

HEADLINER

From Data to Treatment: The Role of Generative AI in Advancing Precision Health Discovery and Delivery



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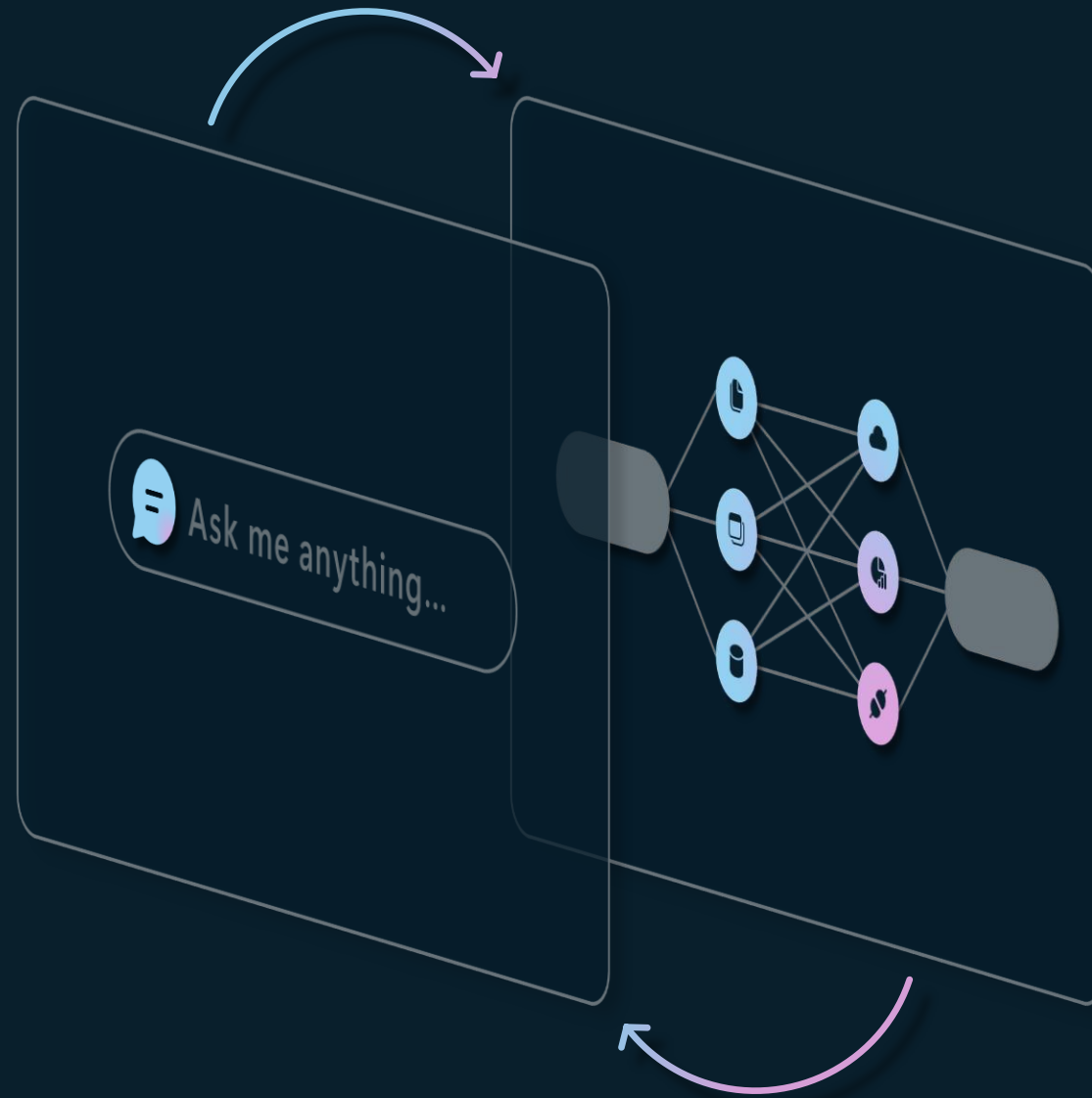
Microsoft



Precision Health Discovery and Delivery in the era of Gen-AI

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Microsoft

Natural language



Reasoning engine

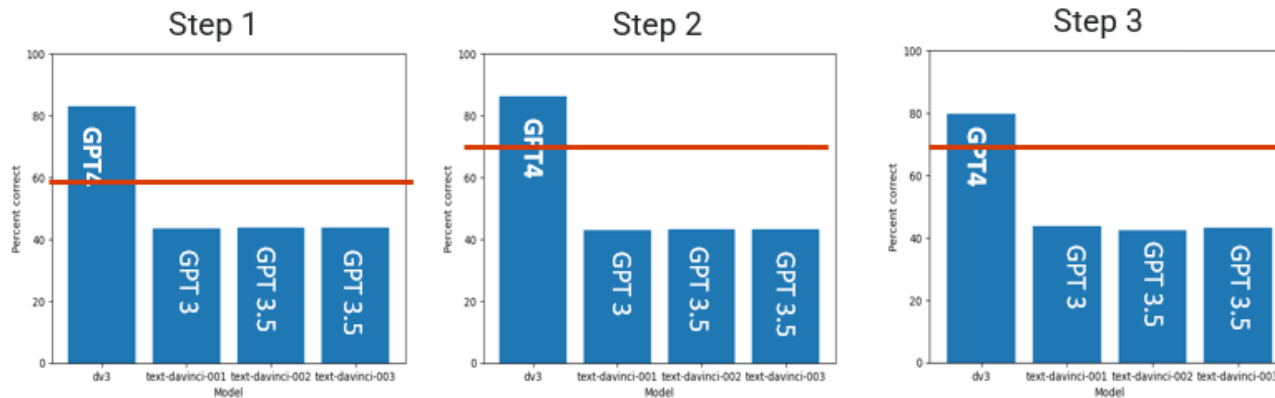


A new Healthcare paradigm
is emerging,
with computation as copilot

Surprising jump in multiple capabilities

Internal Study: Professional Workloads

US Medical Licensing Exam (USMLE) – workload >2000 questions



———— = Passing score

Passing 1-3 = Qualified to practice medicine in the United States without supervision.

Surprising jump in multiple capabilities

A 12-year-old girl is brought to the emergency department by her mother because of a 1-week history of worsening swelling in her legs. The patient also noticed blood in her urine yesterday. The bleeding has not recurred. She had an upper respiratory tract infection and sore throat 1 week ago that caused her to miss several days of school. Medical history is otherwise unremarkable, and she takes no routine medications. Menarche has not yet occurred. BMI is 20 kg/m². Vital signs are temperature 37.0°C (98.6°F), pulse 78/min, respirations 12/min, and blood pressure 136/84 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 100%. Physical examination discloses erythema of the posterior pharynx, mild cervical lymphadenopathy, and 3+ pitting edema to both knees.

Results of urinalysis are shown:

Protein	150 mg/dL
Blood	Positive
Leukocyte esterase	Positive
Nitrite	Negative
WBCs	5–10/hpf
RBCs	10–25/hpf
Casts	1–2/lpf

Results of which of the following laboratory studies are most likely to be abnormal in this patient?

- (A) Bleeding time
- (B) Erythrocyte count
- (C) Serum concentration of C3
- (D) Serum IgA concentration
- (E) Serum rheumatoid factor assay

Surprising jump in multiple capabilities

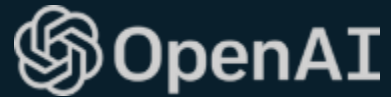
(C) Serum concentration of C3.

This patient is likely to have poststreptococcal glomerulonephritis (PSGN), which typically presents with edema, hypertension, and hematuria after a recent streptococcal infection. In PSGN, the serum concentration of C3, a complement protein, is often low due to activation of the immune system.

What do you think the girl described in this problem might be thinking and feeling?

It's impossible to say exactly what this 12-year-old girl might be thinking and feeling, but she could be experiencing a range of emotions and thoughts. She may be feeling uncomfortable and scared because of her symptoms, which include swelling in her legs and blood in her urine. She might also be confused and worried about what's happening to her body, and anxious to find out what's wrong and how it can be treated. Additionally, she may be feeling frustrated or upset because of the impact her symptoms are having on her daily life, such as missing school. She might also be feeling reassured by her mother's presence and by receiving medical attention.

Generative AI Models' Families on Azure Open AI



GPT-*

Prompt:

Write a tagline for an ice cream shop.

Response:

We serve up smiles with every scoop!

Codex

Prompt:

Table customers, columns = [CustomerId, FirstName, LastName, Company, Address, City, State, Country, PostalCode]

Create a SQL query for all customers in Texas named Jane
query =

Response:

```
SELECT *  
FROM customers  
WHERE State = 'TX' AND  
FirstName = 'Jane'
```

DALL·E

Prompt: A group of people attending a workshop about Generative AI

Response:



ChatGPT

What is the fastest animal on land?


the cheetah (*Acinonyx jubatus*), which can reach speeds of up to 60 miles (97 kilometers) per hour.

What makes them so fast?

Cheetahs are built for speed and have several adaptations that make them the fastest land animal: lean body, long legs, flexible spine, large nostrils and claws that don't retract.




AI will empower every process

Provider 

Patient engagement and support
Clinical documentation and content triage
Ambient clinical intelligence

Payor 

Member insight and personalization
Provider network management
Operational workflow automation

Life Sciences 

Drug development and discovery
Medical and scientific literature review
Clinical trial recruitment and management

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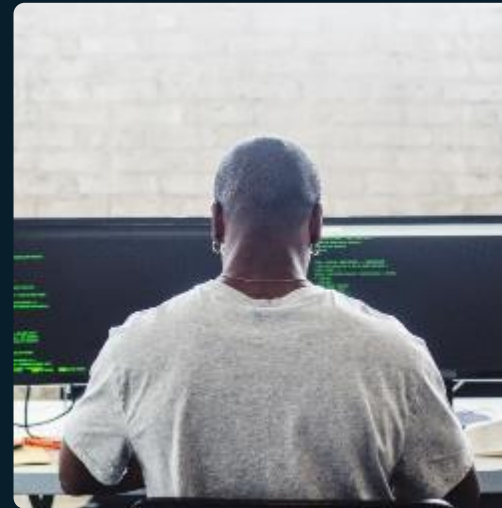
Empowering everyone to achieve more



Every employee



Clinical roles



Security & IT
professional



Researcher, developer
& data professional

AI-powered Documentation



Workflow efficiency

True portability with smartphone microphone

Advanced cloud speech recognition with voice skills and natural language control

In-workflow guidance across outpatient, inpatient, and surgical

Automated notes

Ambient multi-party conversation capture

AI-generated clinical documentation

Documentation quality

Prioritized CDS worklists

Integrated CDS assistant

DRG impact and pre- and post-discharge review

Denials management

Empowering Life Sciences with Precision Discovery and Development

Productivity and Collaboration in Scientific Research



- Enhance understanding of diseases
- Accelerate lead generation
- Improve accuracy in experiments

Precision and Reach in Clinical Development



- Improve patient identification & retention
- Modernize and enhance solutions with CROs
- Enhance inclusion of trials



+
Our
Future
Health



Secure, manage and activate data for the next generation of collaboration



multi modal, distributed



One view of your data estate, even across clouds



Governed genomics research collaboration with external organizations

Leading biomedical research platform: Terra

Terra

A data and application platform that enables biomedical research through policy-driven data access and compliant, collaborative workspaces



Policy-Driven Data Access



Collaborative Workspaces



Reproducible and Compliant Analyses

Enabling the research ecosystem

Data Providers

- Terra as a data marketplace – creating data gravity
- Enable use of data while maintaining data ownership and policy compliance
- Includes public and private data generators and consolidators



Tools & App Developers

- Terra as an ecosystem of tools and applications for data analysis
- Plays to MSFT strength as an enabler of developers and partners

Data Consumers

- Terra as an analytical environment providing access to unique datasets
- Ensure compliance with data use and organizational security policies
- Includes academic and medical research centers, public health, pharma, biotech, consortia

A R&D paradigm is emerging with computation as CoPilot

Today

Wet lab

Intensive experimentation

Explanatory modeling

Supports and rationalizes



Future

Predictive modeling

Searches, designs molecules, and guides experiments

Lab testing

Targeted and optimized experimentation



Disruptive opportunity for chemistry and materials applications



Scale

HPC automation
at 1000x scale



Speed

Artificial Intelligence
with 1000x acceleration



Accuracy

Quantum computing
at 100x accuracy



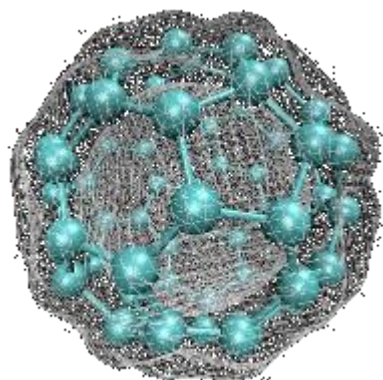
Productivity

Enable a faster innovation cycle with AI digital assistance and automated workflows

Graphormer: A General-Purpose Technology for Molecular Modeling



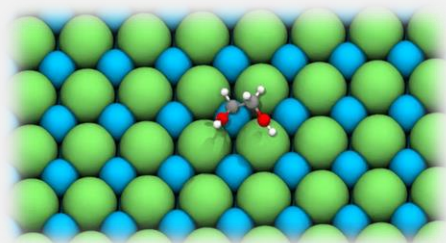
Learn from Massive Data



Can "Understand" Molecules



**Champion of 1st OGB Large-Scale Challenge
(Quantum Property Prediction)**



**Champion of 1st Open Catalyst Challenge
(Catalyst Adsorption Simulation)**

Productivity

Scale

Speed

Accuracy

Copilot in Azure Quantum

Harness the power of AI assistance within your cloud environment to improve research efficiency.

Large language models for ease of use

- Faster R&D innovation cycle
- Research efficiency with an AI agent integrated in your virtual environment

Custom applications

- Integrate conversational interface with PubChem and other databases
- Code generation for new and existing workflows

```
%%code
I'd like to use AiiDA with Quantum ESPRESSO.
Please import the necessary packages and create a silicon atomic structure for me
```

```
import ase.build
from aiida import load_profile
from aiida.orm import Code
from aiida.plugins import WorkflowFactory
from aiida.engine import submit

# Load the AiiDA profile
load_profile()

# Create a silicon atomic structure using ASE
silicon_structure = ase.build.bulk("Si", crystalstructure="diamond", a=5.431, cubic=True)
```

```
%%code
This structure looks good to me.
I'd like to first relax the structure and then compute its electronic bands using an AiiDA workflow if possible.
```

```
from aiida import load_profile
load_profile()
from aiida.plugins import WorkflowFactory
PwBandsWorkChain = WorkflowFactory('quantumespresso.pw.bands')
from aiida.orm import Code, StructureData

code = Code.get_from_string('pw@pbj-hcl1')
structure = StructureData(ase=silicon_structure)

builder = PwBandsWorkChain.get_builder_from_protocol(code=code, structure=structure, protocol='moderate')
from aiida.engine import submit

workchain_node = submit(builder)
print(f"Submitted PwBandsWorkChain with PK {workchain_node.pk}")
```

... could unlock prominent scenarios across the value chain

Enhance Disease Understanding

Summarize and visualize patient timelines, encounters, EMR indications, RWD to enhance indications findings by TAs

Accelerate discovery with Gen Chemistry

Automate high-throughput screening of candidate compounds, leverage search & models for graphical representation of molecules

Scientific Literature Review

Synthesize, search, query scientific literature across all languages, extract relevant entities

Automate Sales and Marketing Material Updating

Update & tailor marketing material automatically (MAP), label reviews, extraction and summarization of questions; automate indexing & search of incoming documents

Sales teams' effectiveness and engagement

Summarize HCPs interests & sentiment, summarize conversations, automatically generate follow up emails

Medical Affairs' training and compliance

Text summarization and pattern recognition to automatically generate reports and spot deviation from a 'golden protocol'

Modernize and standardize experiences in Patient Support Programs

Research and Drug discovery

Development and regulatory

Commercial Market Access, Medical

Manufacturing Supply Chain

Security & compliance



Recommendation engines for clinical trials

Review and summarize trials' protocols, recommend trials' matching, support site identification, personalized interactive experiences (chatbot with image and text prompts) to enhance retention.

Digital Biomarkers

Leverage image-based models and text prompts to monitor and validate biomarkers, automated labelling of images.

Expedite Submission

Generate submission document, automate response to health authorities, summarize content coming from soft standing CTMS files and generate report, risk dashboard.

Staff Onboarding, focus on C&G Manufacturing

Generate training material and simulations for personnel to speed up onboarding based on conversation/video history, immersive scenarios, quality controls..

Internal Helpdesk/ GxP Documentation

Use intent classification, entity extraction, summarization of internal tickets, to automate route, reduce resolution, summarize GxP documentation and traceability.

Equipment and Experiment Reporting

Text summarization and pattern recognition to automatically generate reports on equipment failures, lab experiments, identify deviations in procedures etc.

PHARMA LIFE SCIENCES' INDUSTRY BENEFITS

Acceleration in Pipeline / Alternative Treatments

Productivity & Efficiency through Optimized Ops and Quality Control

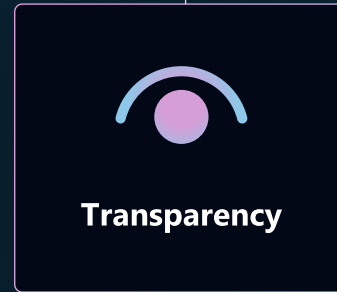
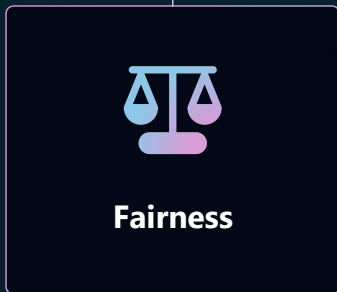
Personalized Experiences

Responsible AI learnings in healthcare

Guard against biases in training data
(e.g., demographic biases)

Clinical information is from verifiable
sources and auditable

Patient data used during training or fine-
tuning can't be revealed



Ensure results are accurate
e.g., patient chart summarization

Ensure that AI is accessible and sensitive
to all population segments

Legal, regulatory compliance, along with
fairness, safety, and so on



Thank you.

elenab@microsoft.com



Microsoft Cloud

AI you can trust

Your data is your data

Your data is not used to train the OpenAI foundation models without permission

Your data is protected by the most comprehensive enterprise compliance and security controls

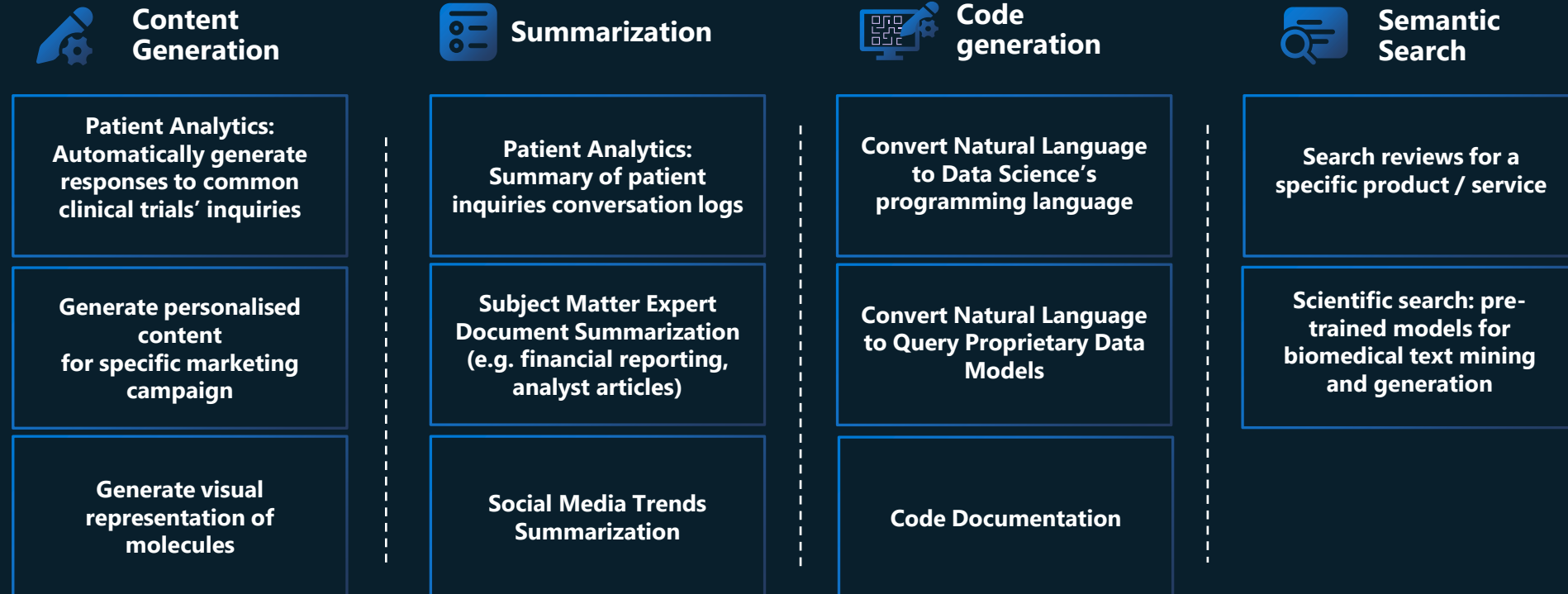


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← AI and CoPilot enabled →

We observed top 4 capabilities in Generative AI use cases



End to End Call Center Analytics: Classification, Sentiment, Entity Extraction, Summarization and Email Generation

Customer 360: Hyper-personalisation using timely Summarization of customer queries & trends, Search, and Content Generation

Business Process Automation: Search through structured & unstructured documentation, Generate Code to query data models, Content Generation

Examples of Multiple Model Use Cases

Use-case customers are innovating with....

Recap Assistance	Conversational AI	Writing Assistance	Knowledge Mining
Product reviews, articles, long-form reports	Customer service bots, enterprise Q&A	Creative ideation & design	Domain specific research
Bot-to-human handoff with summary	End-to-end contact center solutions	Content write assistant	Social media trend analysis
Insights from structured and unstructured data	Faster Software Development		Surface cross-functional insights within an enterprise
	Code generation	Code documentation	



Healthcare



Financial Services



Retail



Manufacturing



Public Sector



Nonprofit

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Top 10 generative AI use cases for healthcare

Patient
engagement
and support

Claims
management

Clinical and
operational
workflow
automation

Fraud detection
and
cybersecurity

Value-based
care

Accelerated
automation
for care
management

Chatbots and
virtual
assistants

Language
translation and
natural language
processing

Predictive
analytics and
forecasting

Medical
research and
personalized
care

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