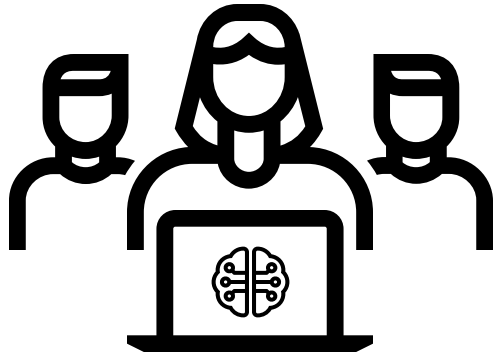
LA SALUTE SI FA SMART: AI AL SERVIZIO DEL MEDICO

Dati Protetti, Diagnosi Potenziate: l'AI che rispetta la privacy dei dati

Stefano Bucci
Country Leader - Account Cloud Engineering for Data Platform

Oracle Italy

AI changes everything

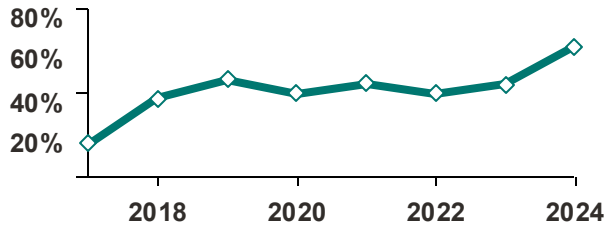


"AI won't replace humans —
but humans with AI
will replace humans without AI"

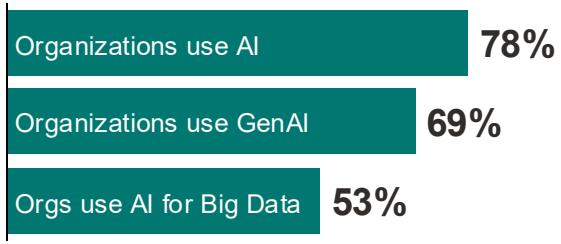
Karim Lakhani
Harvard Business Review

AI has become a boardroom-level priority, and drives strategic agendas of leading entities

% of organizations that use AI in at least 1 business function



Use of AI has accelerated from 55% to 78% in 2025 in organizations



87%

of companies ***identify AI as a top priority*** in their business plans

AI's contribution to the global economy by 2030 is estimated at at least

$16Tn

2025 saw some of the largest AI investments/commitments

Stargate ***$500Bn***	Private AI Investment ***$250Bn***
NVIDIA > OpenAI ***$100Bn***	Other Hyperscalers ***$200Bn+***

15%

decisions will be made autonomously through agentic AI by 2028

33%

of Enterprise SW Applications will ***include agentic AI*** by 2028

Source: IDCA Global Artificial Intelligence Report (2025), McKinsey: "The State of AI" (March 2025), Gartner 2025, MIT Sloan "Five Trends in AI and Data Science for 2025"

Successful AI use cases in Healthcare can create significant economic and productivity gains

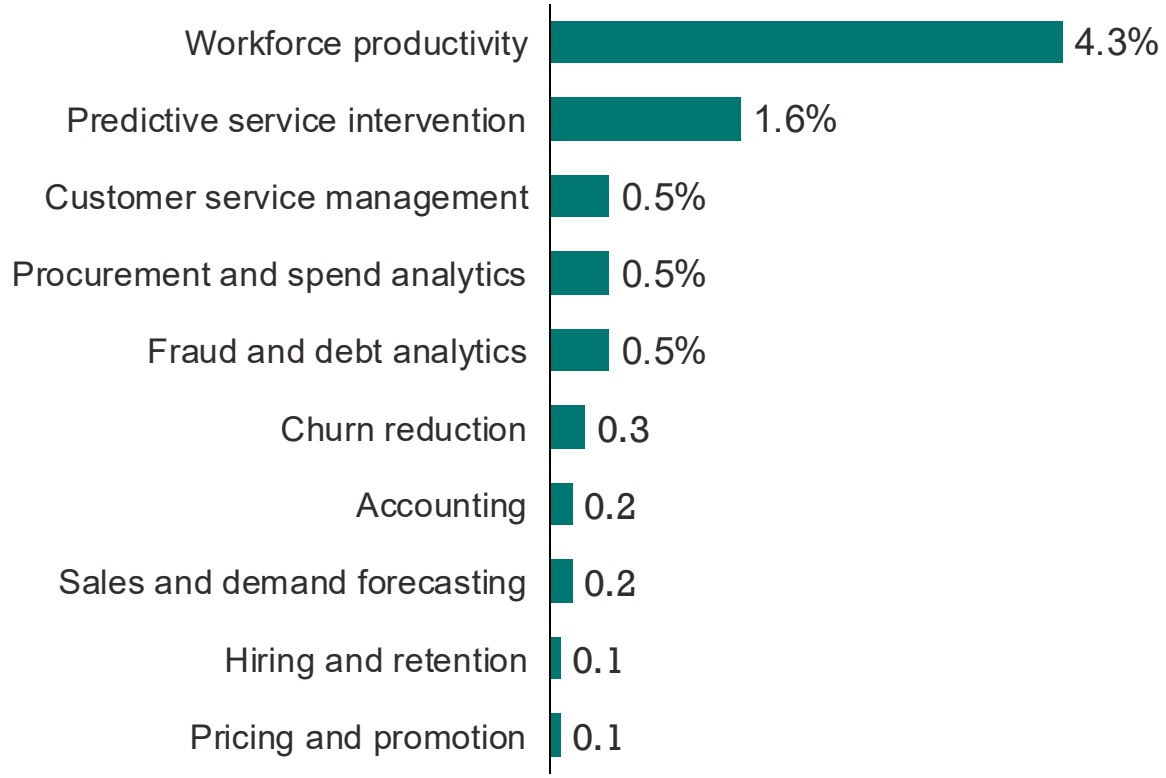
GenAI use cases impact in Healthcare

$150 – 260Bn

This impact is equivalent to:

2 – 4% of Industry Revenue

Potential impact of top 10 Healthcare use cases as % of revenue



Source: McKinsey - The economic potential of AI and Generative AI, including feed forward, recurrent, and convolutional neural networks, GenAI, clustering, Monte Carlo and other techniques

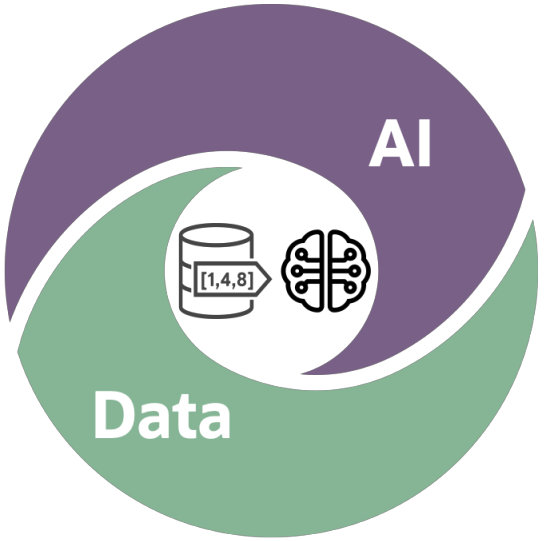
AI needs private data to answer your questions

To use AI to answer business questions, you need to provide AI with **private data** that is **relevant** to the question

AI can then combine this data with its own knowledge and data from public sources to produce an answer

Finding relevant **private data** requires searching your private data using a combination of traditional data search and **AI Vector Search**

Oracle "AI for Data" Strategy

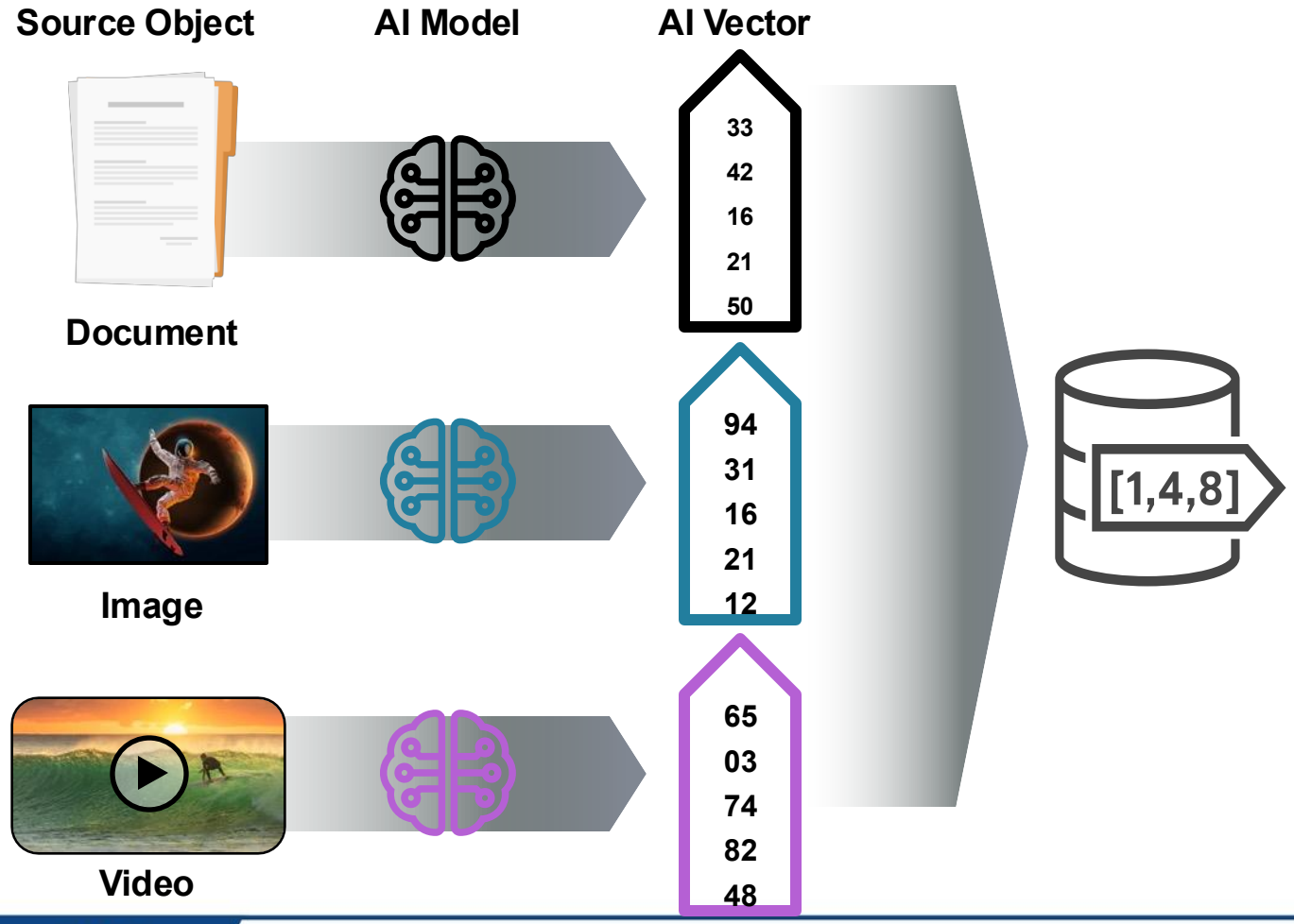


Bring AI to Your Private Data

instead of

Bring Your Private Data to AI

AI Vector stores semantic content of a complex "unstructured" object

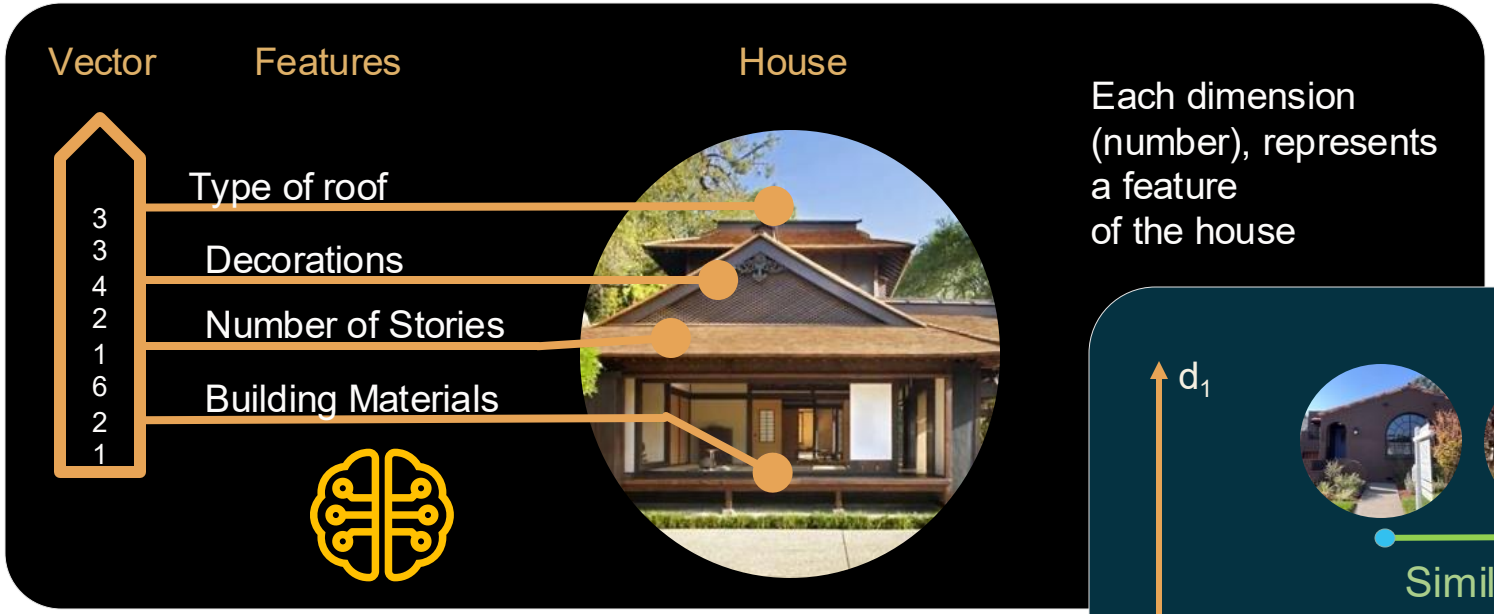


AI Vector Search works by representing the **semantic content** of a document, image, video, or even relational data as a sequence of numbers, called a vector

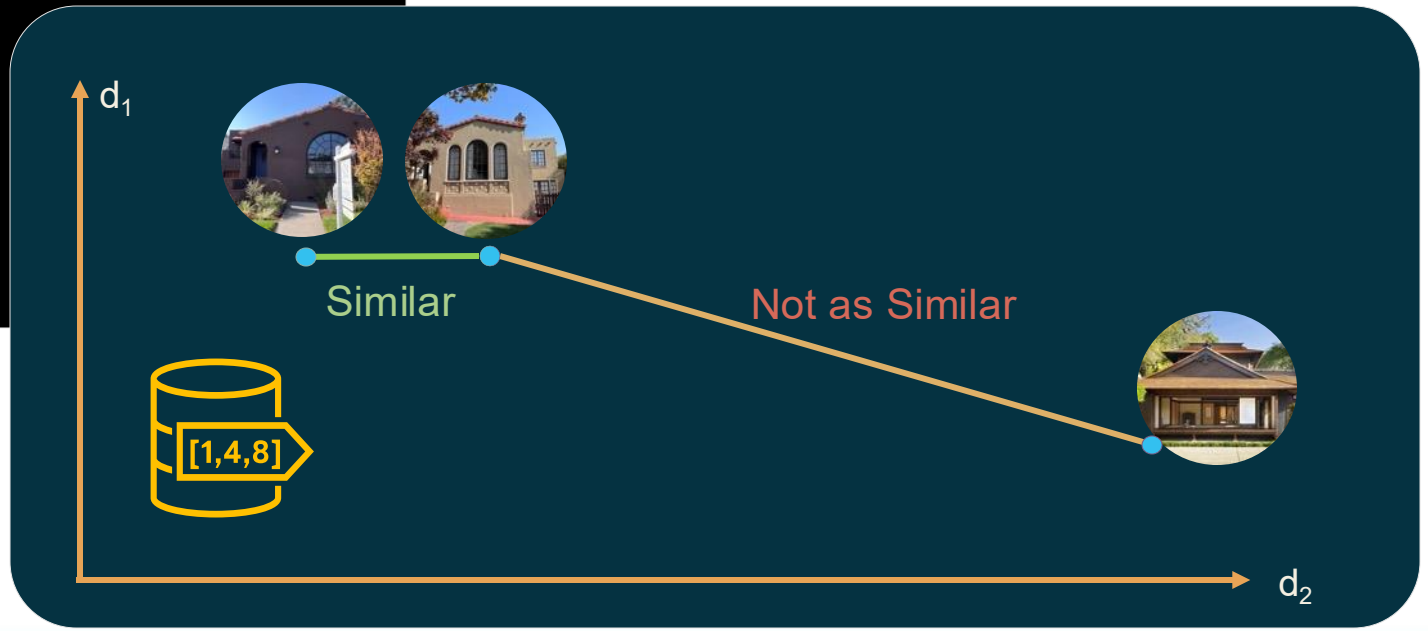
Developers create a vector for an object by just passing the object to a built-in vectorization function (**vector embedding**)

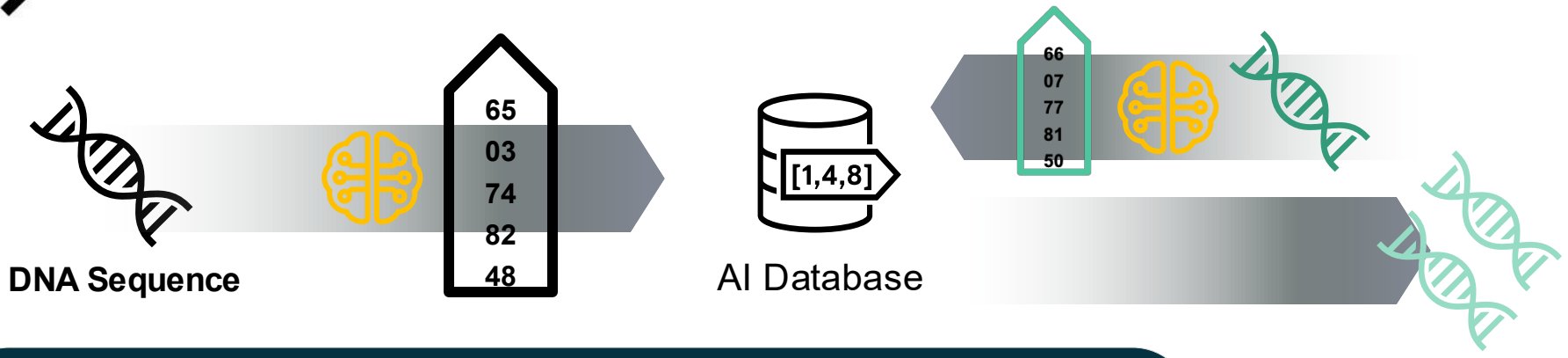
Oracle AI Database natively stores vectors and compares vectors to find objects with **similar semantic content**

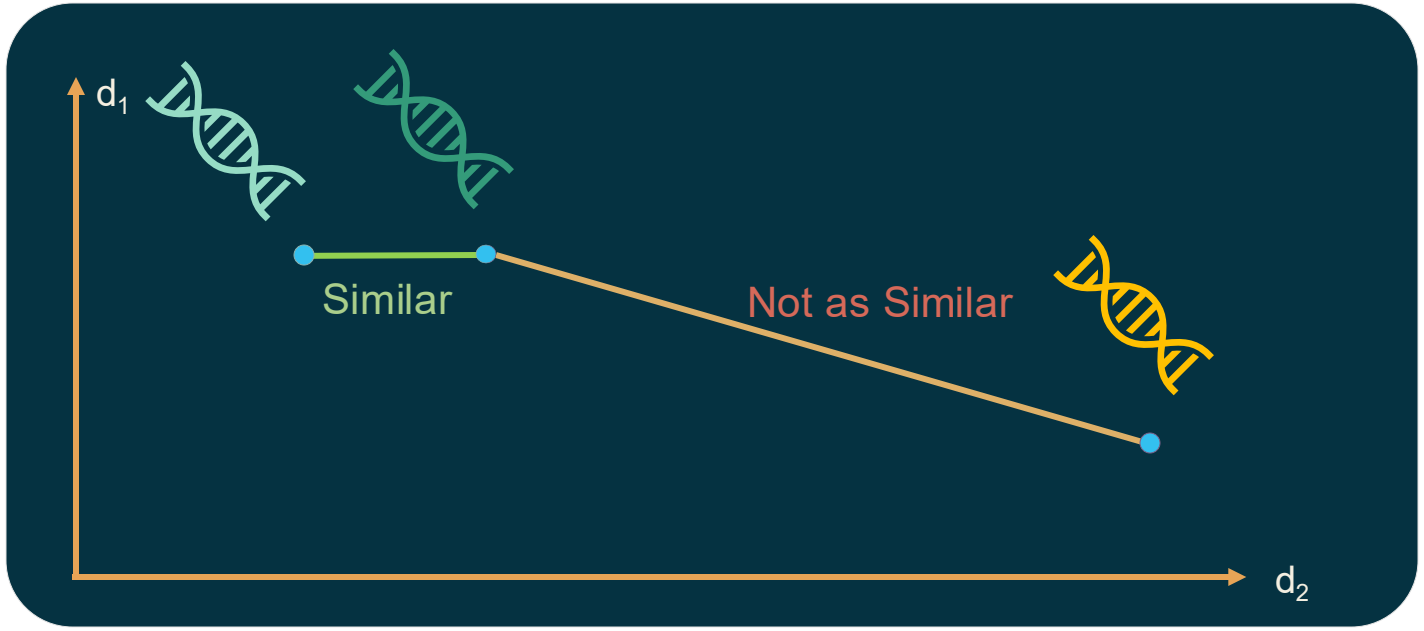
AI Vector Search enables semantic searches on “unstructured” data



Each dimension (number), represents a feature of the house







DNA sequencing is the most common and accurate method to identify the specific **bacteria present in a patient**, but it can be time-consuming due to the slow identification process of intensive data analysis.

Imagine to store the vectors for DNA data of **720,000 bacteria** in an **AI Database** including data about antibiotic resistance.

Imagine having a **patient affected by a particular pathogen** and being able to **identify the best therapy with a query in a database** by mapping the genetic material to the family of bacteria it comes from.

Biofy Tackles **Antibiotic Resistance** with Oracle AI Vector Search

> *"Oracle's technology has been instrumental in revolutionizing our disease identification process. The AI Vector Search and Autonomous Database have enabled us to **significantly reduce diagnosis time, improve accuracy, and provide better patient care**."*

Paulo Perez CEO & co-Founder, .biofy Technologies

Business Needs

- **Analyze** large datasets to uncover patterns and trends in bacterial resistance
- **Provide** accurate and timely information to clinicians for effective treatment
- **Process** large datasets efficiently, supporting therapy development and unknown strain identification
- **Use** high computational power for quick genomic and clinical data processing

Business Results

- **Achieved 99% accuracy** in resistance profiling, **saving 2,000 lives in one year** with personalized therapies
- **Cut** diagnosis time **from 5 days to 4 hours** using Oracle ADB Vector Search and AI
- Oracle ADB **scalability** enables BioFy to **serve more** hospitals and laboratories
- **Achieved** 50% better performance at half the cost using Oracle technologies

Enhancing medical AI with retrieval-augmented generation and AI Database

Vectorize Question
An end-user's human language question is encoded as a vector

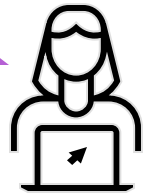
1

AI Vector

2

Find Related Data
AI Vector Search finds **private database data** that matches the user's vector

For the **patient John Doe** presenting with a **Staphylococcus aureus bacteremia**, what is the first-line empiric antibiotic dosage recommended

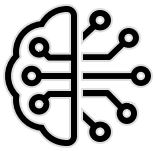


User

Retrieval Augmented Generation (RAG)

Private Data

Patient John Doe's medical records:
- 64 years old
- .....
- **resistance to the antibiotic oxacillin**
- .....



GenAI LLM

Ask LLM
The combination is sent to an LLM to provide an informed answer to the question

4

3

Augment Prompt
The user's question is **augmented** with this **private data**

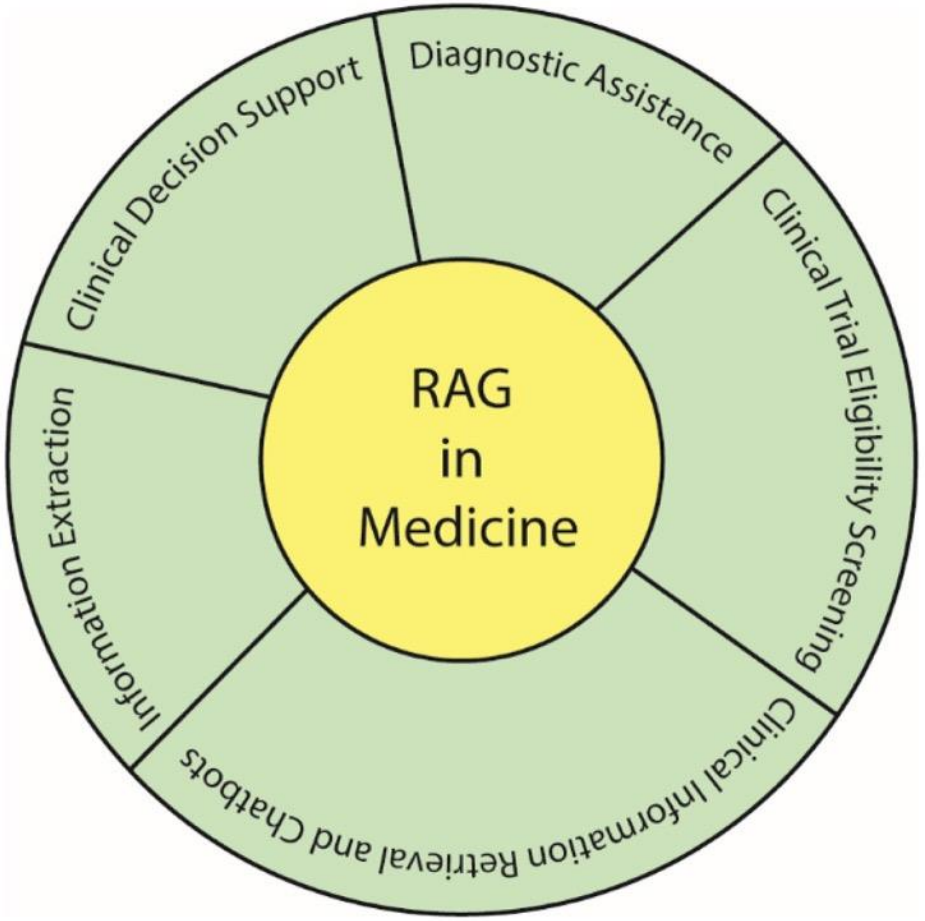
The first-line empiric therapy for a confirmed Staphylococcus aureus bacteremia that is **Oxacillin-Resistant** (MRSA) is **Vancomycin**

Diagnostic Assistance

RAG-enhanced model achieved **78% accuracy** in identifying the main diagnosis, compared to **54% for the base GPT-4 model.**

Clinical information retrieval and chatbots

Almanac significantly outperformed ChatGPT in factuality, with an average increase of 18 percentage points across specialties, **particularly in cardiology (91% vs. 69%)**



Guideline interpretation and clinical decision support

Improve the interpretation of hepatologic disease guidelines using RAG-enhanced GPT-4 and achieving an overall accuracy of **99.0%, compared to GPT-4 Turbo's 43.0%**

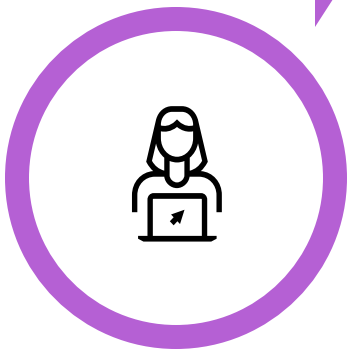
Clinical trial eligibility screening

RECTIFIER (RAG-Enabled Clinical Trial Infrastructure for Inclusion Exclusion Review) demonstrated superior performance, achieving an accuracy of **93.6% compared** to the study staff's **85.9%**

Source: National Library of Medicine - Enhancing medical AI with retrieval-augmented generation: A mini narrative review - https://pmc.ncbi.nlm.nih.gov/articles/PMC12059965/

AI Database goes beyond just RAG with AI Agents

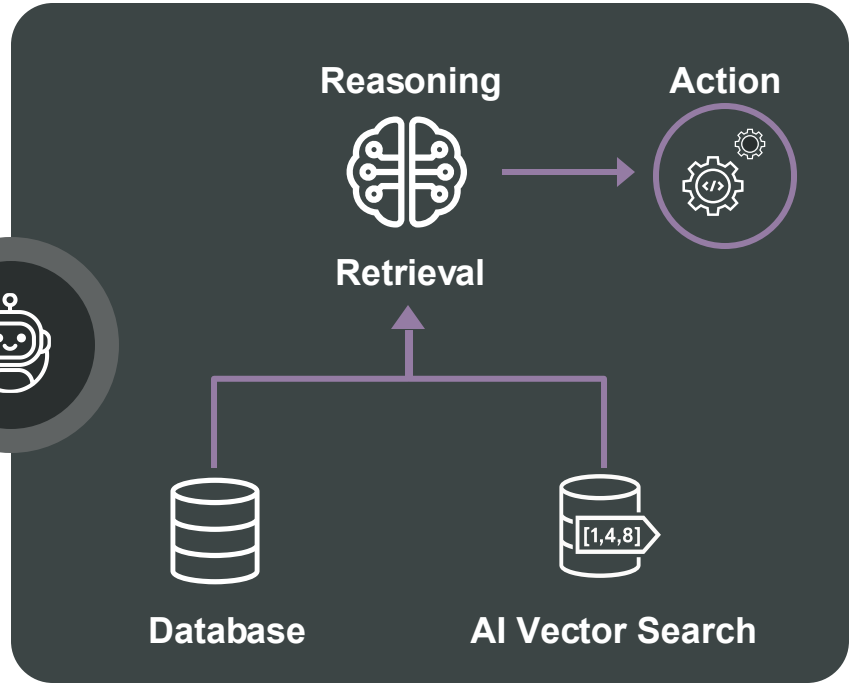
For the **patient John Doe** presenting with a **Staphylococcus aureus bacteremia**, what is the first-line empiric antibiotic dosage recommended and **what is the current stock status** of that specific drug in the Pharmacy



AI Agent

The first-line empiric therapy for a confirmed Staphylococcus aureus bacteremia that is **Oxacillin-Resistant** (MRSA) is **Vancomycin.**
The current stock level for **Vancomycin is 10 pieces** so I have **started the replenishment request** to guarantee at least 30 pieces in the stock

› Reasoning and multi-step workflows



AI Agents on the Job

Agents can assist providers and patients at every stage of the healthcare journey.

An agent listens in on the appointment so the physician can focus on the patient, not the computer screen.

The physician gets the patient information they need before entering the exam room.

An agent can help save the patient valuable time by helping with preregistration.

An agent pulls from a data library to give the physician the most recent research on the patient's condition and details about the patient's history.

An agent follows up with the patient to help provide monitoring, care support, and lifestyle advice.

Grazie per l'attenzione