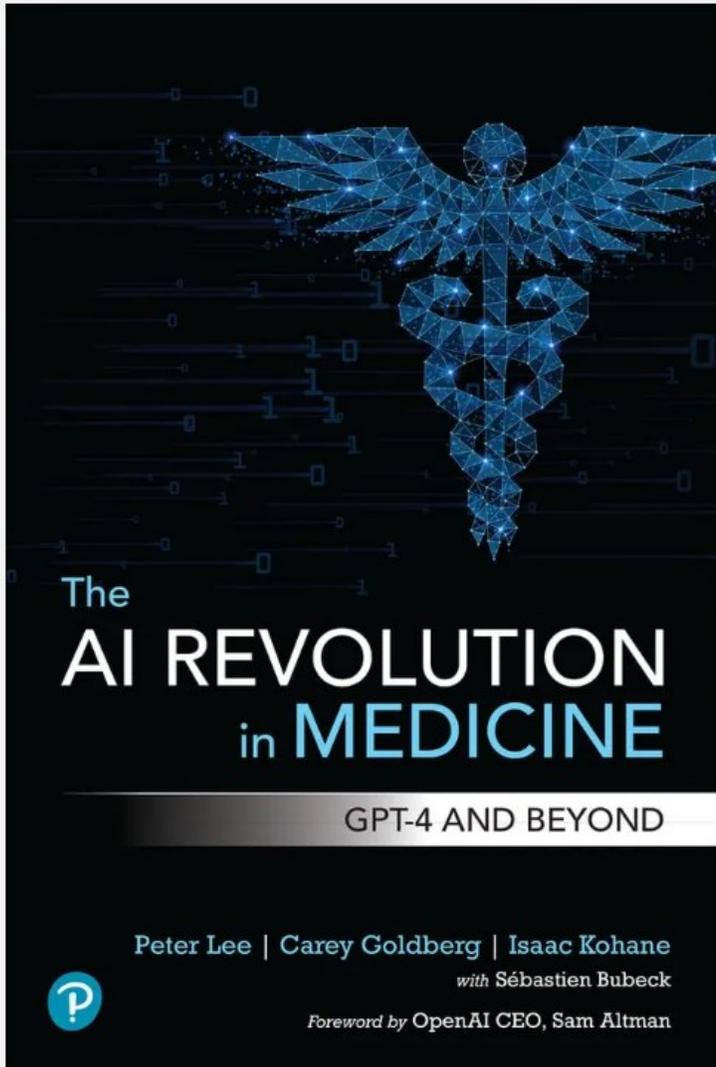


# Chat GPT 소개 및 향후 의료분야에 미칠 영향

2023



A new book by Peter Lee, Carey Goldberg, Isaac Kohane will be released as an e-book April 15th and as a paperback May 3rd and I've had the chance to read it. With my keen interest for how AI can transform medicine (as written about in [Deep Medicine](#) and multiple recent review papers [here](#), [here](#), [here](#)), I couldn't put it down. It's outstanding for a number of reasons that I'll elaborate.



Peter Lee summarized what GPT-4 can do, and how it differs from ChatGPT in the paragraph below and, as the sole author of the first 3 chapters, provides considerable insights about the multi-potency, liabilities, and nuances of this new large language model. Many actual prompts to GPT-4 and its responses are presented to get these points across. The first 3 chapters culminate with “The Big Question: Does It Understand?”

My takeaways from these chapters are that GPT-4 is a remarkable conversationalist, it edits better than creates, provides language that suggests it has a real grasp on causality, and that it appears to exhibit logical reasoning. When asked, it can give an idea of what a patient may be thinking. To Peter’s credit, he aptly presents both sides of whether GPT-4 actually understands; the “stochastic parrot” versus a more advanced form of machine intelligence and comprehension than we have previously seen. Taking us through a poem that his son wrote, and that GPT-4 rewrites, is quite informative, as is the French phrase that the LLM interprets with remarkable cultural insight.

This issue about “understanding” is a lot like the explainability issue of AI. If it works well, it may not really matter what is the level of the machine’s capability.

# Overview of GPT-3



## Generative Pre-trained Transformer 3 (GPT-3)

- 인간과 유사한 텍스트를 생성하기 위해 딥 러닝을 사용하는 자동 회귀 언어 모델 <sup>2023</sup>
- 수조 개의 단어에 대한 사전 학습
- 입력 텍스트를 기반으로 가능성이 가장 높은 다음 단어 예측
- 일반 텍스트 입력/텍스트 출력 인터페이스



# Chat GPT 란?



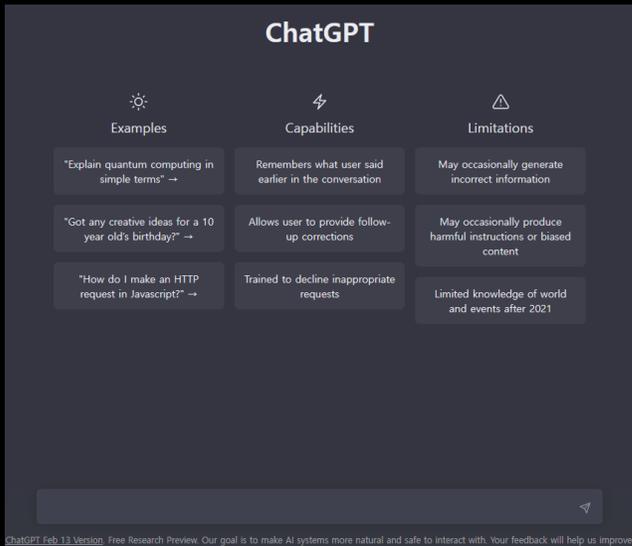
**ChatBot** +

**Generative** : '생성하는' 문장

**Pretrained** : '사전 학습된' 사전 학습된 정보를 기반한

**Transformer** : '변환' 글의 맥락을 이해할수있는 언어모델

2023



## 할수있는일의 예시

- 간단하게 설명요약
- 브레인스토밍
- 코드 작성 도우미

## 주요 기능

- 이전 대화를 기억하여 답변
- 적절하지 않은 질문은 거르고 답변
- 추가 질의를 통해 답변을 개선

## 한계

- 부정확한 데이터를 답변할수있다
- 부적절한 콘텐츠를 생성할수도 있다
- 2021년 이후 데이터에 대한 지식 미보유

# GPT 와 ChatGPT의 차이점



## ChatGPT

인간과 유사한 반응

상황 인식

대용량 데이터로 훈련

## GPT-3 vs ChatGPT: 차이점 이해

### GPT-3: 더 스마트한 앱 만들기

2023



주문형 인텔리전스(on-demand intelligence)용 API를 통해 액세스할 수 있는 AI 모델

### ChatGPT: 생산성 향상



GPT-3 모델을 사용하여 상호작용하고 작업을 수행하도록 요청할 수 있는 챗봇을 구축

다음과 같은 용도로 사용:



의미가 담긴 텍스트 이해 구현



내부정보 조회 및 추출



Copilot과 같은 애플리케이션 구축



ChatGPT가 할 수 있는 일을 포함하여 더 많은 용도로 사용



콘텐츠 제작을 위한 아이디어



일반적인 질문 답변



코드 생성과 대화 지원

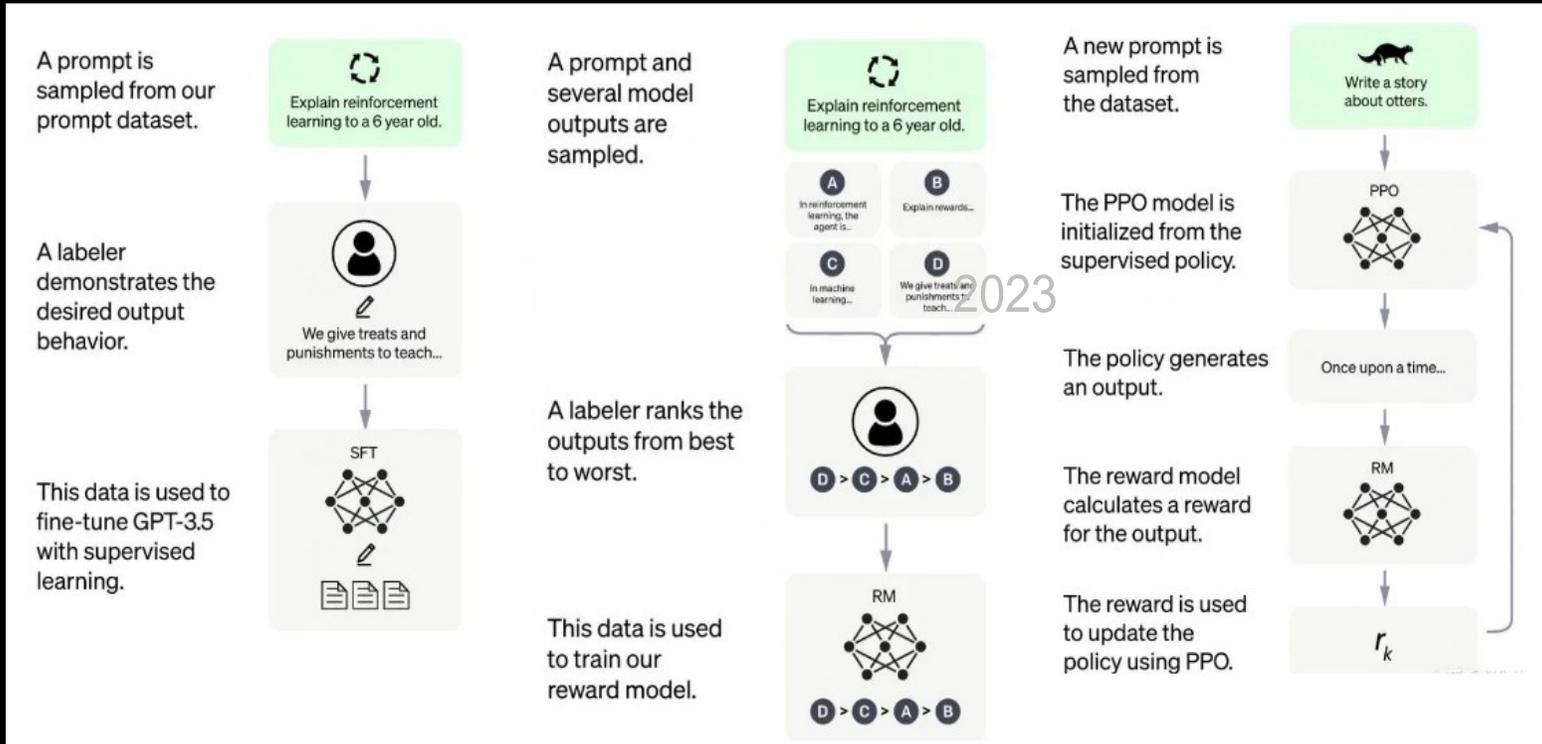
# Chat GPT 를 어떻게 만들었나?



## Step 1. 샘플 데이터를 기반으로 지도학습 수행

## Step 2. 비교 데이터 수집 / 보상 모델 훈련

## Step 3. 강화학습 모델을 활용하여, 보상모델 최적화

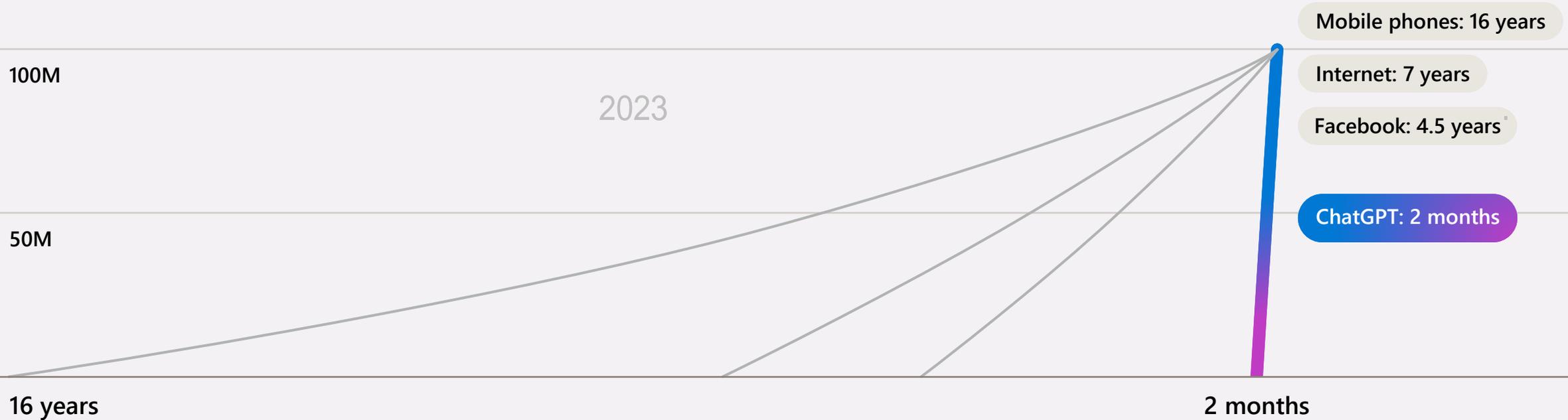


분야	시험	수준	성적/정답률
경영	와튼 MBA 학위	통과	약 B
회계	미국 회계사 (AICPA)	통과	57.6%
법무	미국 변호사 (Bar Exam)	통과	50.3%
의학	미국 의사 면허 (USMLE)	통과	60% 이상

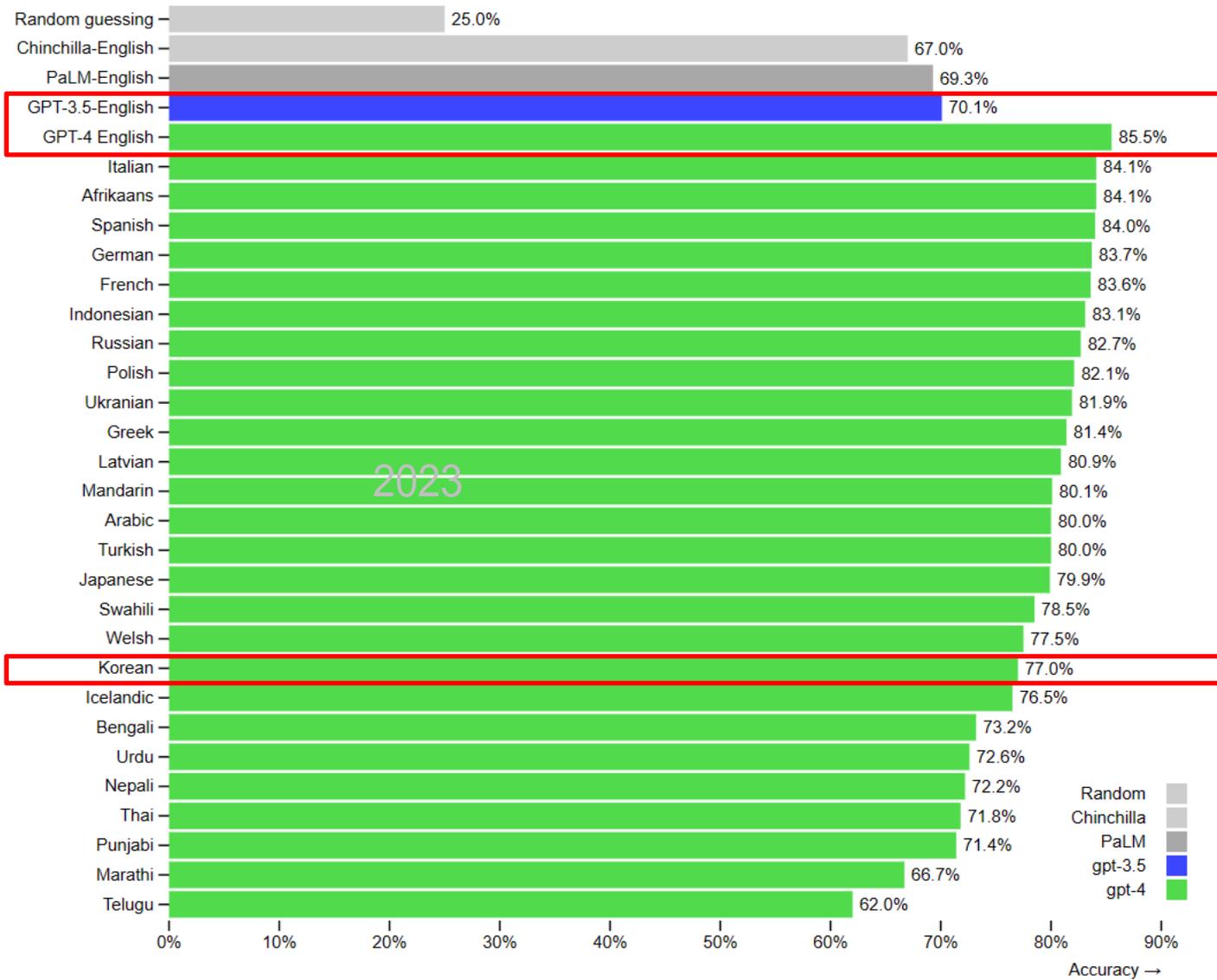
GPT-3.5라고 하는 Large Language Model 을 기반으로 함. (1750억개의 파라미터)

# Unprecedented Vertical growth

## Time to reach 100M users



### GPT-4 3-shot accuracy on MMLU across languages



# Token

Welcome to Global AI Bootcamp in Busan!

Welcome to Global AI Bootcamp in Busan!

2023

10개 토큰

Welcome to Global AI Bootcamp in Seoul!

9개 토큰

# Token

<https://platform.openai.com/tokenizer>

## Tokenizer

The GPT family of models process text using **tokens**, which are common sequences of characters found in text. The models understand the statistical relationships between these tokens, and excel at producing the next token in a sequence of tokens.

You can use the tool below to understand how a piece of text would be tokenized by the API, and the total count of tokens in that piece of text.

GPT-3 Codex

Hi this is Anne shin. How are you?

Clear

Show example

Tokens	Characters
10	34

Hi this is Anne shin. How are you?

# Token

GPT-3

Codex

2023

여러분 안녕하세요

Tokens

23

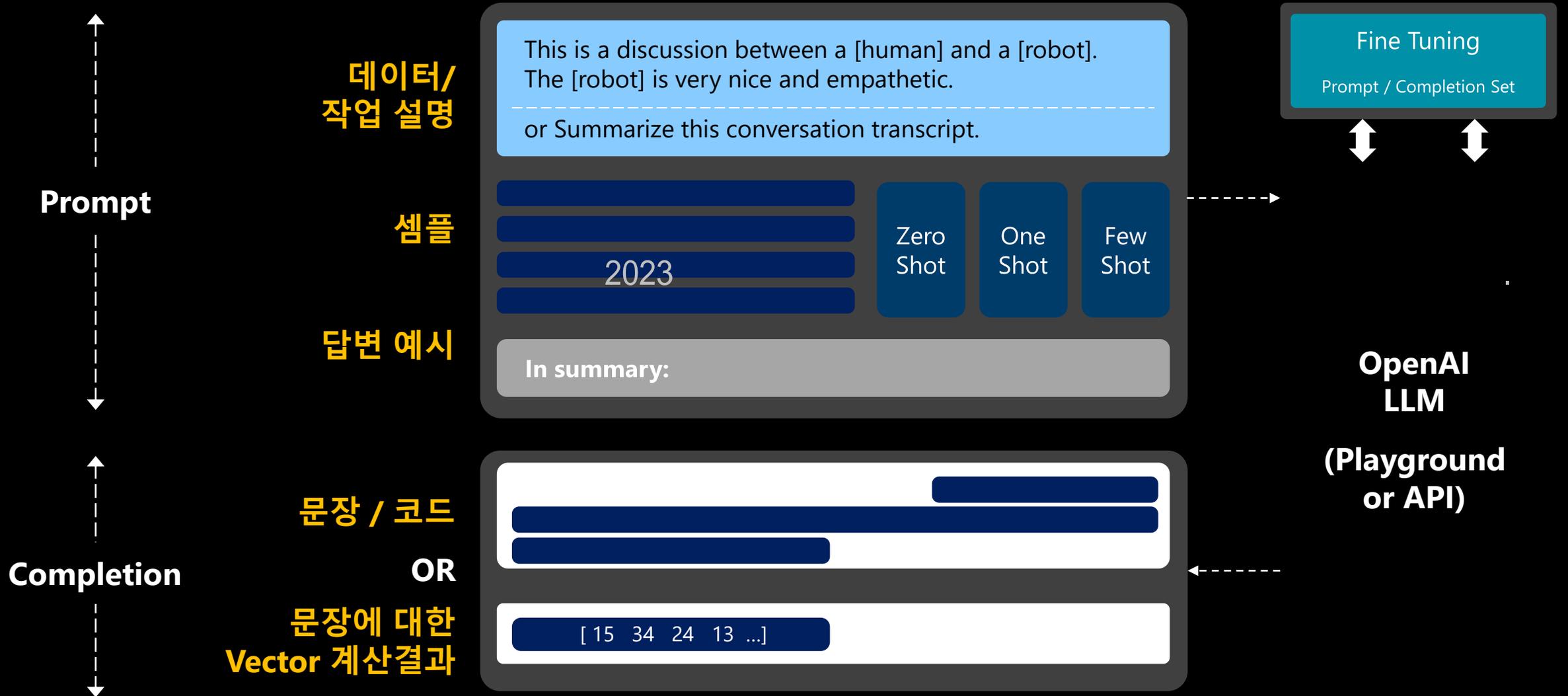
Characters

9



무려 23개 토큰 😲

# Chat GPT 활용 기본 개념 요약



# ChatGPT benefit



## Conversational

대화형 특성으로 인해 상호 작성이 좀 더 쉬워지므로 모델을 보다 쉽게 최대한 활용할 수 있음

## Multi-Turn

ChatGPT의 대화 특성으로 인해 모델의 <sup>2023</sup>응답을 쉽게 추적할 수 있으며, 이를 통해 사용자는 요청, 편집 제안, 설명 등을 쉽게 수행할 수 있음

## Creative

ChatGPT 모델은 콘텐츠 작성 및 스토리텔링과 같은 창의적인 작업에 탁월함

# ChatGPT limitations



## Hallucinations

ChatGPT는 광범위한 지식을 가지고 있지만, 때로는 잘못된 답변을 제공하기에 제약사항을 이해하고 시나리오에 해당 사항을 막기 위한 지시 사항들을 적용하는 것이 중요함

## No custom-tuning

2023

ChatGPT 모델에 대한 Custom-tuning model을 제공하지 않기에 시스템 메시지를 사용 사례에 맞게 조정하거나 사용자와 어시스턴트 간의 메시지 예시를 사용하여 모델을 맞춤 설정하는 것을 권장

# Text classification — Named Entity Recognition (Zero-Shot)



Prompt:

Extract the name and mailing address from this email:

Dear Kelly,

It was great to talk to you at the seminar. I thought Jane's talk was quite good.  
Thank you for the book. Here's my address <sup>2023</sup> 2111 Ash Lane, Crestview CA 92002

Best,  
Maya

Completion:

**Name:** Maya

**Mailing Address:** 2111 Ash Lane, Crestview CA 92002

# Text classification – Custom Named Entity (Few-Shot)



**Prompt:**

**Extract job titles from the following sentences.**

**Sentence: John Doe has been working for Microsoft for 20 years as a Linux Engineer.**

**Job title: Linux Engineer**

**###**

**Sentence: John Doe has been working for Microsoft for 20 years and he loved it.**

**Job title: none**

**###**

**Sentence: Marc Simoncini | Director | Meetic**

**Job title: Director**

**###**

**Sentence: Damien is the CTO of Platform.sh, he was previously the CTO of Commerce Guys, a leading ecommerce provider.**

**Completion:**

**Job title: CTO**

# Summarization – Extractive vs Abstractive



## Extractive

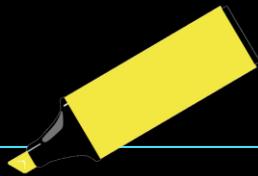
Select parts of the original text to form a summary

- Easier
- Restrictive (no paraphrasing)

2023

Peter and Elizabeth took a taxi to attend the night party in the city. While in the party, Elizabeth collapsed and was rushed to the hospital.

Peter and Elizabeth attend party city. Elizabeth rushed hospital



## Extractive (Semantic)

Generates new text using natural language generation techniques

- More difficult
- More flexible (more human)

Peter and Elizabeth took a taxi to attend the night party in the city. While in the party, Elizabeth collapsed and was rushed to the hospital.

Elizabeth was hospitalized after attending a party with Peter.



# Abstractive summarization – Contact Center summarization



Prompt:

Summarize this for a call center agent:

**Agent:** Thank you for calling ADM. Who am I am speaking to?

**Customer:** Hello, my name is Peter Smith. I own a small business and have some questions regarding payroll processing.

**Agent:** Good morning, Peter, before we get started <sup>2023</sup> may I ask you a few questions so that I better answer your questions today?

**Customer:** Thank you that is quite helpful. Are there specific regulations that I need to follow?

**Agent:** Certain aspects of payroll processing are regulated by the Internal Revenue Service (IRS) and the Department of Labor (DOL)

Completion:

The agent is speaking to a customer named Peter Smith. Peter is asking for tips on manual payroll processing. The agent also informs Peter that certain aspects of payroll processing are regulated by the Internal Revenue Service (IRS) and the Department of Labor (DOL).

# Product description & ad generation (Few-Shot)



Generate a product description out of keywords.

Keywords: shoes, women, \$59

Sentence: Beautiful shoes for women at the price of \$59.

###

Keywords: trousers, men, \$69

Sentence: Modern trousers for men, for \$69 only.

###

Keywords: gloves, winter, \$19

Sentence: Amazingly hot gloves for cold winters, at \$19.

###

Keywords: t-shirt, men, \$39

Sentence:

Sentence: **Extraordinary t-shirt for men, for \$39 only.**

# Chatbot with personality (Few-Shot)



This is a discussion between a [human] and a [robot].  
The [robot] is very nice and empathetic.

[human]: Hello nice to meet you.

[robot]: Nice to meet you too.

###

[human]: How is it going today?

[robot]: Not so bad, thank you! How about you? <sup>2023</sup>

###

[human]: I am ok, but I am a bit sad...

[robot]: Oh? Why that?

###

[human]: **I broke up with my girlfriend...**

[robot]: Oh? How did that happen?

# Prompt Chaining



## Entity Extraction

Please **extract entities** from the following news article: ***The new iPhone model is set to be released next month. It has been highly anticipated by Apple fans and is expected to feature a larger screen and improved camera***

```
{'text': 'iPhone', 'type': 'PRODUCT'}, {'text': 'Apple', 'type': 'ORGANIZATION'}
```

## Summarization

Please **summarize** the information about the product

```
[{'text': 'iPhone', 'type': 'PRODUCT'}, {'text': 'Apple', 'type': 'ORGANIZATION'}]
```

The iPhone is a line of smartphones designed and marketed by Apple Inc. These devices combine a computer, camera, and internet connectivity in a single device, and are known for their sleek design and user-friendly interface.

## Sentiment Analysis

Please provide a **sentiment** for the following text:

The iPhone is a line of smartphones designed and marketed by Apple Inc. These devices combine a computer, camera, and internet connectivity in a single device, and are known for their sleek design and user-friendly interface.

**Positive**

# Few Shot Reasoning



## 1st prompt

Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

Answer: The answer is 11.

2023

The cafeteria has 23 apples. If they used 20 to make lunch and bought 6 more, how many do they have?

**The answer is 27**



## 2nd prompt—provide reasoning

Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

Answer: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls.  $5+6 = 11$ . The answer is 11.

The cafeteria has 23 apples. If they used 20 to make lunch and bought 6 more, how many do they have?

**The cafeteria had 23 apples originally. They used 20 to make lunch. So they had  $23-20 = 3$ . They bought 6 more apples, so they have  $3 + 6 = 9$ . The answer is 9.**



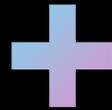
# Best practices for prompt engineering



1. 최신 모델 사용
2. 프롬프트의 시작 부분에 지침을 넣고 ### 또는 ""를 사용하여 지침과 문맥을 구분
3. 원하는 컨텍스트, 결과, 형식, 스타일 등에 대해 구체적이고 설명적이며 가능한 상세하게 작성
4. 예제를 통해 원하는 출력 형식을 명확하게 표현
5. Zero-Shot에서 시작하여, one-Shot, few-Shot, 이후 효과가 없으면 fine-tuning
6. "흐릿하고" 부정확한 설명 줄이기
7. 하지 말아야 되는 것을 지시하지 않고, 대안으로 해야 할 것을 지시
8. Code 작성 시, "leading words"를 사용하여 모델을 특정 패턴으로 유도



*Ensure that artificial  
general intelligence (AGI) <sup>2023</sup>  
benefits humanity.*



*Empower every person and  
organization on the planet  
to achieve more*

---

**GPT-3**

Generate and Understand Text

**Codex**

Generate and Understand Code

**DALL·E**

Generate images from text prompts



Bookmark 'what's  
new' in Azure OpenAI  
Service

Update

# Azure OpenAI Service

GPT-3 (GA)

DALL·E 2 <sup>2023</sup>  
(preview)

ChatGPT (GA)

GPT-4 (GA)



Apply *your  
own data*

Available in Preview  
early June



Plugins for Azure  
OpenAI Service

Coming soon



Configurable  
Content Filters

Available in Preview  
early June

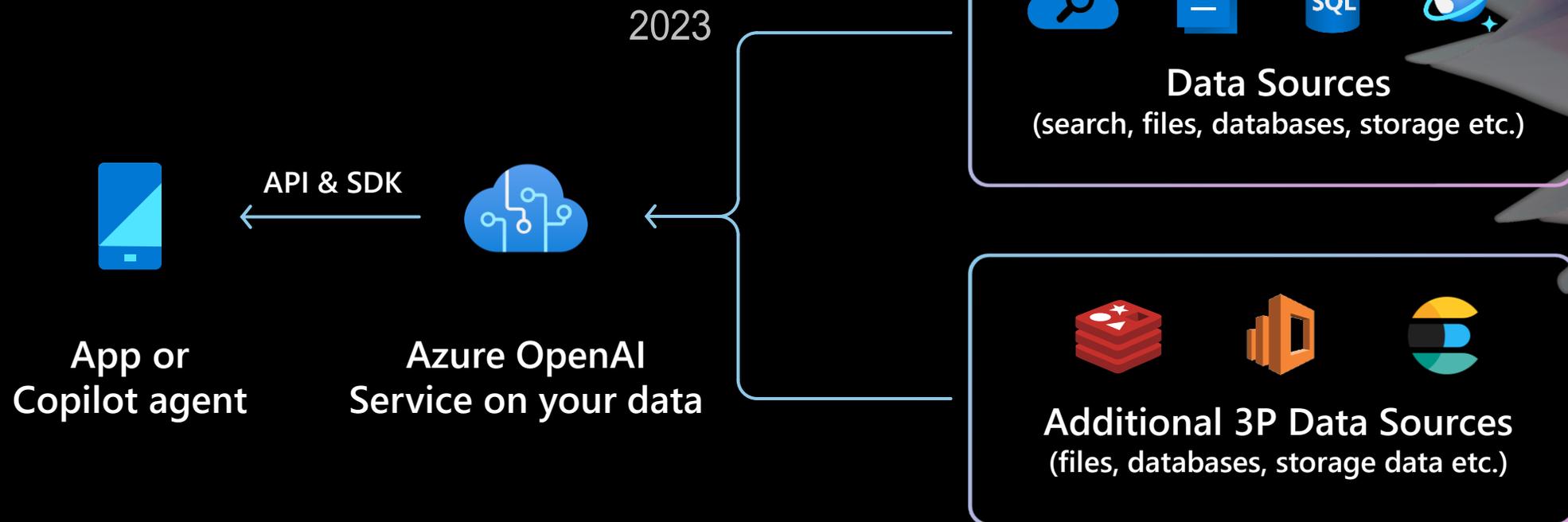


Provisioned  
Throughput

Limited Availability  
early June

Just Announced

# Azure OpenAI Service on your data



# Azure AI

## Applications



Partner Solutions

## Application Platform

AI Builder



Power BI



Power Apps



Power Automate



Power Virtual Agents

## Scenario-Based Services

Applied AI Services



Bot Service



Cognitive Search

2023



Form Recognizer



Video Indexer



Metrics Advisor



Immersive Reader

## Customizable AI Models

Cognitive Services



Vision



Speech



Language



Decision

Azure OpenAI Service

## ML Platform



Azure Machine Learning



Business Users



Developers & Data Scientists

# Azure OpenAI | Top 4 Capabilities & Use Cases



## Content Generation

컨택센터 : 고객 질의에 대한 맞춤형 답변 생성

웹 : 맞춤형 UI 생성 (개인화)



## Summarization

컨택센터 : 콜 로그에 대한 요약

전문 영역 주제에 대한 요약 (회계/ 마케팅 보고서, SNS 外)



## Code generation

개발자 / 데이터 관리자 : 코드 및 SQL 쿼리 등 작성

운영자 : 각종 스크립트 작성



## Semantic Search

검색 결과 리뷰 (제품/ 서비스 外)

정보 검색 및 지식화

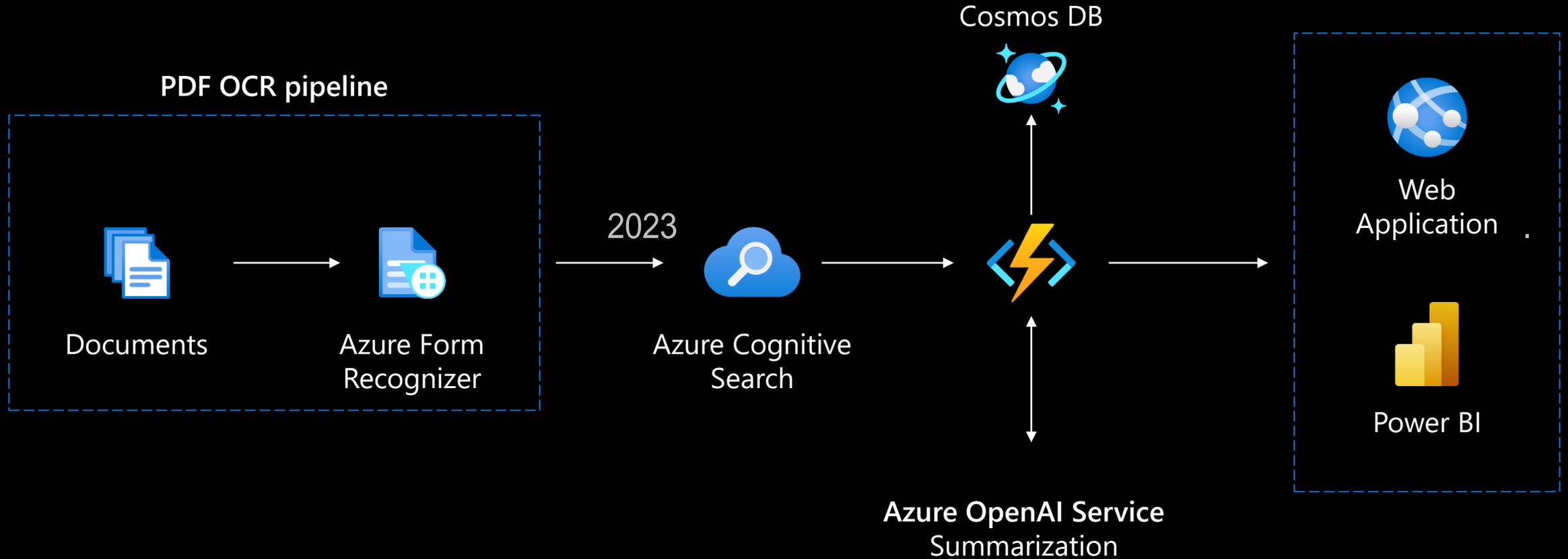
컨택센터 활용 시 : 분류, 감정분석, 주요 정보 추출, 요약, 답변 생성

고객 관리 목적 : 개별 고객에 맞춤형 정보 제공 (고객 문의, 트렌드, 검색결과, 조회결과 생성)

업무 자동화 : 정형 비정형 문서 검색 / 매크로, 스크립트, 코드 생성 / 콘텐츠 생성

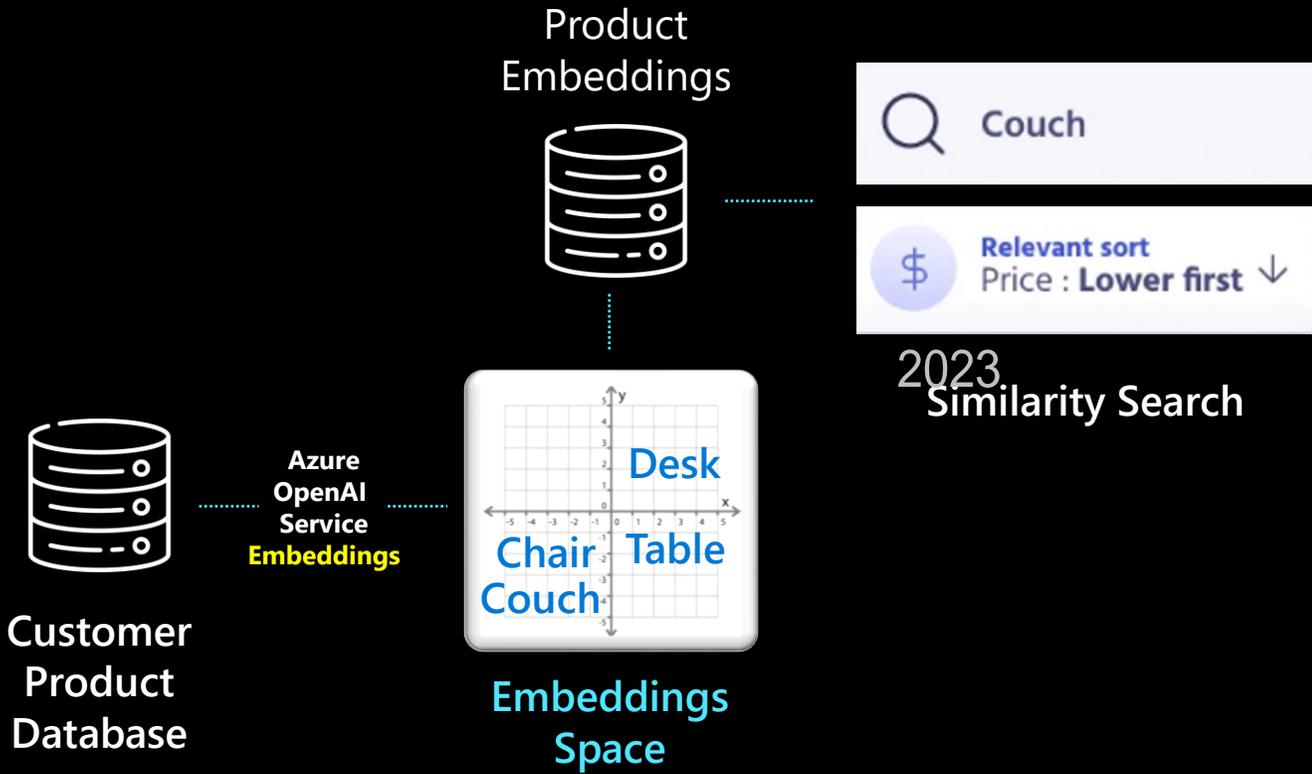
# Azure OpenAI | Sample high-level architecture

## Document processing and summarization



# 쇼핑몰 상품 검색

Similarity search



\*코사인 유사도



**Saffron Ella \$2,300**  
Signature series



**Slate Ray \$2,300**  
Signature series



# 미디어 활용

## 뉴스 분석 & 기사 생성



News Broadcast  
(지구 온난화)



Search  
SEO  
Virtual Agent  
Analytics  
Reporting  
Knowledge Mining

컨텐츠 분석

컨텐츠 생성

Ideation  
Productivity  
Personalization  
Accessibility  
A/B Testing

### 주제 분류

Global warming, Deforestation, Carbon footprint

### 엔터티 추출

Organizations: IPCC, UNFCCC, Green Peace  
Geography: Canada, USA

### 키워드 추출

Human activities, fossil fuels, earth atmosphere

### 질문과 답변

What is the Intergovernmental Panel on Climate Change (IPCC)?  
The IPCC is an international organization that studies climate change and the effectiveness ...

### 비디오 요약

The article discusses about global warming and its effects on the Earth's atmosphere, wildlife, and human communities. It states that the primary cause of global warming is ....

### 뉴스 기사 생성 (or 블로그, 소셜 미디어)

Global warming is the gradual increase in the overall temperature of the Earth's atmosphere, primarily caused ...

### 스크립트 생성

Act 1: The show opens with a shot of a beautiful coastal town  
Act 2: As the town struggles to cope with the crisis ...

### 개인화된 컨텐츠 생성 (or 광고)

Simon, as someone passionate about global warming, you are aware of the urgent threat it poses to our planet ...

# Azure OpenAI Service use cases in Health & Life Science

## 관리 작업 간소화

Azure OpenAI를 사용하여 일정 예약, 환자 등록, 보험 확인과 같은 관리 작업을 자동화하여 의료진이 환자에 좀 더 집중할 수 있는 환경 조성

## 공급망 관리 개선

의료 기관들은 Azure OpenAI를 사용하여 데이터를 분석하고 의료용품의 재고 수준을 최적화하여 낭비를 줄이며 필수 소모품이 항상 2023 사용하도록 개선

## 의료 장비의 예측 유지 관리

의료장비의 유지 관리 시기를 예측하고 예기치 않은 다운타임을 방지할 수 있도록 의료장비의 성능을 이용하는 데 Azure OpenAI 사용

## 자동화된 의료 코딩

Azure OpenAI를 사용하여 의료 기록을 자동으로 분석하고 청구 및 환급을 위한 의료 코드를 추천하여 오류를 줄이면서 효율성을 개선함

## 데이터 인사이트 지원

Azure OpenAI는 대량의 데이터를 분석하여 의료 기관들이 진료에 대해 더 많은 정보에 기반한 의사 결정을 내릴 수 있게 패턴을 식별할 수 있도록 지원

## 사기 탐지

의료 기관은 Azure OpenAI를 사용하여 사기성 보험 청구를 조기에 감지하여 손실을 방지하고 불필요한 치료로 부터 환자를 보호할 있음

# | GPT-4 를 이용한 Medical Exam Test 사례 (1/2)

## GPT-4 accurately diagnosing a clinical situation

### Prompt:

A medical student is considering a challenging clinical situation:

A 28-year-old man comes to the office with an episode of blood in his urine. He lived in sub-Saharan Africa until he came to the USA 6 months ago for graduate school. Temperature is 37.0°C, pulse is 60/min, respirations are 16/min, and blood pressure is 110/84 mm Hg.

#### General

Hemoglobin 12.3 g/dL  
Hematocrit 37%  
Leukocyte count 13,400/mm<sup>3</sup>  
Segmented neutrophils 65%  
Bands 5%  
Eosinophils 5%  
Lymphocytes 22%  
Monocytes 3%

#### Serum

Urea nitrogen 75 mg/dL  
Creatinine 3.8 mg/dL

#### Urine

Blood 3+  
RBC 200/hpf  
WBC 100/hpf  
RBC casts absent  
WBC casts absent

She is considering the most likely reason for these findings and is considering the following possibilities:

- (A) Exposure to a chemical toxin
- (B) Interstitial cystitis
- (C) Malacoplakia
- (D) Schistosomiasis
- (E) Vesicoureteral reflux
- (F) Acute Renal Failure

# | GPT-4 를 이용한 Medical Exam Test 사례 (2/2)

## GPT-4 accurately diagnosing a clinical situation

The patient's history and lab results can help guide the medical student in determining the most likely cause of the clinical findings.

The patient is a 28-year-old man who lived in sub-Saharan Africa until 6 months ago, which is an important piece of information to consider. He presents with an episode of blood in his urine (hematuria). Lab results show elevated urea nitrogen and creatinine, indicating impaired kidney function. Additionally, there is an increased leukocyte count with a normal distribution of white blood cells.

Considering the patient's history and lab results, the most likely cause of these findings is: (D) Schistosomiasis: This is a parasitic infection caused by Schistosoma species. The patient's history of living in sub-Saharan Africa is significant, as this region has a high prevalence of the disease. Schistosomiasis can cause hematuria and kidney dysfunction, which aligns with the patient's lab results.

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The other possibilities are less likely due to various reasons:

(A) Exposure to a chemical toxin: While certain toxins can cause kidney dysfunction, there is no specific indication that the patient has been exposed to a toxin. Additionally, the patient's history and clinical presentation are more suggestive of schistosomiasis.

(B) Interstitial cystitis: This is a chronic condition characterized by bladder pain and urinary symptoms. While it can cause hematuria, it typically does not result in elevated urea nitrogen and creatinine levels.

(C) Malacoplakia: This is a rare inflammatory condition characterized by the presence of soft, yellowish plaques in the urinary tract. It can cause hematuria but is unlikely given the patient's history and lab results.

(E) Vesicoureteral reflux: This condition occurs when urine flows backward from the bladder into the ureters and kidneys. While it can cause kidney dysfunction, it is typically seen in children and is less likely in this case.

(F) Acute kidney injury: This is a possibility, but the patient's history and clinical presentation are more suggestive of schistosomiasis. Additionally, acute kidney injury usually presents with a more rapid decline in kidney function.

In summary, schistosomiasis (D) is the most likely cause of the patient's symptoms and lab findings given his history and clinical presentation.

# MS, 의사의 말에서 임상 기록 정리하는 'DAX 익스프레스' 출시

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박찬 위원 · 입력 2023.03.21 18:04 · 댓글 0 · 좋아요 0



CNBC는 마이크로소프트(MS)의 자회사인 뉘앙스 커뮤니케이션이 의료진을 위한 인공지능(AI) 기반의 임상 노트 애플리케이션 '드래곤 앰비언트 익스피리언스(DAX) 익스프레스'를 출시했다고 20일(현지시간) 보도했다.

DAX 익스프레스는 환자 진료 후 몇 초 안에 임상 기록의 초안을 생성, 의료진의 행정 부담을 줄이는 서비스다. 대화 속에서 인사이트를 추출하는 '앰비언트 AI'와 오픈AI의 GPT-4로 구동된다.

앰비언트 AI는 일상에 계속 존재하면서 영향을 주는 AI 기술을 뜻하는 개념으로, 없어서는 안 될 요소가 음성 인터페이스다. MS는 지난 2021년 진료와 전화, 음성 메일 등의 음성을 인식하는 앰비언트 AI 도구 업체 뉘앙스를 160억달러(약 21조원)에 인수했다.

뉘앙스는 진료자들이 환자 데이터를 관리하고 처리하며 복잡한 분석을 수행하고 결정을 내리는 행정 업무에 소요되는 시간을 줄이고, 더 많은 환자들을 치료하도록 지원하기 위해 이 제품을 선보였다고 밝혔다.

또 DAX 익스프레스는 이미 55만명 이상의 의사가 사용 중인 뉘앙스의 '드래곤 메디컬 원' 애플리케이션을 통해 활성화된다. 드래곤 메디컬 원은 의사가 음성을 사용해 작동할 수 있는 클라우드 기반 워크플로 도우미로, 임상 시스템을 탐색하고 환자 정보에 빠르게 액세스할 수 있는 도구다. DAX 익스프레스에서 생성된 임상 기록은 드래곤 메디컬 원 데스크톱에 표시된다.

뉘앙스는 "모든 유형의 환자 상담에 대해 효율적인 도구를 제공, 의사들이 많은 환자를 돌보게 하는 것이 목표"라고 강조했다.

사용 가격을 공개하지 않았지만, 사용자 수와 시스템 규모에 따라 달라진다고 밝혔다. 처음에는 비공개 미리보기로 제공되며, 사용자들의 피드백에 맞춰 공개를 확대할 예정이다.

한편 뉘앙스는 이 제품이 MS의 '책임 있는 AI 프레임워크'를 준수하며, 환자 정보를 보호하기 위해 추가적인 안전 조치를 취했다고 밝혔다.

다이에나 놀 뉘앙스 의료 부문 부사장은 "AI가 의사가 행정 업무를 수행하는 데 도움이 되더라도, 전문가는 여전히 모든 단계에 관여한다"고 말했다. DAX 익스프레스가 생성된 임상 기록은 의사가 편집하고 서명한 후에 건강 기록에 포함된다.

<https://www.aitimes.com/news/articleView.html?idxno=150065>



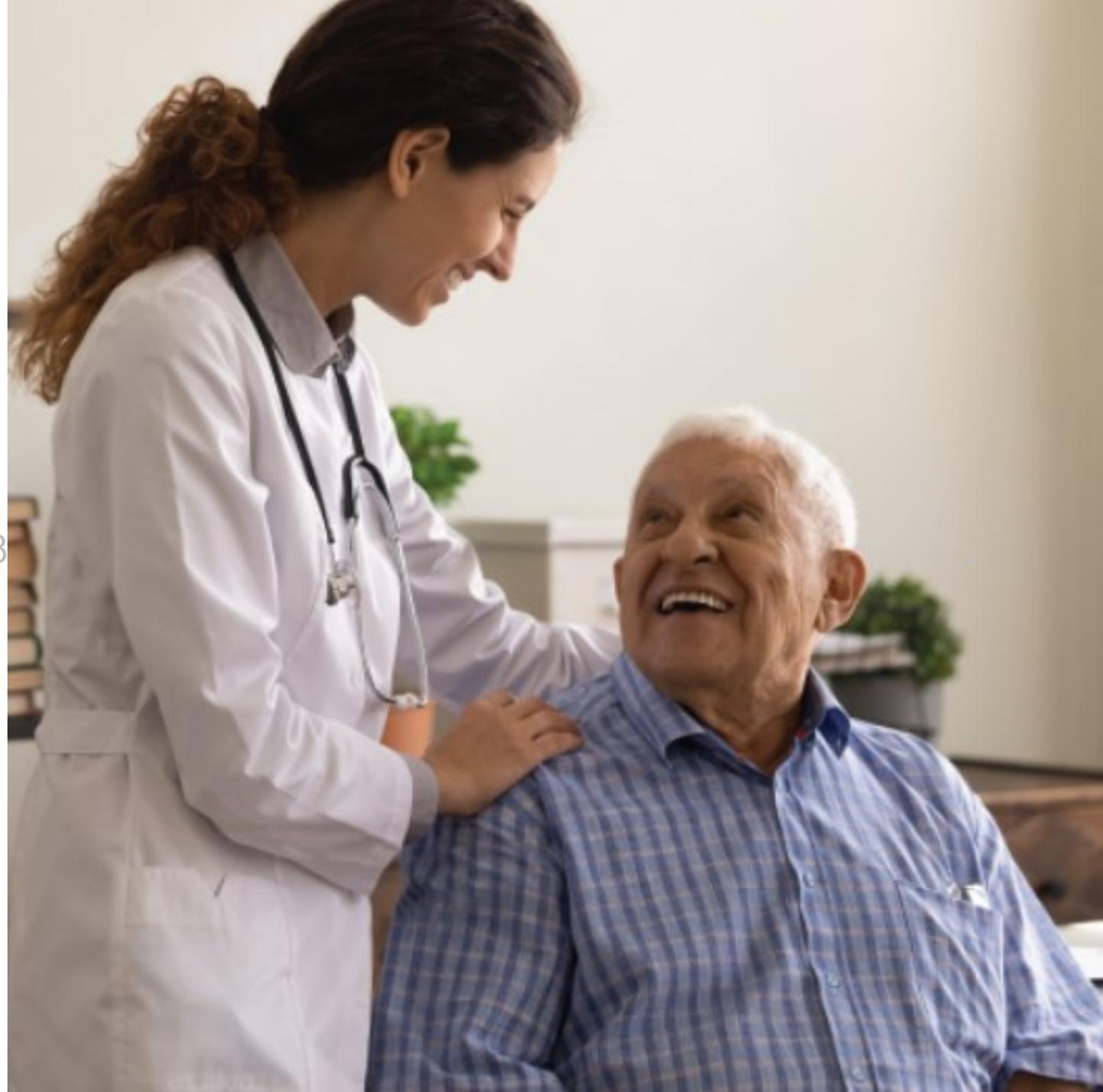
# Epic brings GPT-4 to Electronic Health Records

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“Our investigation of GPT-4 has shown tremendous potential for its use in healthcare. We’ll use it to help physicians and nurses spend less time at the keyboard and to help them investigate data in more conversational, easy-to-use ways.”

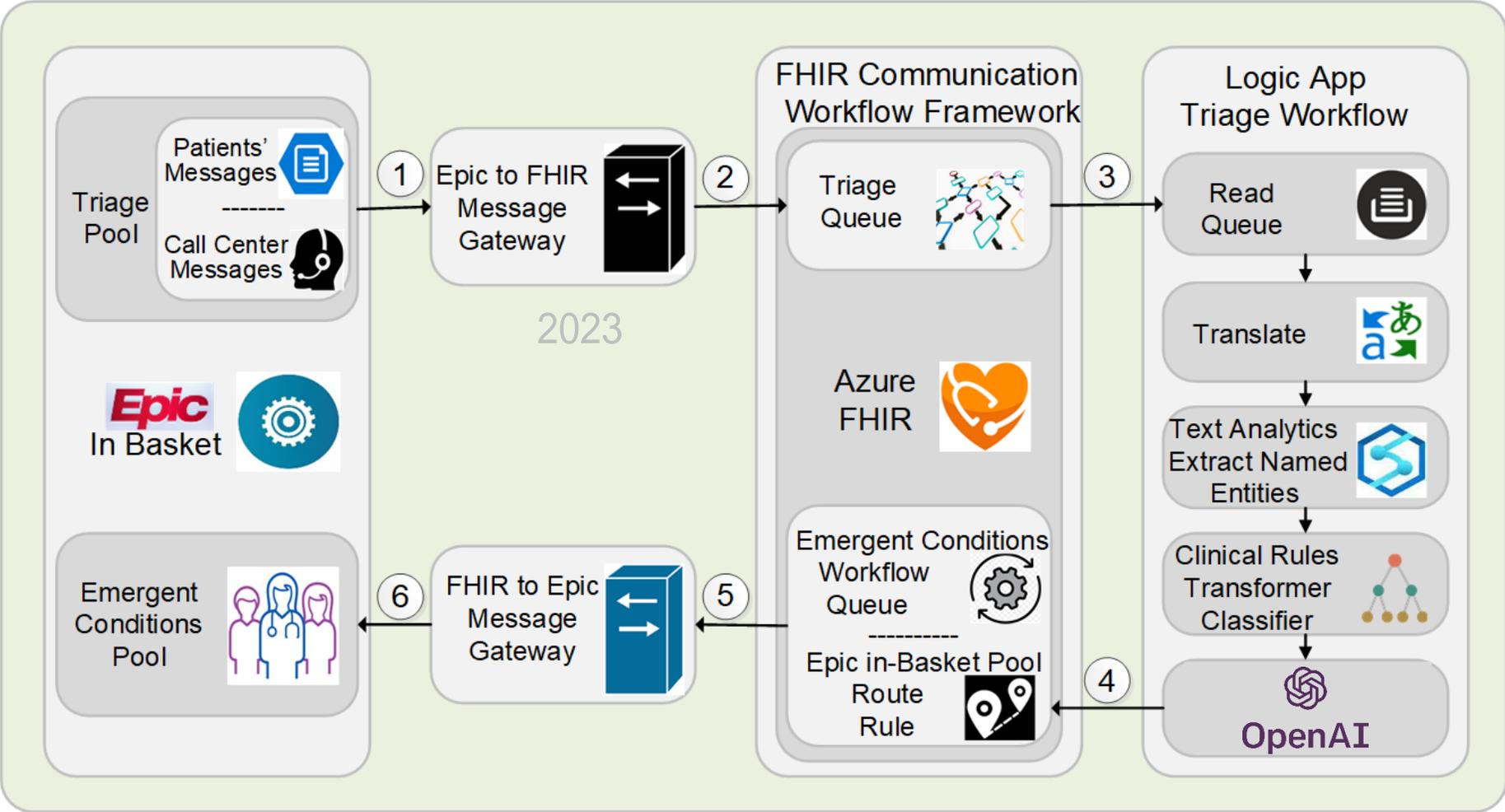
Seth Hain

Senior Vice President of Research and Development at Epic



# Patient Messaging Automation

PIE Systems with Microsoft AI





Thank you

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