Artificial Intelligence in MDS Practice

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Disclosures

Employee at Incyte Pharma, owns stock

Previous employee at Amazon, owns stock

Road Map

- ✓ Where do we stand in 2023?
- ✓ The future is Gen AI
- ✓ ChatGPT and its application in healthcare
- ✓ AI 4 Healthcare

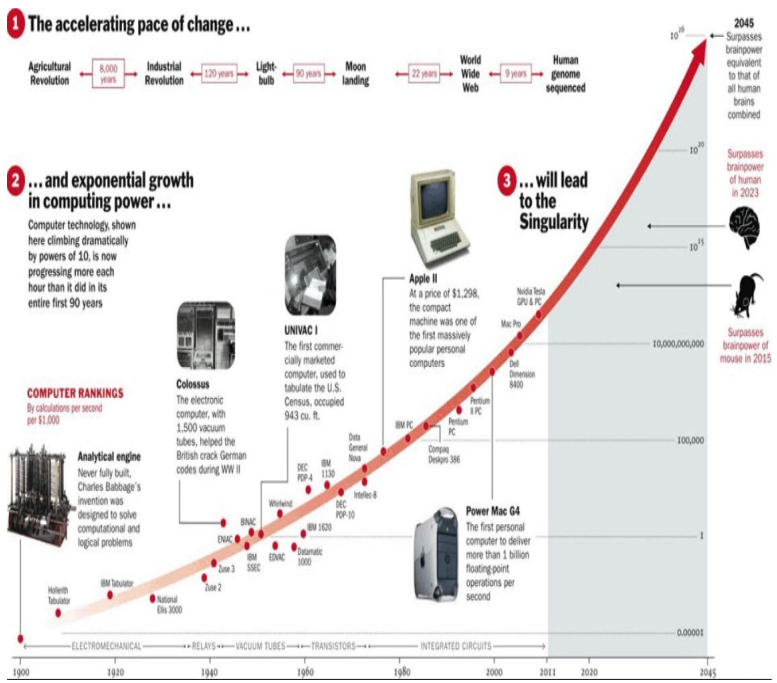
Where is AI in 2023?

"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of light, it was the season of darkness, it was the spring of hope, it was the winter of despair."

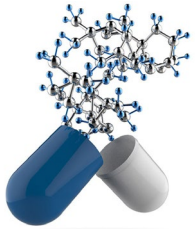
– Charles Dickens, A Tale of Two Cities

It is the best of time to do AI in Healthcare

Source: Micron, International Data Corporation, "Harnessing the Power of Data in Health," Stanford Medicine 2017. Health Trends report, June 2017



FDA cleared algorithms



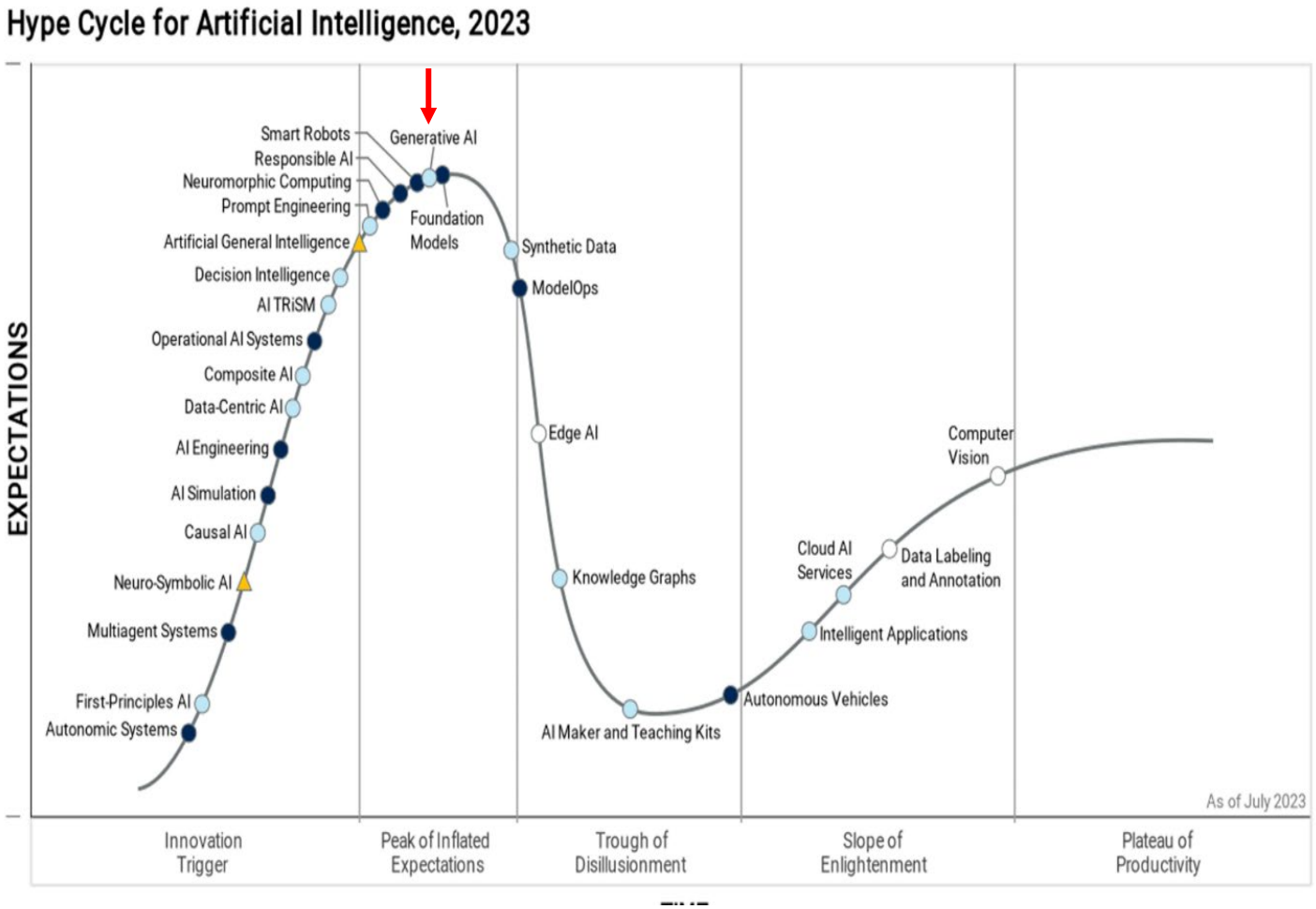
AI designed drugs in development

Big Data

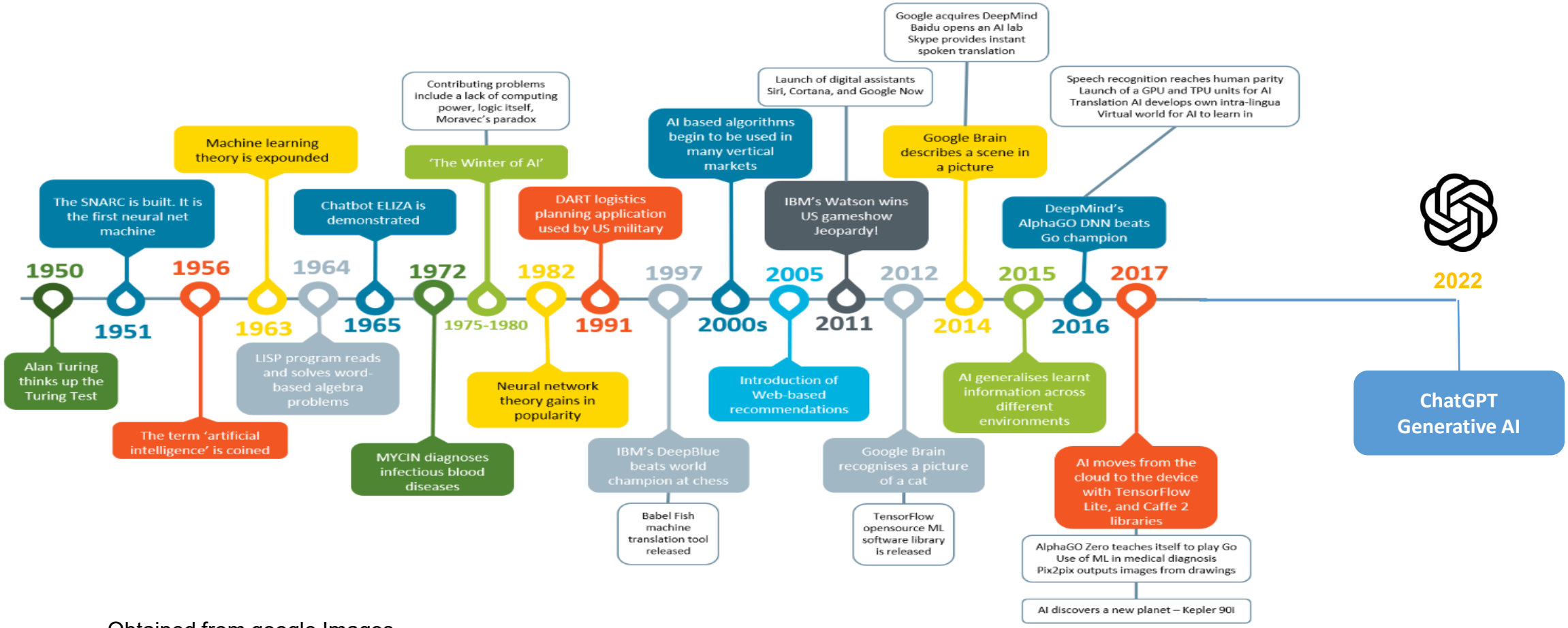
Computational Power

Early Success

It is the worst of time……



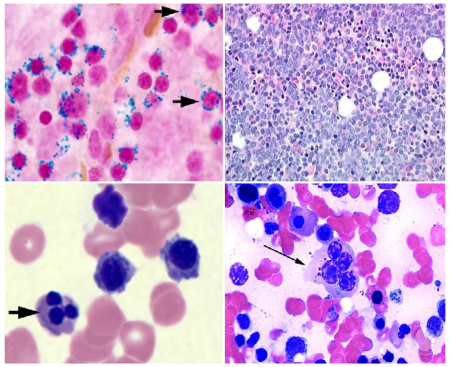
Is AI New?



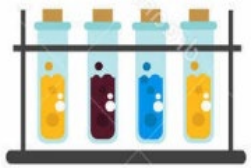
Obtained from google Images

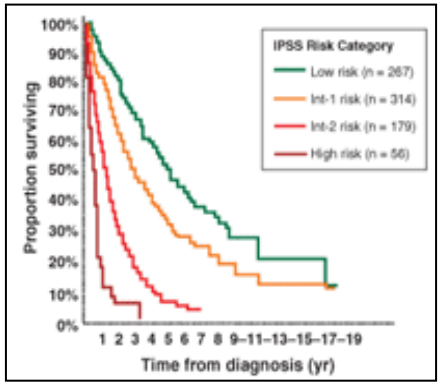
Myelodysplastic Syndromes

Diagnosis



Staging





Treatment

Higher Risk

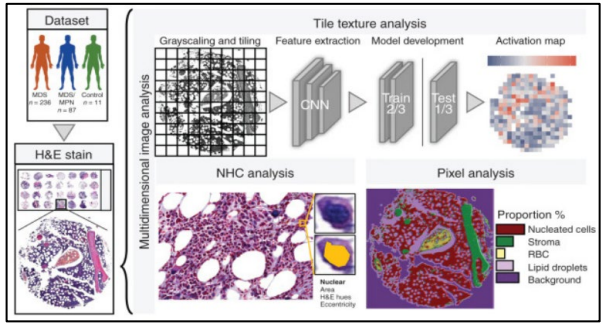
- ✓ Transplant
- ✓ Azacitdine
- ✓ Decitabine

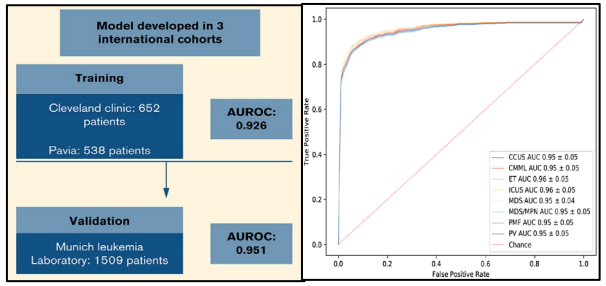
Lower Risk

- ✓ Supportive care
- ✓ Growth factors
- ✓ Other

Myelodysplastic Syndromes + ML

Diagnosis

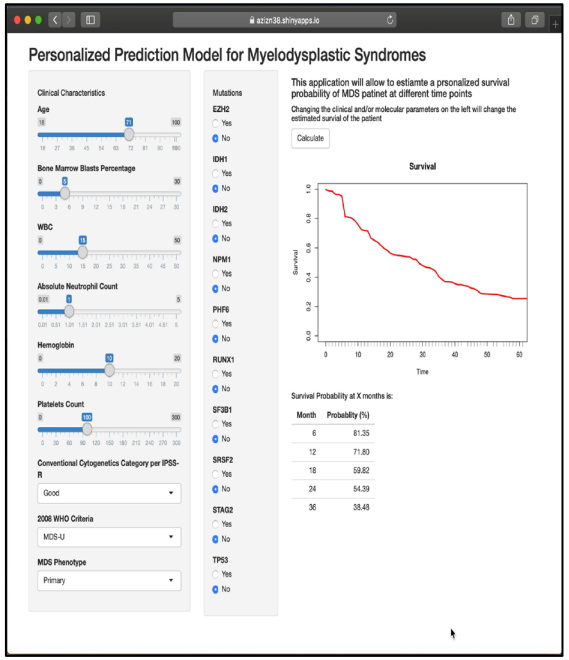




Bruck O, et al. Blood Cancer Discov 2021

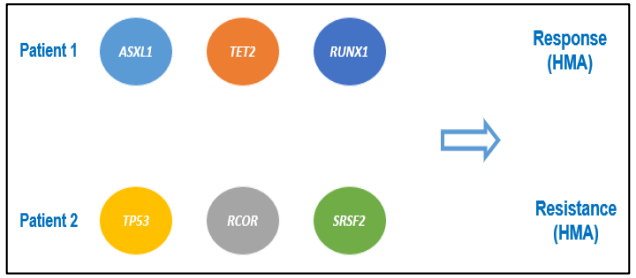
Radakovich N, et al. Blood Advances 2021

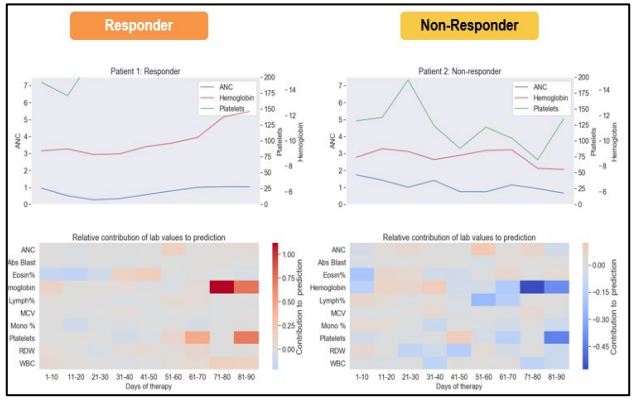
Staging



Nazha A, et al. Journal of Clinical Oncology 2021

Treatment





Nazha A, et al. *JCO Precision Oncology* 2019

Radakovich N, et al. iScience 2022

The Future is Gen AI

(ChatGPT)

Generative AI

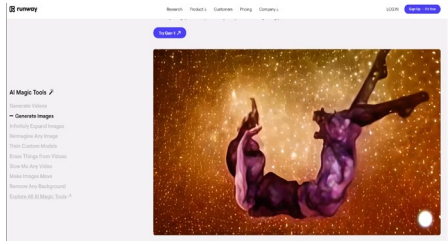
Text to Text

Text summarization, Generation, Conversational, Question Answering
Classification, Translation

Text to Image

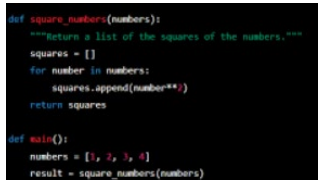
"Draw a cartoon of giraffe with a headphone" →

Text to Video



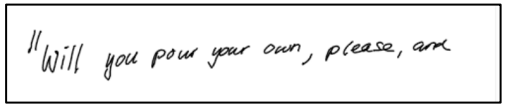
Text to Code

"how to drop a column in python" →



Generative AI

Image to Text



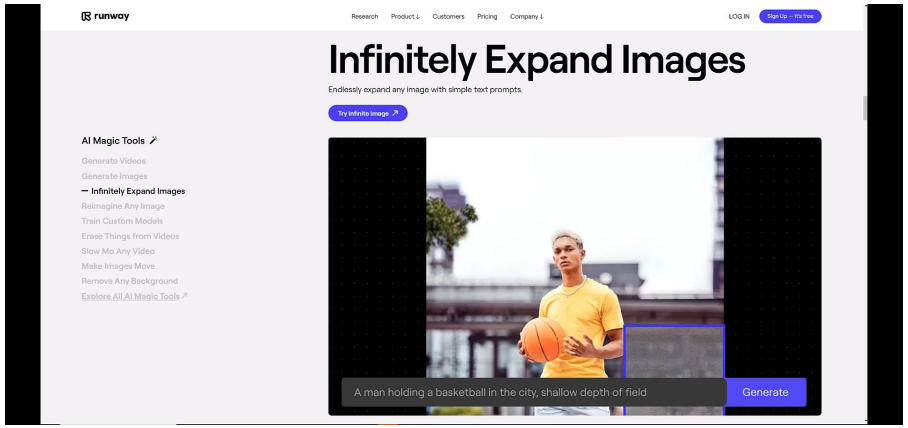
" Will you your your own, please, are

Image to Image

lllyasviel/sd-controlnet-mlsd
Trained with M-LSD line detection

A monochrome image composed only of white straight lines on a black background.

Image modification



WHERE IS GEN AI TODAY?

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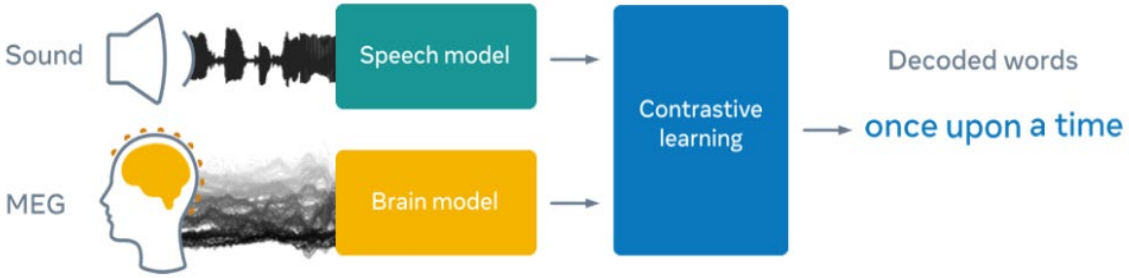
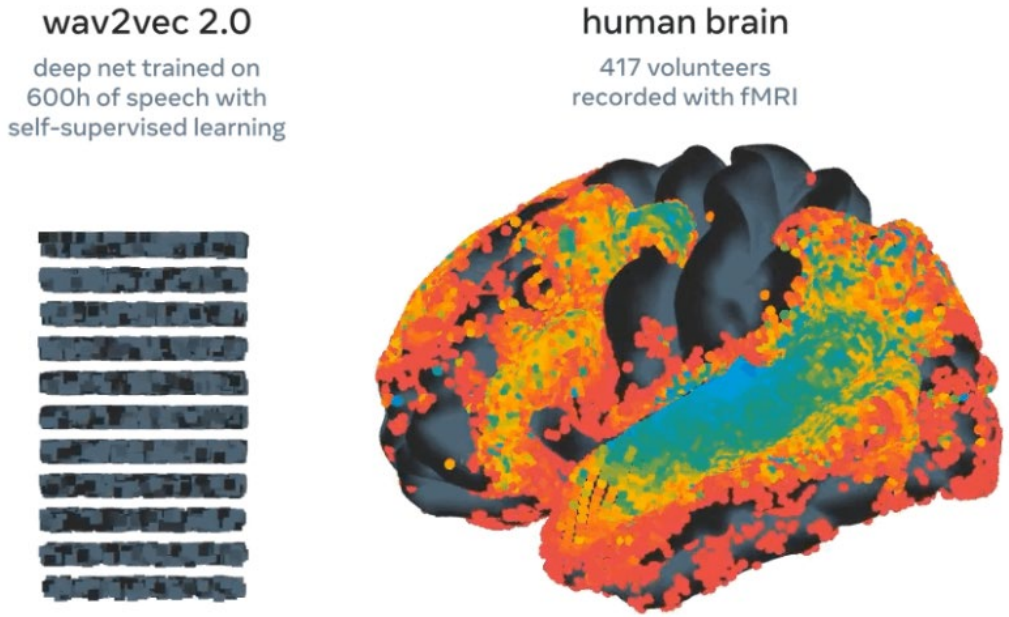
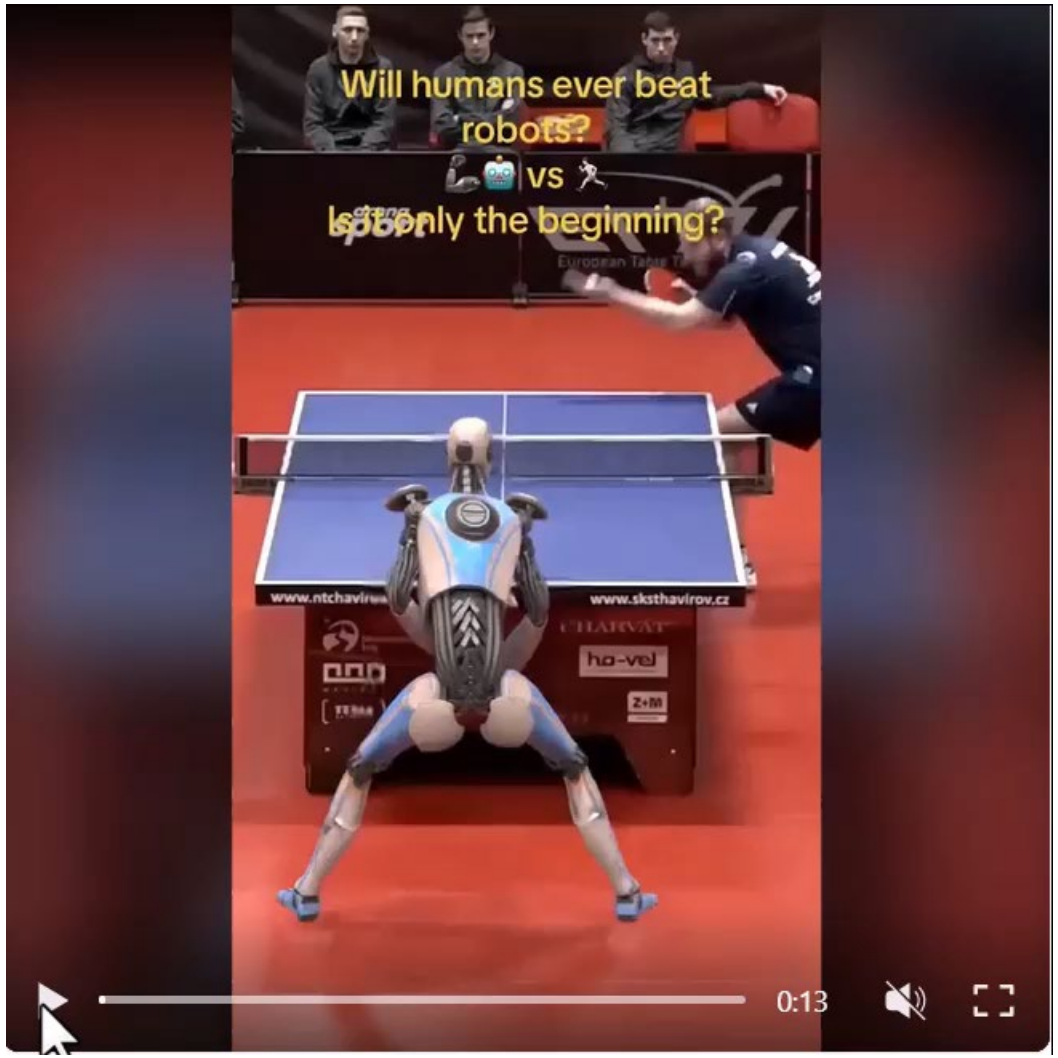




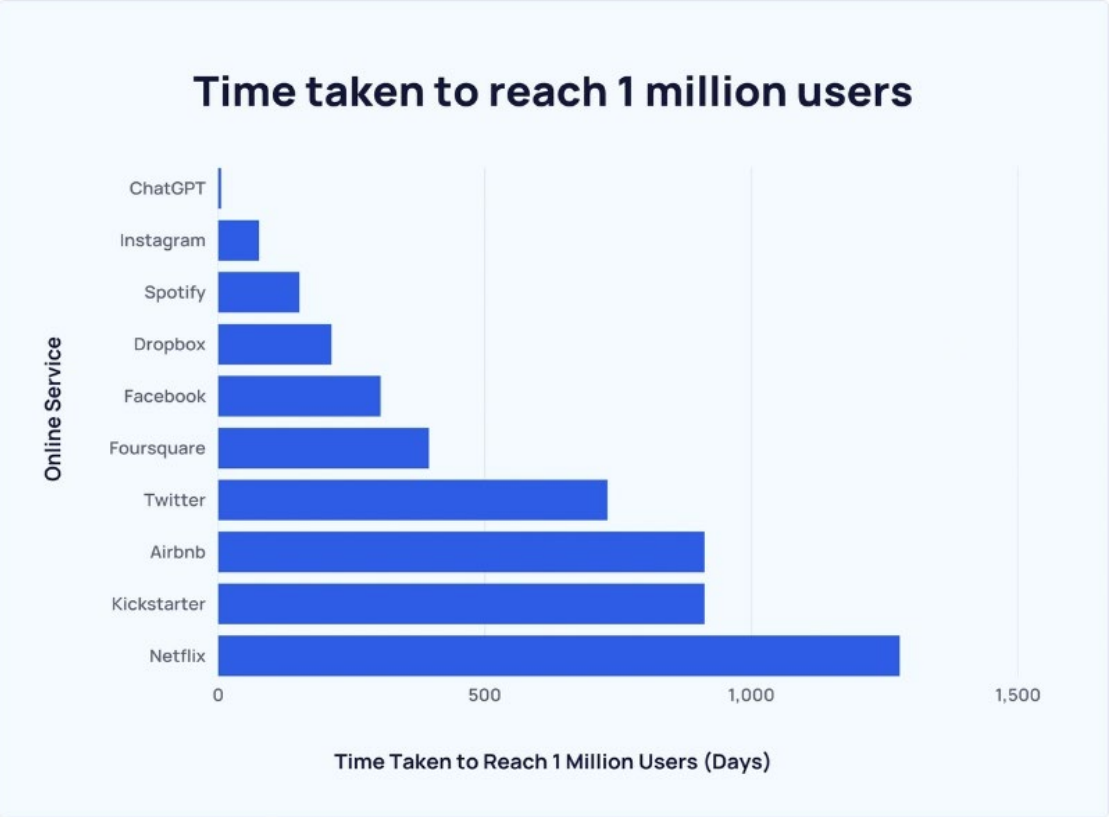
Meta AI research

AI VS. HUMANS


Will humans ever beat robots?
vs
Is only the beginning?
www.sksthavirov.cz
ha-vel
0:13

What is so special about ChatGPT?

- ✓ ChatGPT currently has over 100 million users
- ✓ In just 5 days, ChatGPT surpassed 1 million users
- ✓ Openai.com gets approximately 1 billion visits per month
- ✓ Over 60% of ChatGPT's social media traffic comes via YouTube
- ✓ Over 15% of ChatGPT's users are American



Obtained from: https://explodingtopics.com/blog/chatgpt-users

ChatGPT 4 Healthcare

Chatbot for Q&A for physicians and patients

Research partner

Productivity partner

ChatGPT as Q&A partner

Use of Artificial Intelligence Chatbots for Cancer Treatment Information

Chen S et al, JAMA Oncology 2023

Table 2. Scoring of LLM Chatbot Treatment Recommendations According to Prompt Template[a]

Scoring criteria	Prompt template: What is a recommended treatment for [diagnosis description] according to NCCN? (n = 26)	What is a recommended treatment for [diagnosis description]? (n = 26)	How do you treat [diagnosis description]? (n = 26)	What is the treatment for [diagnosis description]? (n = 26)
1. How many treatment recommendations were provided?				
0	2 (7.7)	0	0	1 (3.8)
1	2 (7.7)	0	0	0
≥1	22 (84.6)	26 (100)	26 (100)	25 (96.2)
2. How many of the recommended treatments were in accordance with 2021 NCCN guidelines?				
0	0	0	0	0
Some but not all	5 (19.2)	11 (42.3)	11 (42.3)	8 (30.8)
All	19 (73.1)	15 (57.7)	15 (57.7)	17 (65.4)
NA	2 (7.7)	0	0	1 (3.8)
3. If some but not all to question 2, how many recommendations were correct in their entirety per 2021 NCCN guidelines?				
0	0	0	1 (3.8)	0
≥1	5 (19.2)	11 (42.3)	10 (38.5)	7 (26.9)
NA[b]	21 (80.8)	15 (57.7)	15 (57.7)	19 (73.1)
4. How many recommended treatments were hallucinated?				
0	25 (96.2)	23 (88.5)	23 (88.5)	20 (76.9)
≥1	1 (3.8)	3 (11.5)	3 (11.5)	6 (23.1)
5. If ≥1 to question 4, how many of the hallucinated treatments are now a recommended treatment in the most current NCCN guidelines?				
0	1 (3.8)	3 (11.5)	3 (11.5)	6 (23.1)
≥1	0	0	0	0
NA	25 (96.2)	23 (88.5)	23 (88.5)	20 (76.9)

Challenges and Limitations (Healthcare)

Validation and accuracy

Social biases

Privacy

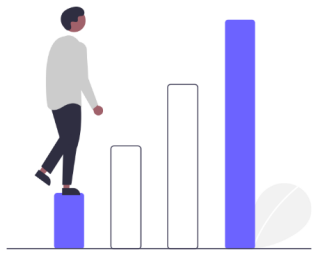
Cost

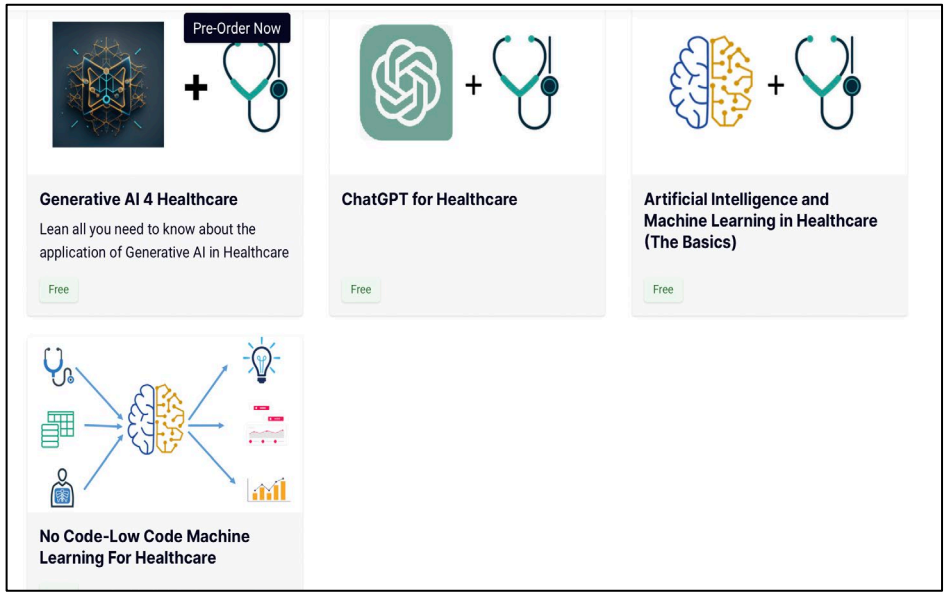
Accuracy (Hallucination) example

Aziz: “how can we target TET2 mutations in acute myeloid leukemia”

ChatGPT:
There are several strategies that can be used to target TET2 mutations in acute myeloid leukemia (AML). Some of these include:
1.Targeted therapies: Researchers are currently developing drugs that specifically target TET2 mutations. One example is the drug guadecitabine (SGI-110), which is designed to target AML cells with TET2 mutations and has shown promise in clinical trials.
2.Immunotherapy: Immune checkpoint inhibitors like anti-PD1/PDL1 antibodies can be used to stimulate the immune system to attack AML cells with TET2 mutations.
3.Gene editing: CRISPR-Cas9 technology can be used to edit the TET2 gene in AML cells and restore its normal function.
4.Chemotherapy: Although chemotherapy is not specific to TET2 mutations, it can still be a useful treatment option for AML patients with TET2 mutations. However, the risk of relapse is higher in these patients.
5.Allogeneic stem cell transplantation: This treatment involves replacing the patient's diseased blood-forming cells with healthy ones from a donor. It can be an effective treatment for AML, including for those with TET2 mutations, but carries a risk of serious complications and is used primarily in young and fit patients.

What is AI for Healthcare?





Map obtain from Google analytics within 14 days of releasing the course via social media

Build Talent

Healthcare focused courses

Global Interest

Conclusions

- ✓ AI is changing our lives
- ✓ GenAI will significantly impact our lives
- ✓ AI will impact MDS and cancer research