generative AI models for question-answering



물질안전보건자료

Sikalastic® U-Primer (JB)



버전 최종 개정일자: SDS 번호:
5.0 13.09.2022 100000009916
지난 작성일자: 25.11.2021
최초 작성일자: 25.06.2018

화학물질명	관용명 및 이명	CAS 번호 또는 식별번호	함유량 (% w/w)
크실렌	크실렌	1330-20-7	>= 20 - < 25
Diphenylmethanediisocyanate, isomeres and homologues	Diphenylmethane diisocyanate, isomeres and homologues	9016-87-9	>= 15 - < 20
Polypropylene glycol	Polypropylene glycol	25322-69-4	>= 10 - < 15
4,4-디이소시안산디페닐메탄	4,4-디이소시안산 디페닐메탄	101-68-8	>= 5 - < 10
에틸 벤젠	에틸 벤젠	100-41-4	>= 5 - < 10
다이에틸렌 글리콜	다이에틸렌 글리콜	111-46-6	>= 0.3 - < 1
dimethyl carbonate	dimethyl carbonate	616-38-6	>= 30 - < 35

4. 응급조치 요령

일반적인 조치사항	: 위험 지역으로부터 벗어나십시오. 의사의 견진을 받을 것. 본 물질안전보건자료를 담당 의사에게 보일 것.
가. 눈에 들어갔을 때	: 즉시 흐르는 물로 눈을 충분히 씻어낼 것. 콘택트 렌즈를 제거할 것. 씻어내는 동안에는 눈을 크게 뜨고 있어야 합니다. 눈의 자극이 지속되면 전문의에게 치료를 구할 것.
나. 피부에 접촉했을 때	: 오염된 의복과 신발을 즉시 벗을 것. 비누와 물로 충분히 씻어내십시오. 증상이 지속되면 의사의 견진을 받을 것.
다. 흡입했을 때	: 신선한 공기가 있는 곳으로 옮기십시오. 심한 노출 후에는 의사의 견진을 받으십시오.
라. 먹었을 때	: 물로 입안을 씻어낸 후 물을 많이 마시십시오. 구토를 유도하지 말 것. 우유나 알코올성 음료를 주지 마십시오. 의식이 없는 사람에게는 절대로 어린한 것도 먹이지 말 것. 한자를 즉시 병원으로 이송할 것.
급성 및 지연성의 가장 중요한 증상/영향	: 심한 폐 손상 위험(흡인에 의한). 자극성 영향 과민성 영향

4 / 18



물질안전보건자료

Sikalastic® U-Primer (JB)

top-left:(1160,169);bottom-right:(1336,323)

버전 최종 개정일자: SDS 번호:
5.0 13.09.2022 100000009916

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화학물질명

크실렌

Diphenylmethanediisocyanate, isomeres and homologues Diphenylmethane diisocyanate, isomeres and homologues

Polypropylene glycol

4,4-디이소시안산디페닐메탄

에틸 벤젠

다이에틸렌 글리콜

dimethyl carbonate

관용명 및 이명

크실렌

Diphenylmethanediisocyanate, isomeres and homologues Diphenylmethane diisocyanate, isomeres and homologues

Polypropylene glycol

4,4- 디이소시안산 디페닐메탄

에틸 벤젠

다이에틸렌 글리콜

dimethyl carbonate

CAS 번호 또는 식별번호 함유량 (% w/w)

1330-20-7 >= 20 - < 25

>= 15 - < 20

>= 10 - < 15

>= 5 - < 10

>= 0.3 - < 1

>= 30 - < 35

4. 응급조치 요령

일반적인 조치사항 : 위험 지역으로부터 벗어나십시오.
의사의 견진을 받을 것.

본 물질안전보건자료를 담당 의사에게 보일 것.

가. 눈에 들어갔을 때 : 즉시 흐르는 물로 눈을 충분히 씻어낼 것. 콘택트 렌즈를 제거할 것.

씻어내는 동안에는 눈을 크게 뜨고 있어야 합니다.

나. 피부에 접촉했을 때 : 눈의 자극이 지속되면 전문의에게 자문을 구할 것 : 오염된 의복과 신발을 즉시 벗을 것. 물로 충분히

비누와 씻어내십시오. 증상이 지속되면 의사의 견진을 받을

다. 흡입했을 때

것

: 신선한 공기가 있는 곳으로 옮기십시오.

심한 노출 후에는 의사의 견진을 받으십시오.

라. 먹었을 때 : 물로 입안을 씻어낸 후 물을 많이 마시십시오.

구토를 유도하지 말 것.

우유나 알코올성 음료를 주지 마십시오.

의식이 없는 사람에게는 절대로 어린한 것도 먹이지 말 것. 환자를 즉시 병원으로 이송할 것.

급성 및 지연성의 가장 중요한 증상/영향

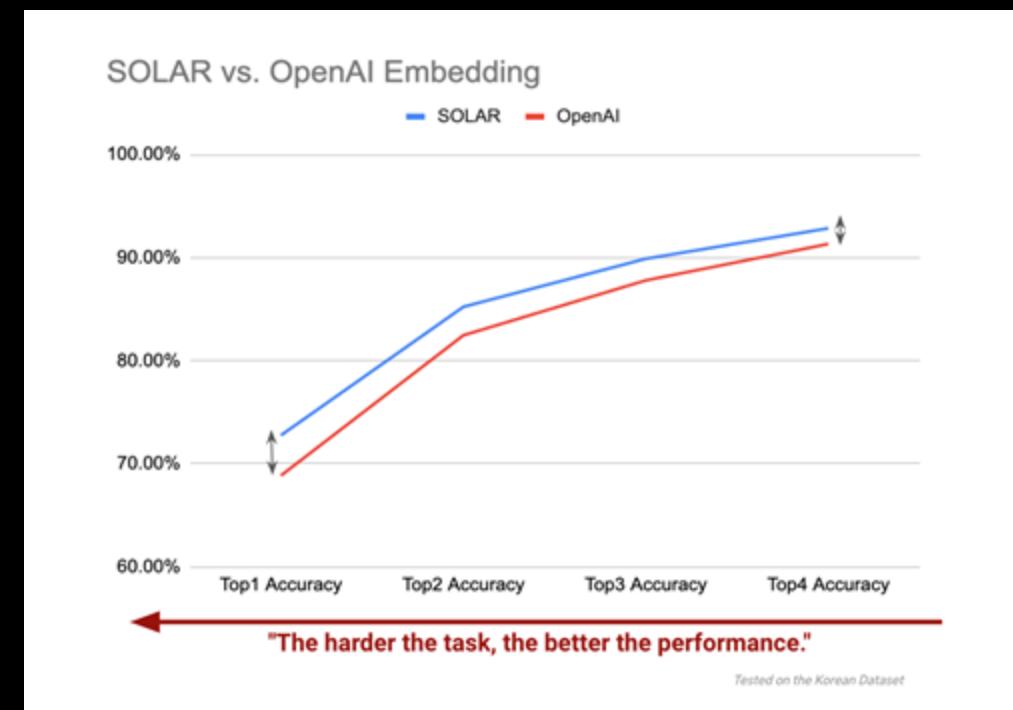
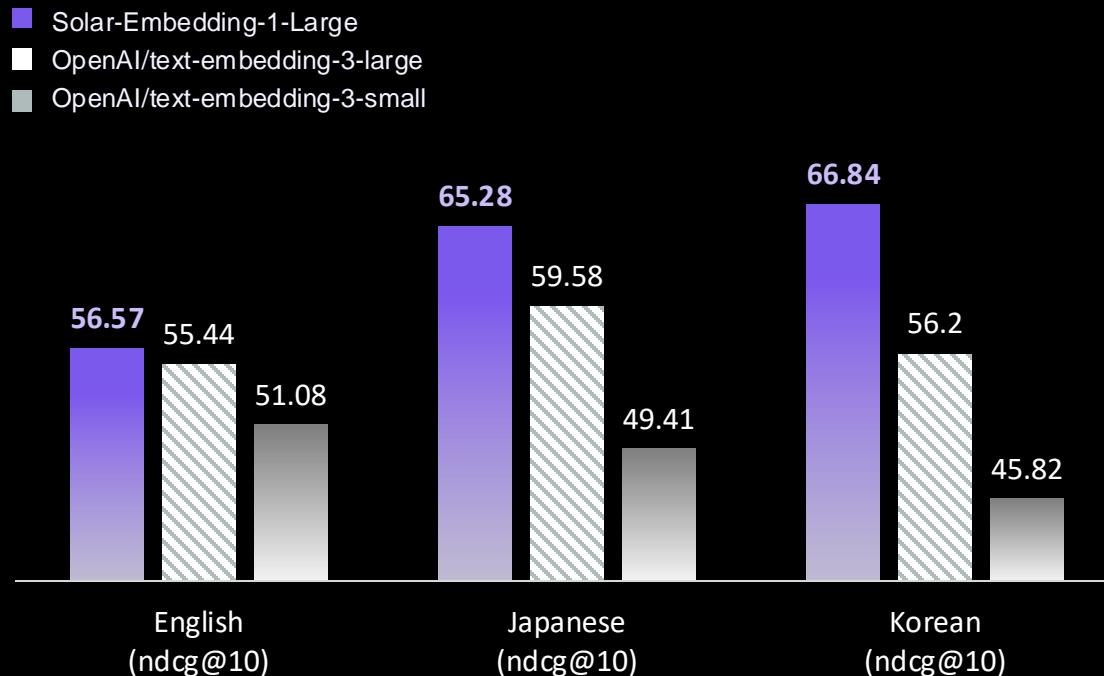
: 심한 폐 손상 위험(흡인에 의한).

자극성 영향

과민성 영향

Upstage Embedding model

- **Key functionality:** Converts unstructured text data into embedding vectors
- **Performance:** Outperforms OpenAI Large model in English, Korean and Japanese



SolarBox: SMB ready LLM appliance



- Global No.1 in Ko, En, Jp
- Speed ↑ RAM usage ↓
- 32K context length



Hardware

- Entry level GPU installable
- Benchmark for each GPU
- LLM packaged appliance



Serving & Monitoring

- Chat UI
- History and Prompt management
- ID, License Key



Fine-Tuning(TBU)

- Entry level GPU fine-tunable
- Private data fine-tuning