Artificial Intelligence

Enabling The Next Generation
of Healthcare Innovation Across Puerto Rico

Presented by **Carlos Meléndez**

Co-Founder and VP of Operations of Wovenware

We are
Wovenware

◉ Founded in **San Juan** in 2003

◉ **Global provider** of AI, custom software development and design services

◉ **240 Employees** – and growing

- **We hire** from all the universities and engineering programs **in Puerto Rico**

◉ Celebrating **20 years** serving companies in **regulated industries across the U.S.**

We are Wovenware, a

MAXAR

Center of **AI Excellence**

Acquired by Maxar Technologies in 2022

‣Leading **space tech company** and largest constellation of satellites in the world

‣**Customer of Wovenware** since 2017 for dataset creation, AI R&D and software development

Chosen for our **San Juan-based tech talent** and rising visibility as tech innovator

Center of Excellence
Nationally Recognized AI Provider

FORRESTER®

New Wave of Computer Vision Consultancies

IDC

Leading AI service provider

Gartner®

Market Guide for Artificial Intelligence Service Provider

HFS

HFS Hot Vendor 2021

Clients include companies in healthcare markets (payer and provider side), along with other regulated industries

Wovenware Success Stories

CDI LABS

- Developed an AI-powered at-home COVID 19 test kit during height of pandemic for official diagnoses and self-reporting.

- Designed the accompanying mobile app

BestOption
HEALTHCARE

- **Machine Learning Model** capable of aiding in selecting right ulcer treatment for patients

- Decision making is complex since no two ulcers are alike and many courses of treatment

- AI predictive algorithm helps to determine course of treatment: i.e. primary bandages, secondary bandages or negative pressure

- Supports physicians in the assessment and treatment process

WHAT IS AI?

- An interdisciplinary field that leverages mathematics and statistics, cognitive science, and computing to enable problem-solving based on vast and robust datasets with high-performance computers.

- **The key to AI is data needed to fully train algorithms** – AI lacks the human elements of common sense or quick thinking.

AI

The newcomer to the field that's causing all the hype:

- **Generative artificial intelligence generates text, images, or other media, using generative models.** It learns the patterns and structure of training data and then generates new data that has similar characteristics.

- Most uses of AI today are focused on more "traditional" forms of AI

How does AI Work?

How to build an AI Model
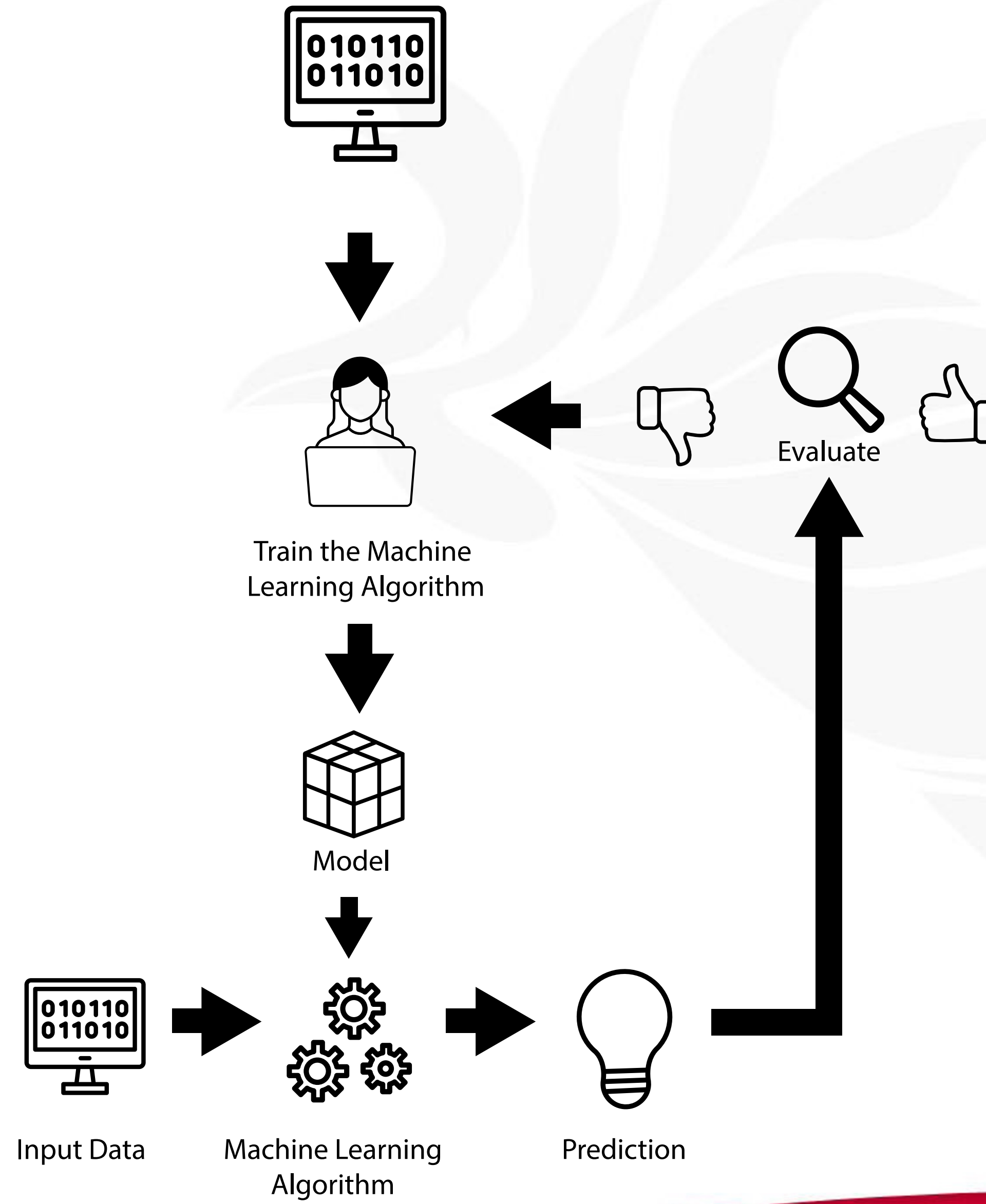
What is not AI?

- AI conjures up images of sci-fi robots, but AI is **not** fictional or magical — it's mathematical.

- **AI is not a replacement for humans.**

- AI is **not** without error. It can sometimes be wrong

- AI is **not** RPA – it doesn't only solve repetitive tasks

What are the Types of AI?

Machine Learning

Capable of learning by recognizing patterns

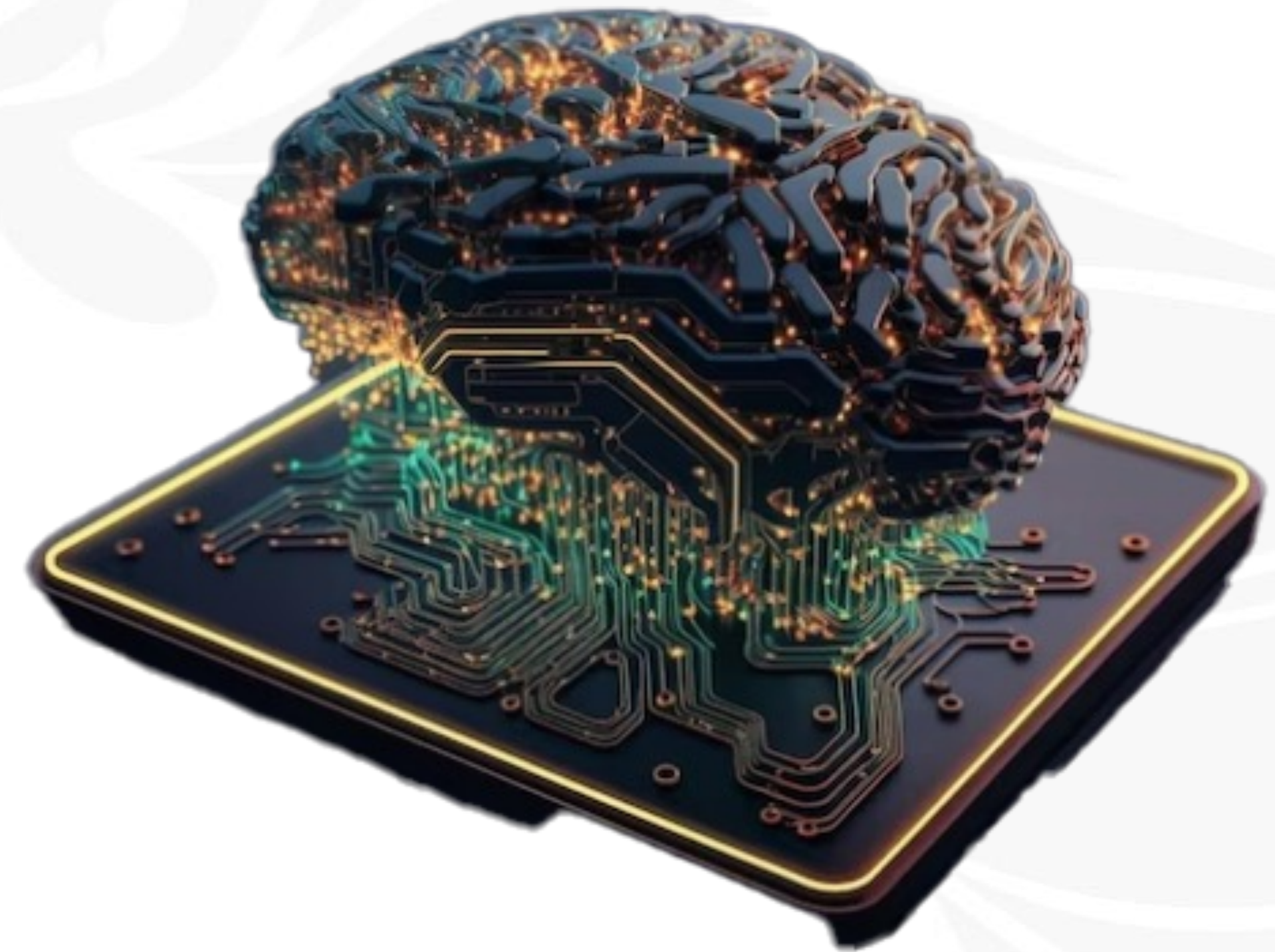in identified variables in training data.

Deep Learning

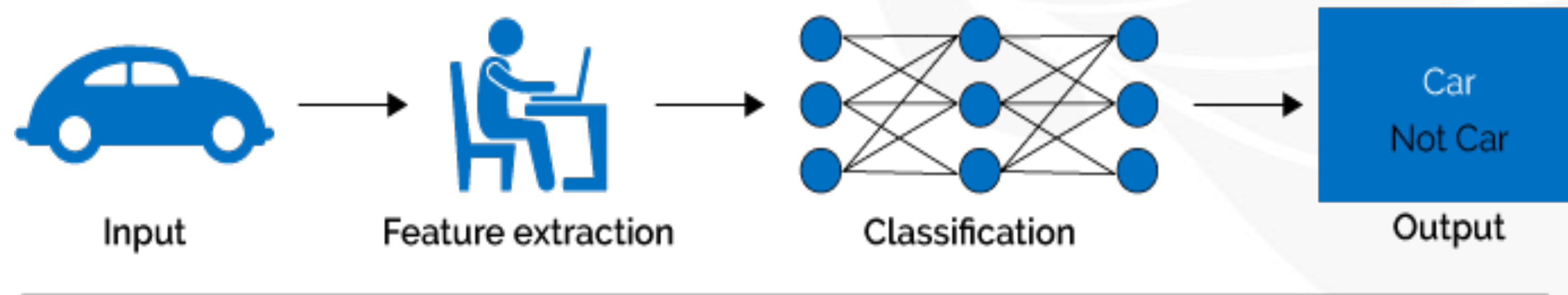Next level of machine intelligence

Teaches itself by making connections or comparisons in the data that are often overlooked or unknown.
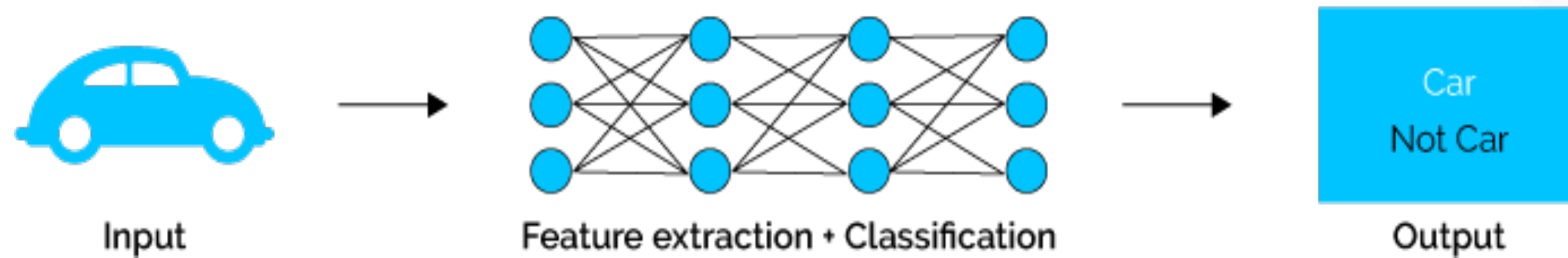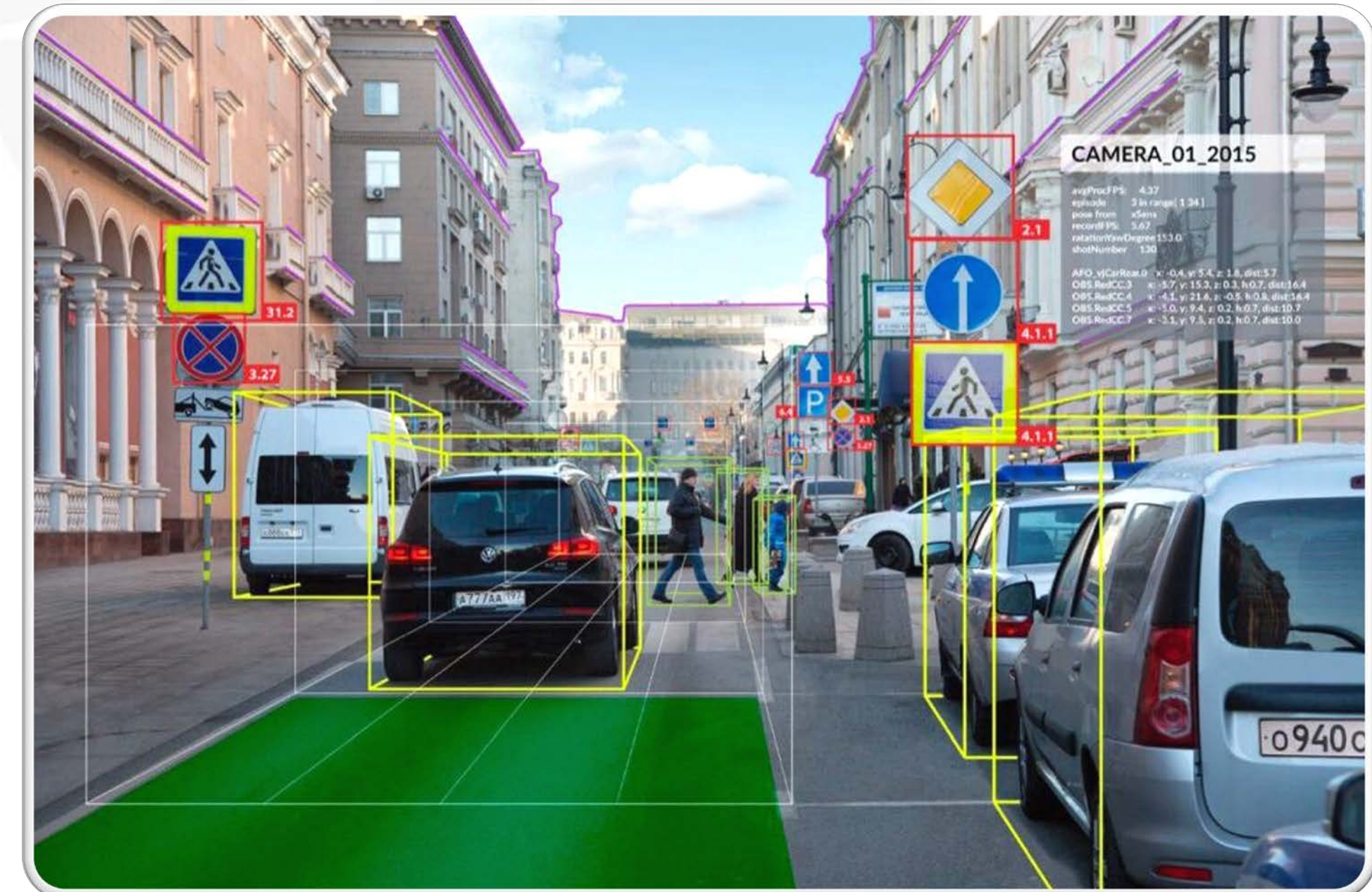
How does AI Work?

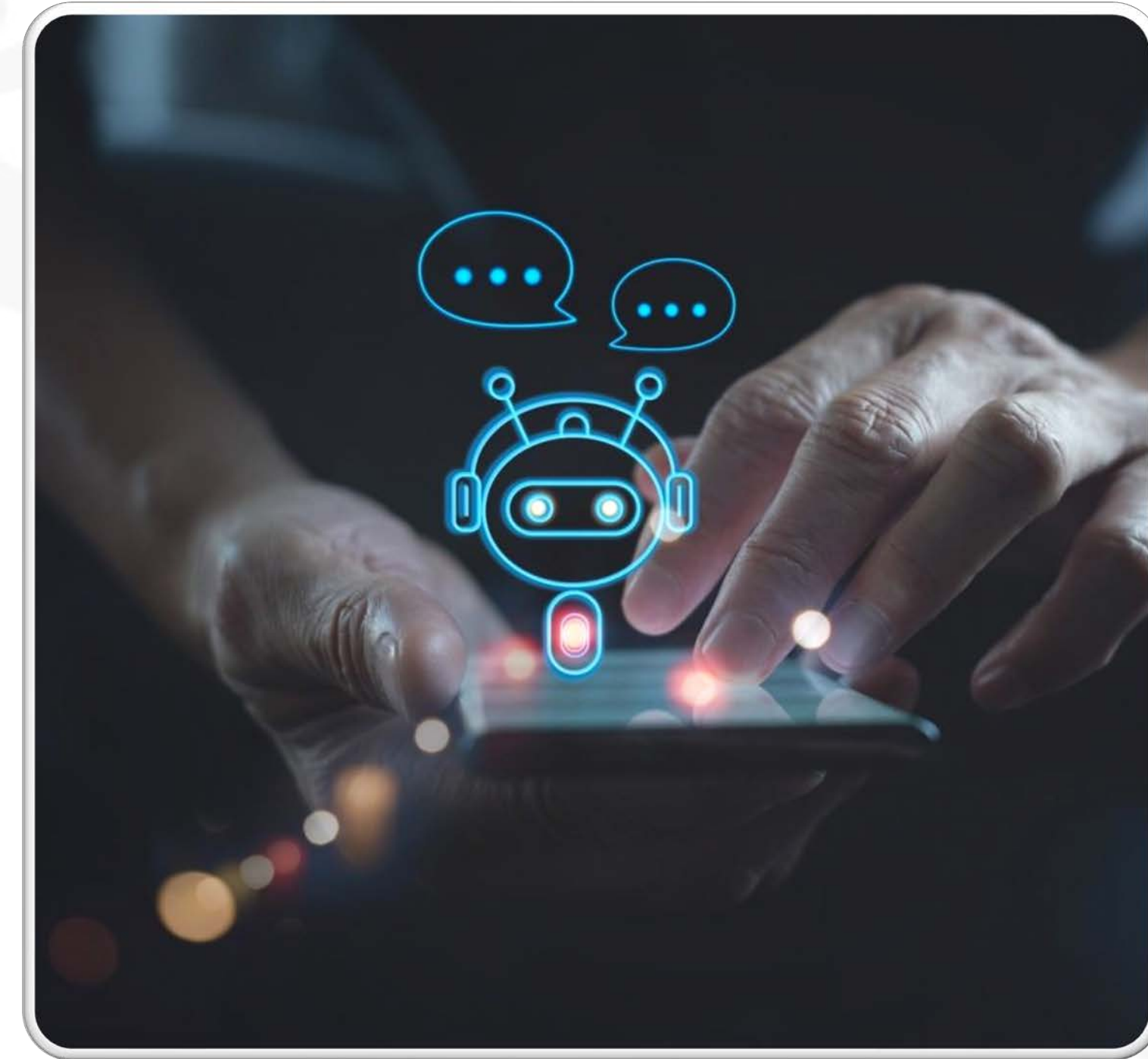## Machine Learning Vs. Deep Learning

Computer Vision

Gathers insight from images or videos. It can be used for image classification, object detection and object tracking, among other applications.

Chatbots

Mimic human communication in speech or text. Uses Natural Language Processing (NLP).
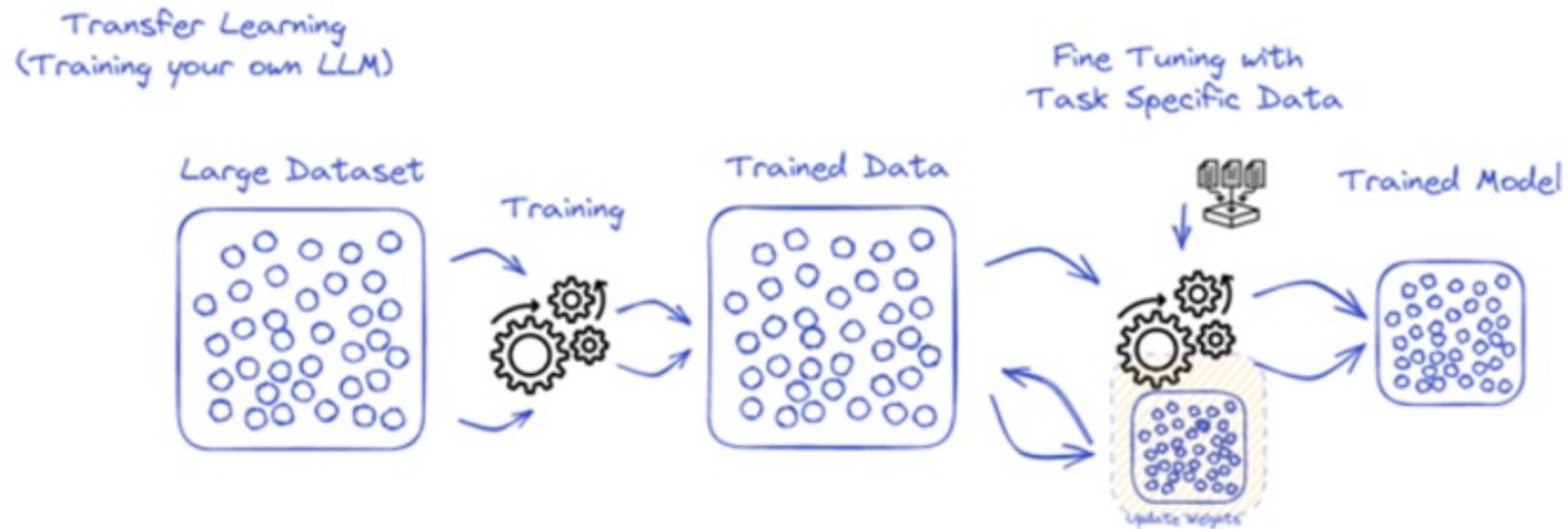
Large Language Models

Deep learning algorithm that can perform a variety of natural language processing (NLP) tasks. Use transformer models and are trained using massive datasets.

How does AI Work?

LLMs

Transfer Learning
(Training your own LLM)

Fine Tuning with
Task Specific Data

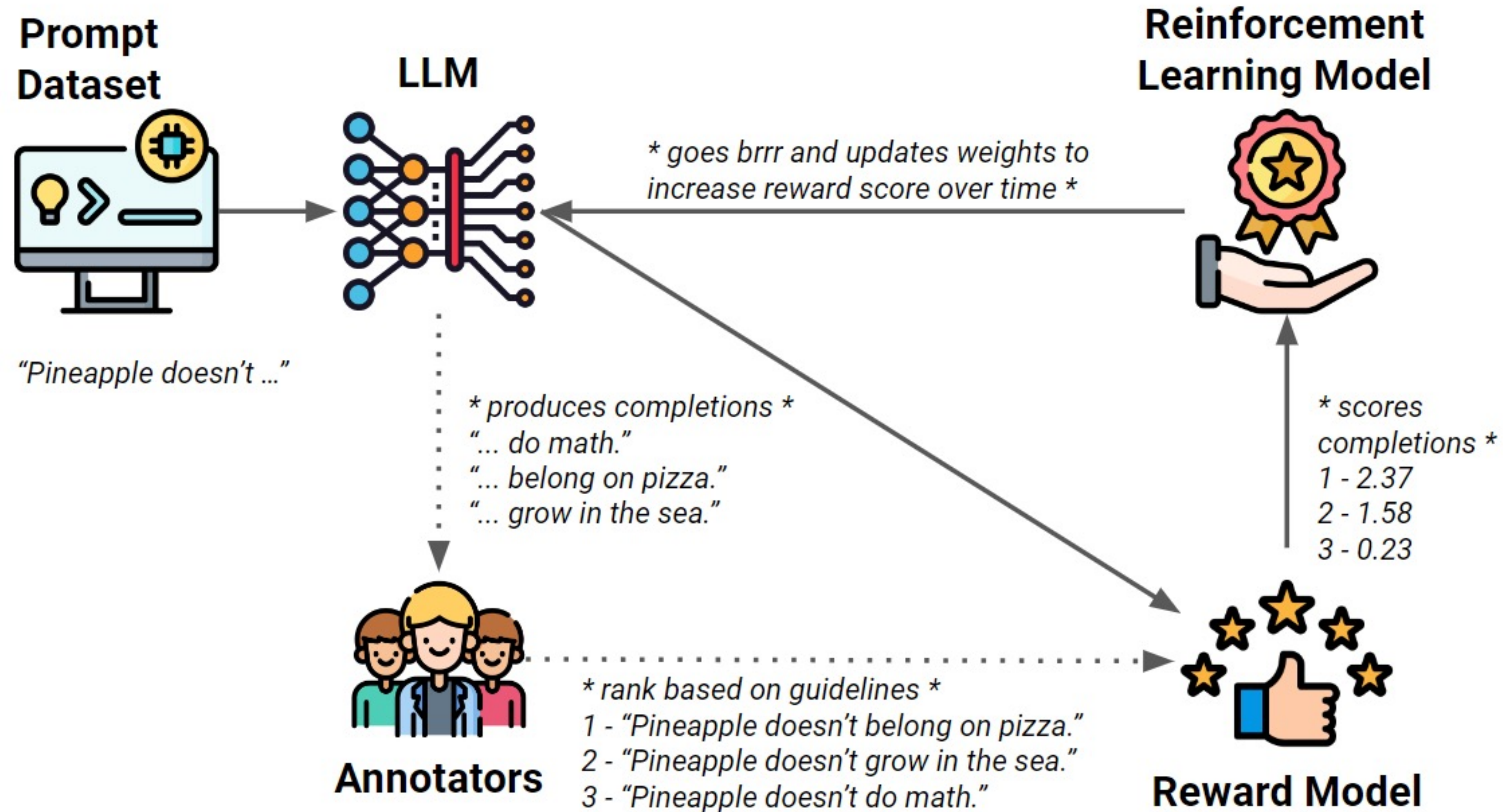Large Dataset   Training   Trained Data   Trained Model

Update Weights

How does AI Work?

LLMs

Predictive Analytics

Designed to predict future outcomes and behaviors based on past data.

HOW ARE ALL THE TYPES OF AI BENEFITING PATIENTS?

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"Every year 400,000 hospitalized patients suffer preventable harm"

because of inaccurate diagnoses
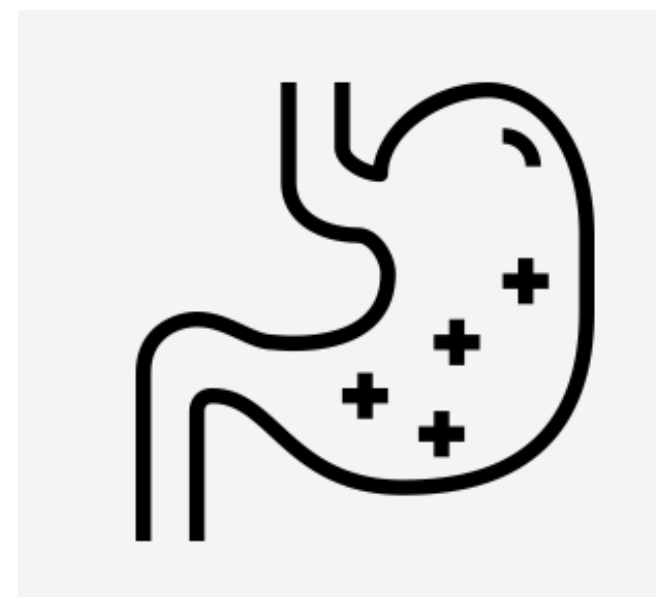
HOW ARE ALL THE TYPES OF AI BENEFITING PATIENTS?

Data-driven diagnostics (more accurate diagnoses)

Identifying problems on
(x-rays)

Progressions of healing
(ulcer example)

Confirming presence
of medical conditions

A boy saw 17 doctors over 3 years for chronic pain. ChatGPT found the diagnosis

Alex experienced pain that stopped him from playing with other children but doctors had no answers to why. His frustrated mom asked ChatGPT for help.

by Meghan Holohan | TODAY

Better treatment decisions (Clinicians can prepare care plans based on historical data)

- Determine course of action for diabetic patients

- Wound care plan for patients

Improved patient experience (less confusion from clinicians, better call center support)

- Chatbots can answer patient questions 24/7

- Data-driven transparency from doctors
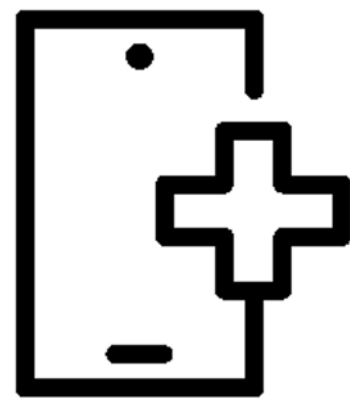
Proactive preventive care (AI-driven alerts, notifications)

- Medication reminders

- Forecasting future medical issues based on family geology, historical data

Driving telehealth/telemedicine (streamlining data analysis, image recognition)

- Remote sick/wellness doctor visits

- Monitoring of vital statistics

Personalized Medicine (targeted therapies for individuals)

- Optimize the timing and dosage of medication for individual patients
- Screen patients using their individual health profiles, rather than just age and sex.

R&D/Pharmaceutical Discovery (sorts through vast amounts of biomedical data)

- Identify therapeutic targets
- Predict the efficacy and safety of drug candidates

TODAY'S AI INNOVATIONS/BREAKTHROUGHS

Innovative companies are driving major advances in how AI is being applied today.

Linux Health

- Developed AI solution to modernize brain health with assessment technology to **detect early signs of cognitive impairment**

- Uses AI to analyze over 50 metrics that reflect the patient's cognitive function.

- Developed a ML solution to **assist pathologists in making more accurate cancer diagnoses and developing methods for individualized medical treatment**.

- Worked with drug developers like Bristol-Myers Squibb and organizations like the Bill & Melinda Gates Foundation to expand AI into other healthcare industries.

regard

- Developed an AI-driven automated **clinical "co-pilot" to diagnose** patients using electronic medical records.

- Healthcare providers **receive specific recommendations about patient care** and the system **updates patient documents automatically** to reduce burnout among healthcare workers.

Buoy Health

- Developed at Harvard Medical School, an **AI-based symptom and cure checker that uses AI to diagnose and treat illness**.

- A **chatbot listens to a patient's symptoms and health concerns**, then **guides that patient to the correct care based on its diagnosis**.

Beth Israel Deaconess Medical Center

- Harvard University's teaching hospital **used AI for diagnosing potentially deadly blood diseases at an early stage**.

- Doctors created **AI-enhanced microscopes to scan for harmful bacteria** like E. coli and staphylococcus in blood samples at a faster rate than manual methods.

- The scientists used **25,000 images of blood samples to teach the machines** how to search for bacteria.

- The machines then learned how to identify and **predict** harmful bacteria in blood **with 95 percent accuracy**.

VIRTUSENSE™

- Uses **AI sensors to track a patient's movements** so that providers and caregivers can be notified of potential falls.

- VSTAlert **predicts when a patient intends to stand up** and notifies appropriate medical staff

- VST Balance employs AI and computer vision to analyze a person's risk of falling within the next year.

WHAT THE INDUSTRY IS SAYING ABOUT AI IN PATIENT HEALTH

"By focusing on specific scientific and operational pain points and fully integrating AI into research workflows, biopharma companies can deliver greater patient impact and significant value."

"It's estimated that AI in healthcare will exceed $20.6 billion in 2023."

"In In a recent Research survey, 94% of health care companies said they employ AI/ML in some capacity. Meanwhile, the industry's average estimated budget allocation to these technologies is projected to grow from 5.7% in 2022 to 10.5% in 2024"

Morgan Stanley

*"Pew Research Center survey found that 6-in-10 U.S. adults say they would feel **uncomfortable** if their own health care provider relied on AI to do things like diagnose disease and recommend treatments."*
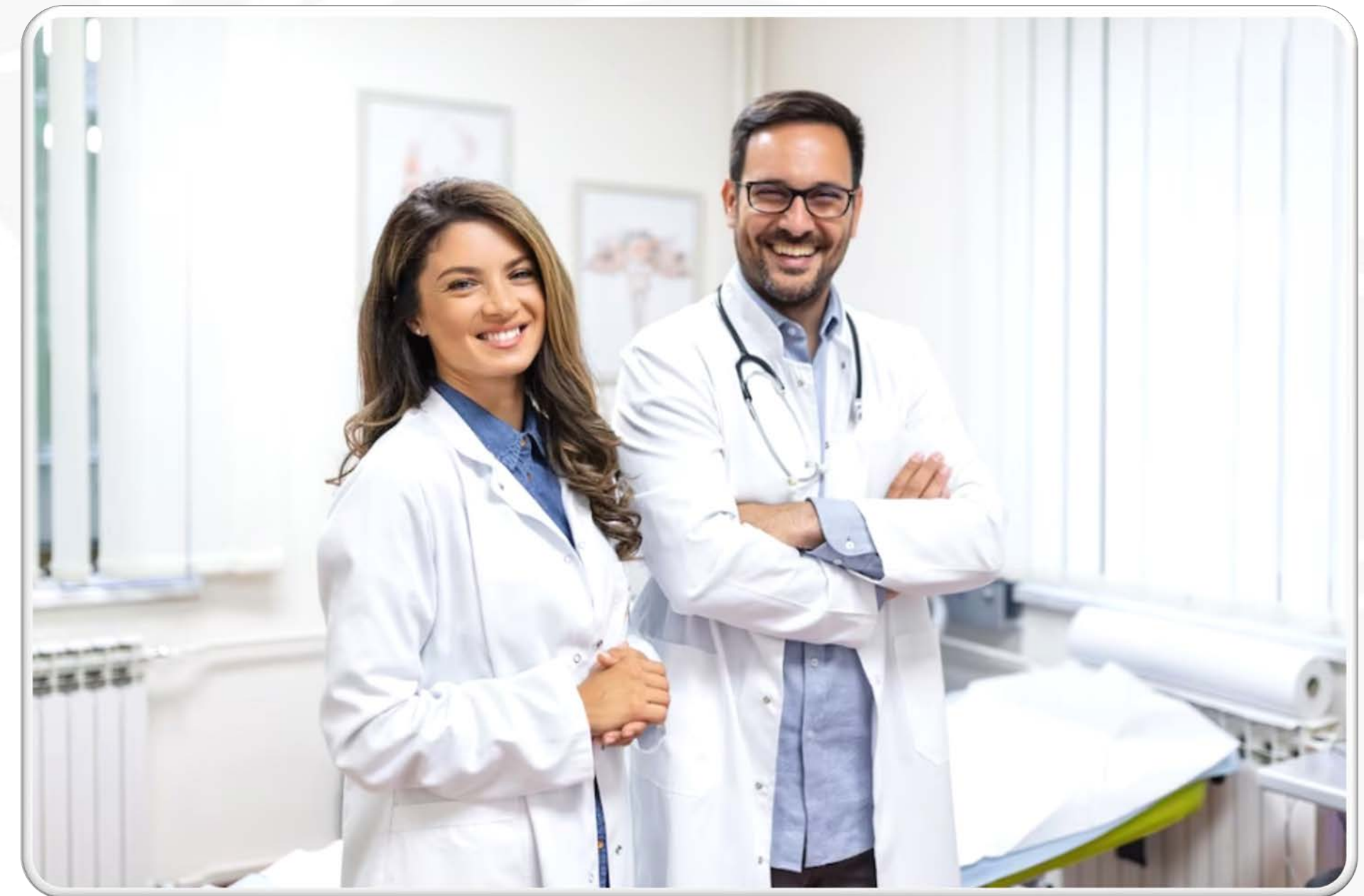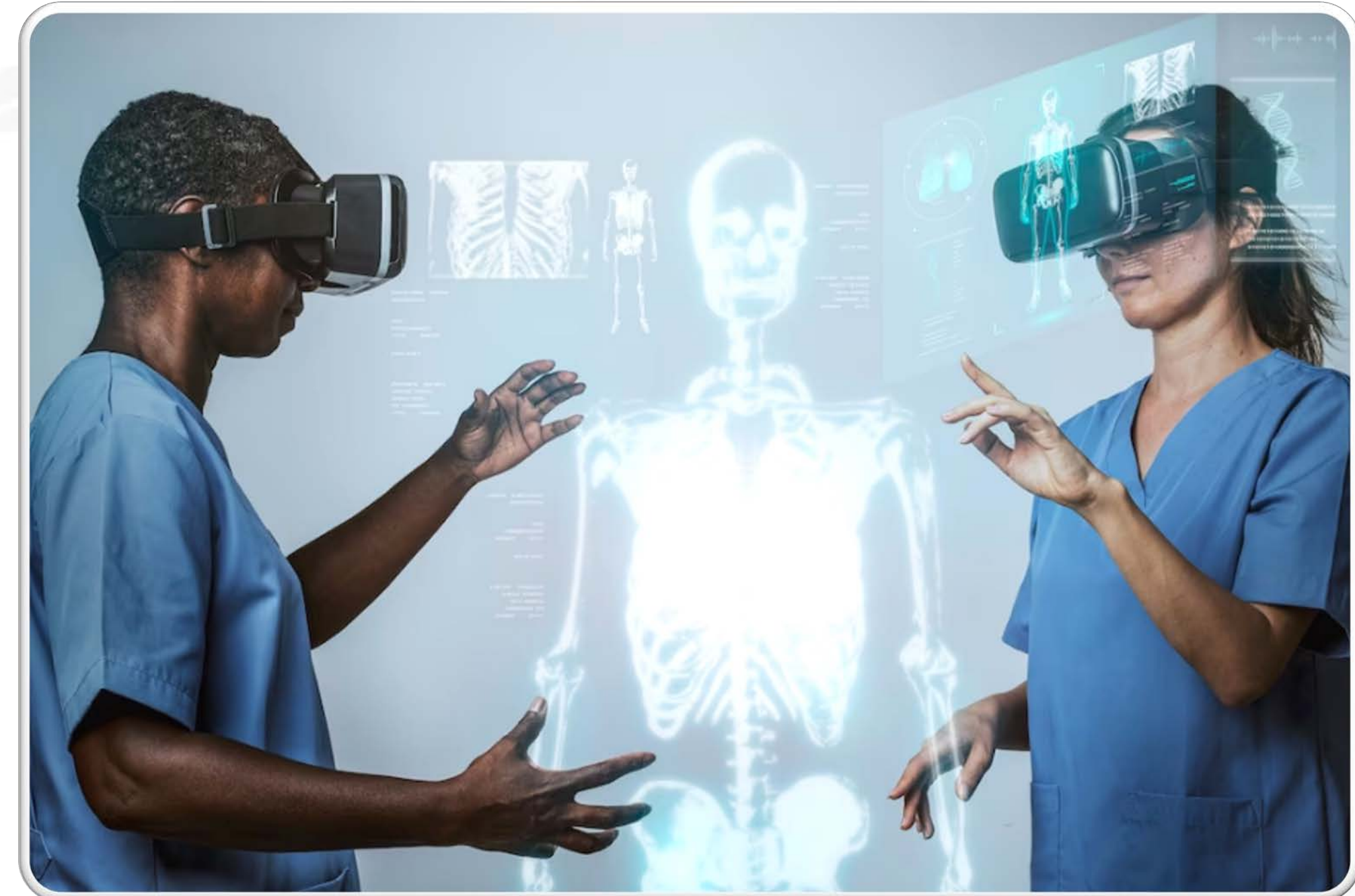
FUTURE OF AI IN HEALTHCARE

Self-Service

AI will facilitate patient scheduling, providing personalized care through the integration and analysis of multiple data sources.

Surgical Assistance

Augmented and virtual reality will assist doctors in surgeries and provide medical training.

Organ Transplants

AI algorithms are beginning to help identify high-risk patients in need of organ transplants, evaluate potential donors, and match donor organs and recipients. The solution can show probable outcomes if they accept or reject the donor organ.
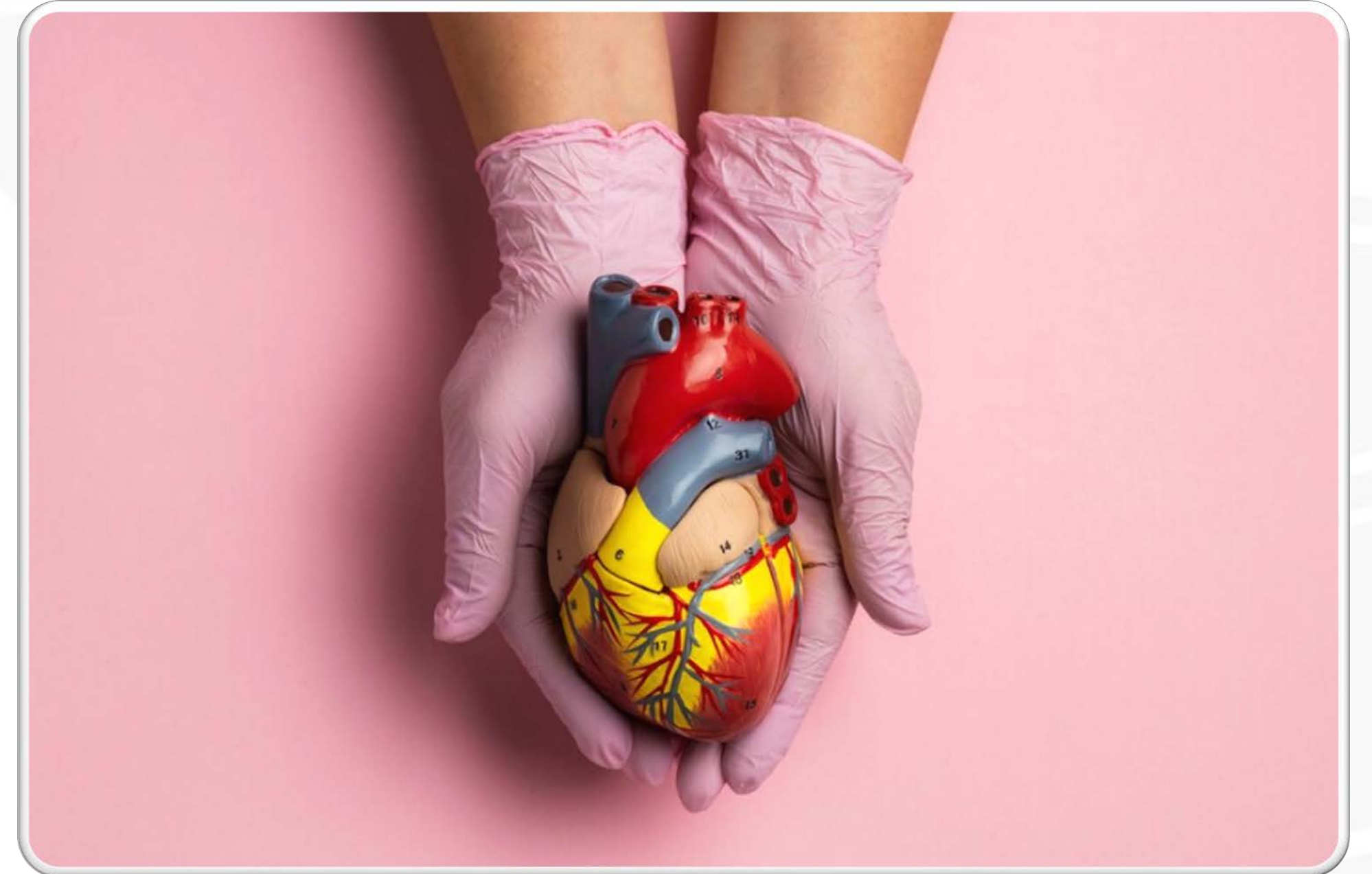
Multimodal Data

AI solutions will be interpreting at scale both radiology images and text-based reports. Interpreting this data to improve care and accelerate research.

Wearable Devices

Smart watches, for example, will collect and transmit vital statistics about heart rate, oxygen saturation and levels of blood sugar. Sensors will monitor faces and bodies to make inferences about the state of health.
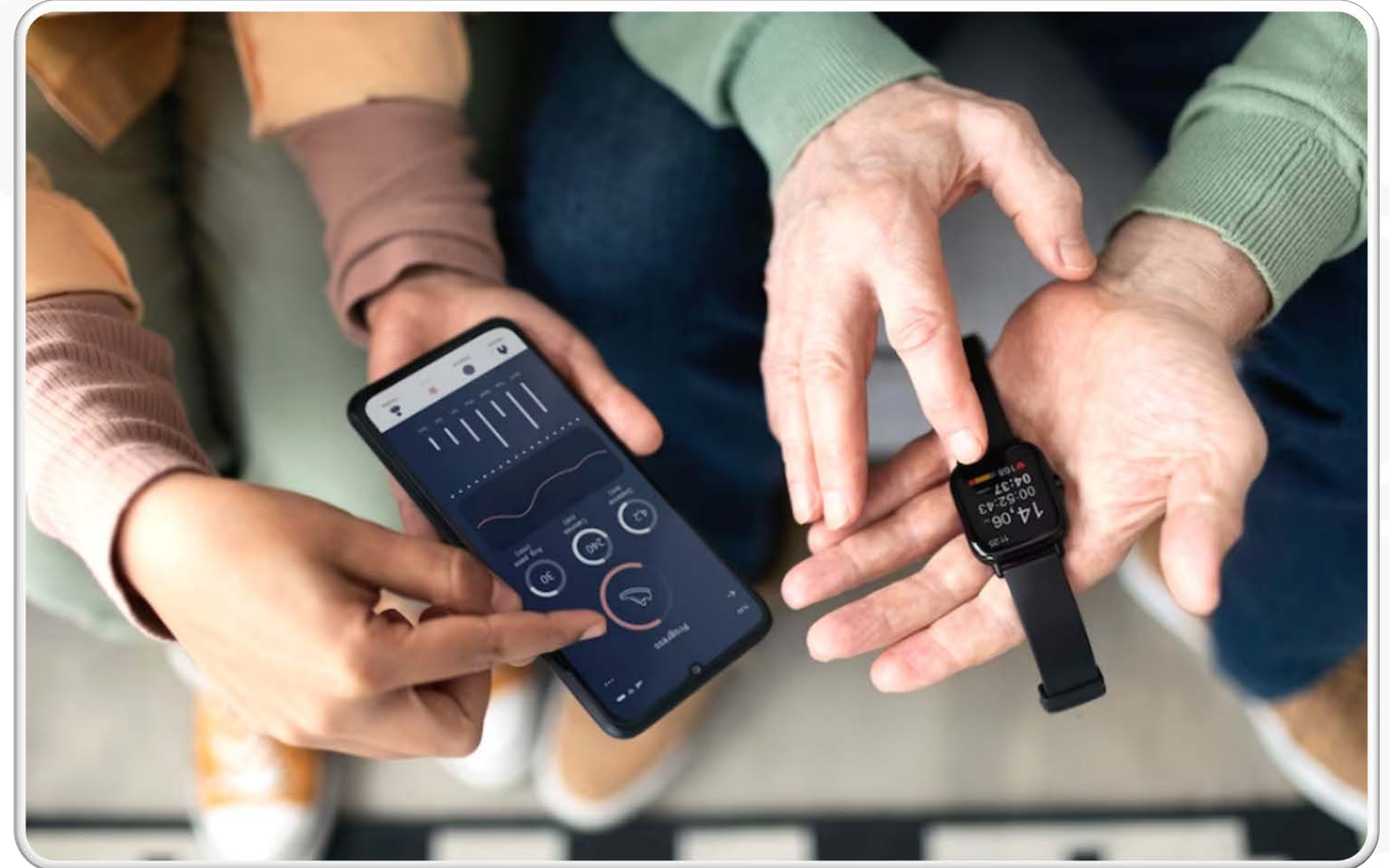
This implant used AI to help a paralysed man walk again

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HEALTHCARE AI
CHALLENGES TO OVERCOME

Patient Trust Issues

- Patient must always feel medical professionals are in charge.
- Patients need to become educated about the role of AI.

Data Privacy

- Since AI is fueled by massive data-sets, practitioners must ensure patient data. privacy and compliance with HIPAA and other regulations.

Humans Always in the Loop

- Nowhere is it more important for AI to be accurate and continuously tested than in healthcare.

Costs of AI

- As health systems struggle with the need to cut costs.

Bias in AI

- Ensuring that AI solutions are trained on unbiased socio-economic data

FORGING A CAREER IN AI-DRIVEN HEALTHCARE

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- Chief Data Officers

- Machine Learning Engineer

- Chatbot Developers

- Chief AI Officer

- Data Scientists

- Data Specialists

- In-house large language model developer

FORGING A CAREER IN AI-DRIVEN HEALTHCARE

- Integrated studies that combine science, math and healthcare disciplines.

- Nurturing and developing talent
  - Introducing STEM when students are young
  - Offering incentives for STEM education
  - Industry/Academic partnerships
  - Integrating AI courses in medical school

- Academic/corporate partnerships
  - More internal continuous education inside companies
  - Government incentives for AI in healthcare growth

"AI has allowed me, as a physician, to be 100% present for my patients."

Michelle Thompson, Family Medicine Specialist with the University of Pittsburgh Medical Center

AI is empowering medical professionals with data-driven assistance, patients with better outcomes and health systems with streamlined operations – and it has only just started.

Thanks for your time!

Contact me

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& VP Operations

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