Artificial Intelligence

CONTINUOUS LEARNING FOR HUMANS

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WHO AM I?

Lots of titles:

- Chief Technical Officer
- Chief Archeologist
- Chief Instigator

I’ve been working with AI since around 2005, with my master’s project at Florida Institute of Technology being an NLP based system for recommending web forum channels that best match a user’s question.

Like many in this room, I have been trying to keep up with AI advancements.

Finally admitting that the “human learning” never stops.

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HUNTSVILLE AI

We began this group in 2018 as a part of CoWorking Night in Huntsville.

I found that many people working in Data Science and AI were often the only person in their company or project with that specific skillset. So we created something of a working group for AI enthusiasts that meet up to do all the things.

Our vision is a group of individuals and organizations in the metro Huntsville area who collaboratively advance the knowledge and application of artificial intelligence in ways that make it available to everyone and improve our quality of life.

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CONTINUOUS LEARNING

The intent of this session is to identify some of the challenges with learning and keeping up to date with AI, and then offer some practical tips to help.

Many of you are familiar with this process:

1. Learn a cool new AI Technique
2. Start building some capability using the technique
3. Learn a newer, cooler AI Technique
4. Update the capability to be cooler
5. Repeat steps 3 & 4 for a while
6. Learn that a groundbreaking model changes the entire way that things work
7. Learn that the capability you built is now available for free in multiple products

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CONTINUOUS LEARNING

To get an idea of how fast things are changing in AI, we can take a look at a few metrics:

- Papers Published
- Patents Granted
- Models Published
- Investment in AI companies

The primary resource for trend data is provided by the Stanford 2024 AI Index Report. I have also used ChatGPT 4o to help evaluate the report (It is 502 pages) and infer some comparative aspects of AI Technologies and Use Cases.

Another good resource is HuggingFace Stats

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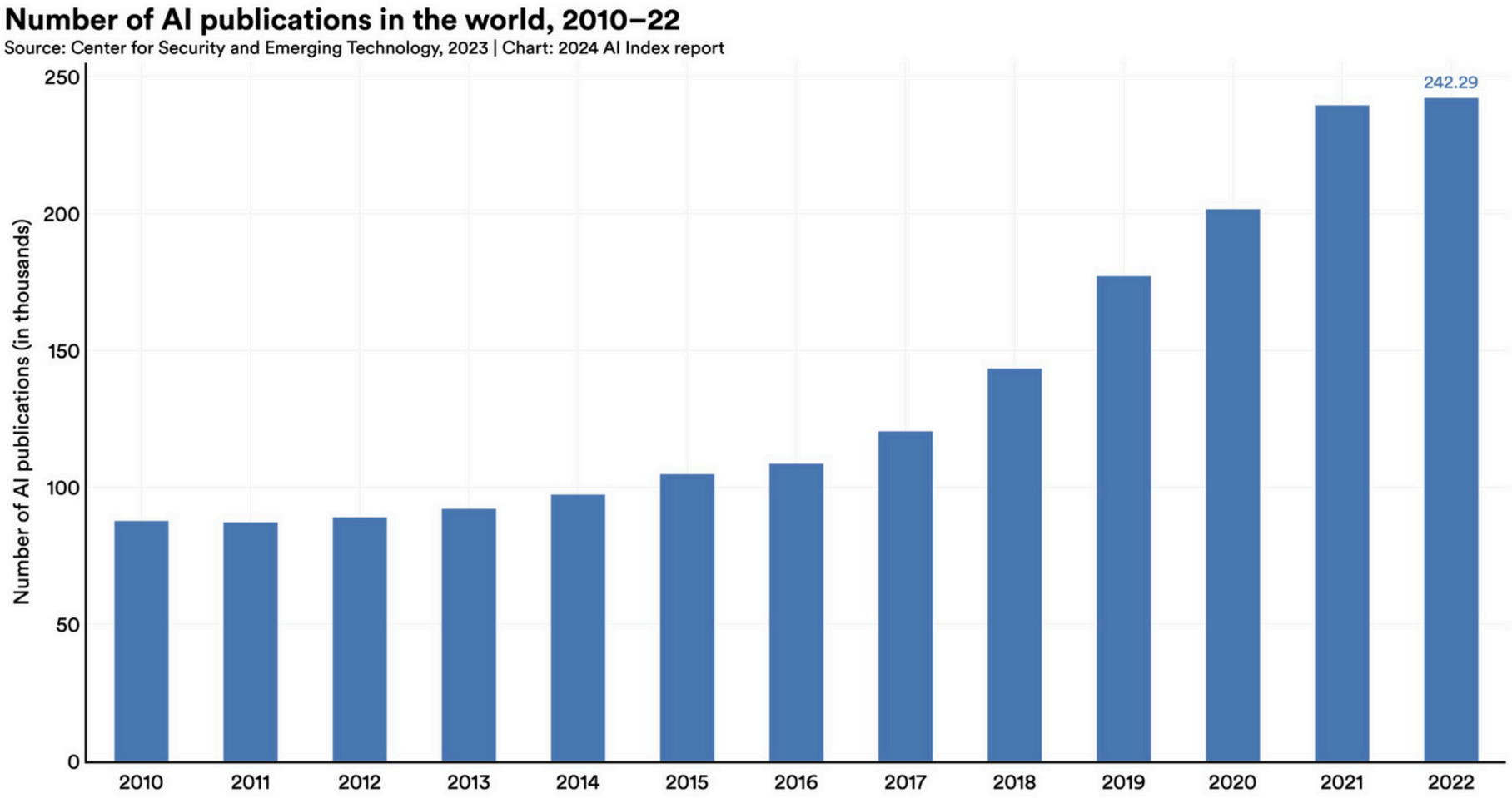
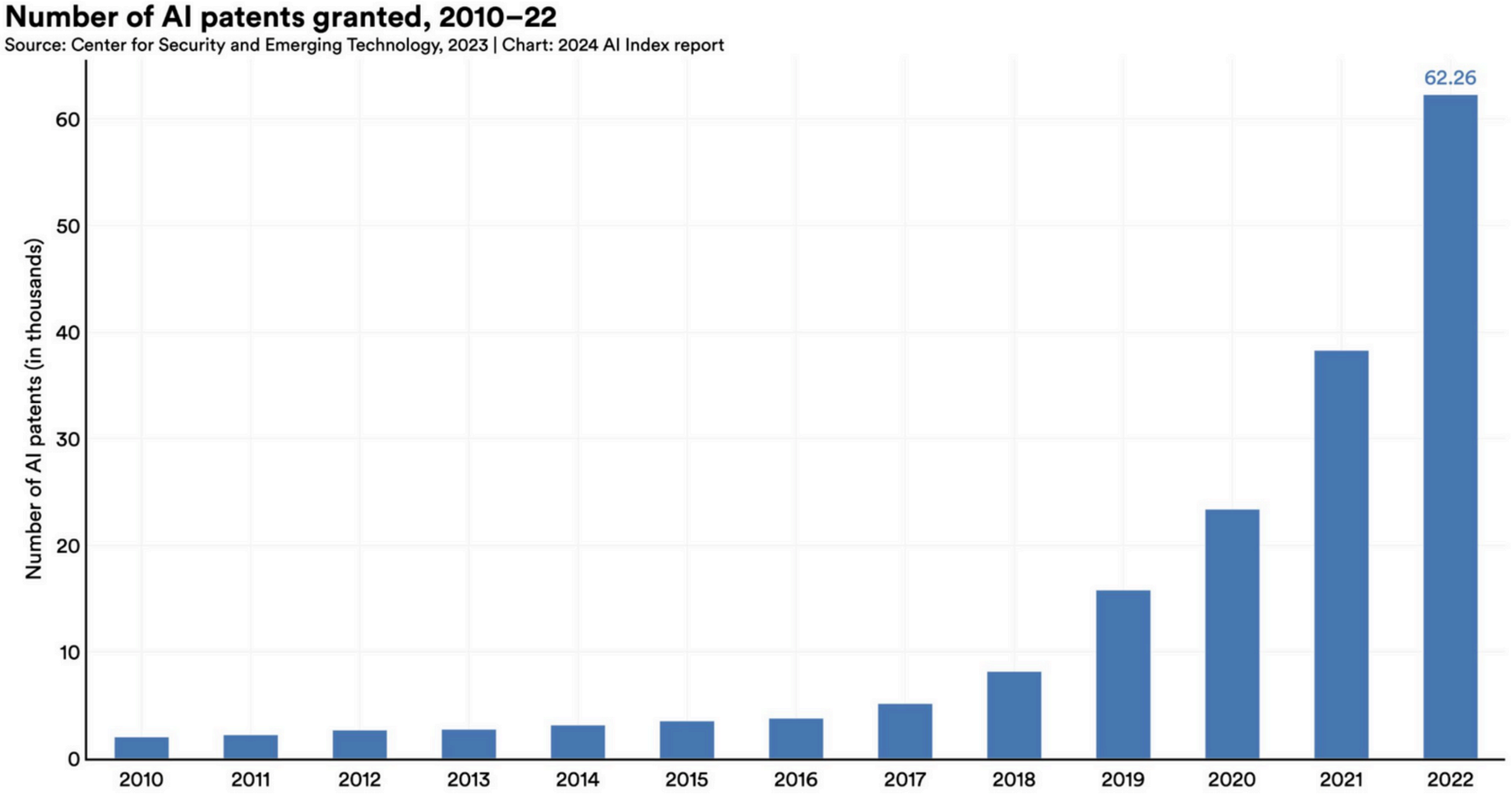
CONTINUOUS LEARNING (PUBLISHED PAPERS TREND)



Source: Stanford AI Index

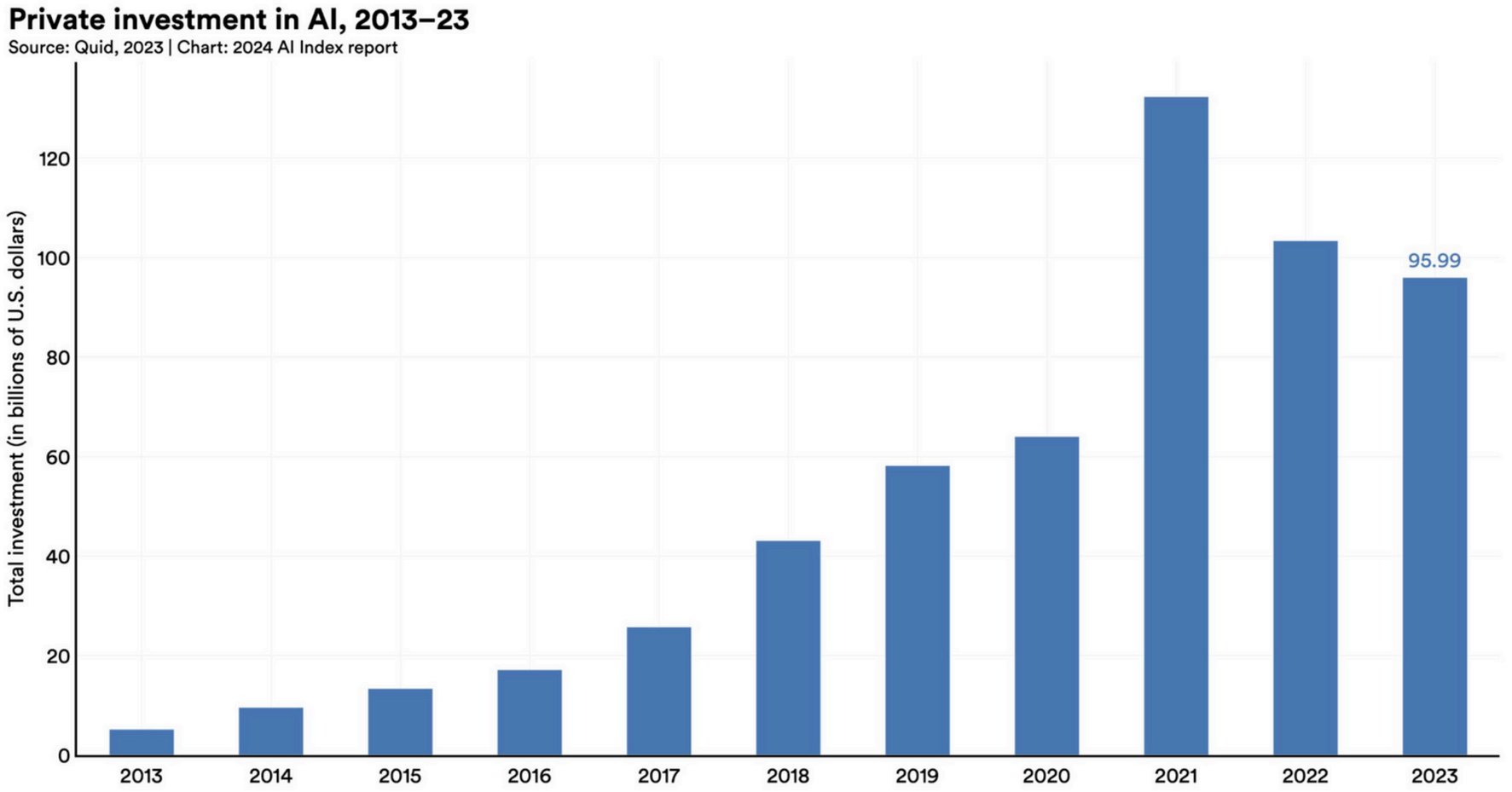
CONTINUOUS LEARNING (PATENT TREND)



From 2021 to 2022, AI patent grants worldwide increased sharply by 62.7%. Since 2010, the number of granted AI patents has increased more than 31 times.

Source: Stanford AI Index

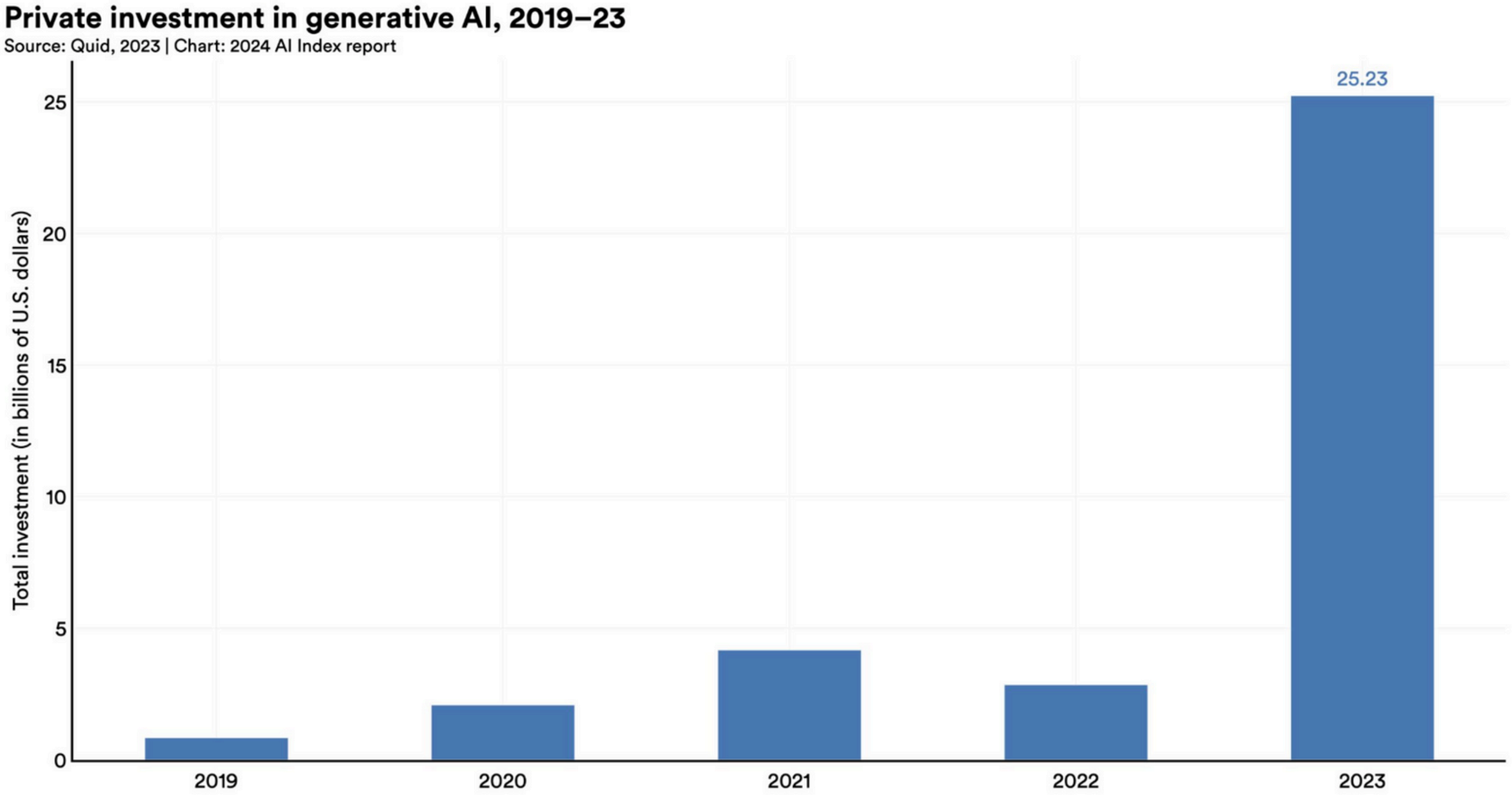
CONTINUOUS LEARNING (PRIVATE INVESTMENT)



Global private AI investment has fallen for the second year in a row, though less than the sharp decrease from 2021 to 2022. The count of newly funded AI companies spiked to 1,812, up 40.6% from the previous year.

Source: Stanford AI Index

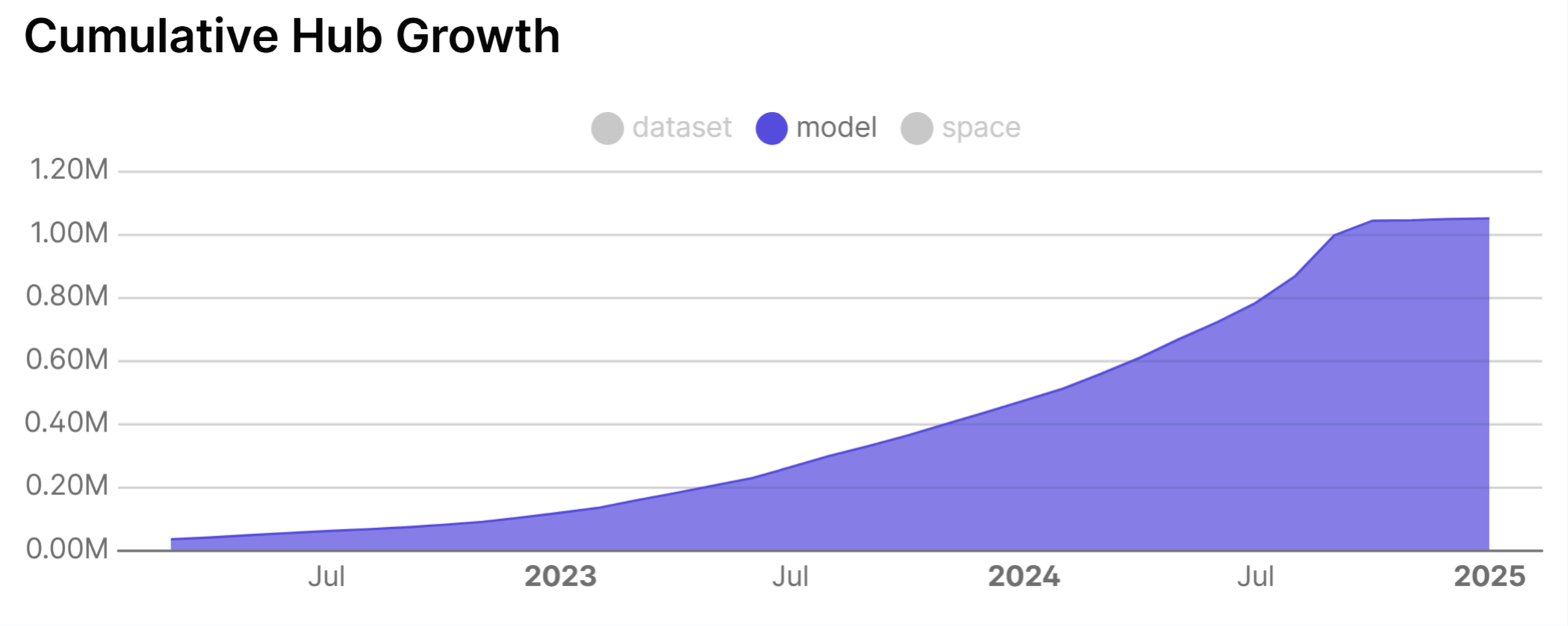
CONTINUOUS LEARNING (GENERATIVE AI INVESTMENT)



Despite a decline in overall AI private investment last year, funding for generative AI surged, nearly octupling from 2022 to reach $25.2 billion. Major players in the generative AI space, including OpenAI, Anthropic, Hugging Face, and Inflection, reported substantial fundraising rounds.

Source: Stanford AI Index

CONTINUOUS LEARNING (MODELS)



Source: Huggingface

TERMINOLOGY (POSSIBLE ENTRY POINTS)

AI Techniques:

1. Natural Language Processing - Classification, Summarization, Generation
2. Computer Vision - Classification, Segmentation, Enhancement, Generation
3. Audio Processing - Recognition, Classification, Generation
4. Multimodal Tasks - Text-to-Image, Text-to-Sound, Text-to-Video
5. Reinforcement Learning - Autonomous Vehicles, Robotics, Optimization
6. Recommendation Systems - Collaborative Filtering, Content Based, Implicit
7. Generative AI - Text, Images, Audio, Video
8. Explainable AI - SHAP/LIME, Attention Maps
9. Agentic AI - Tool Calling, Decision Making
10. Embodied AI - Humanoid Robots, Autonomous Drones

TERMINOLOGY (POSSIBLE ENTRY POINTS)

AI Domains / Use Cases:

1. Healthcare - Medical Imaging, Drug Discovery, Health Assistants
2. Finance/Insurance - Risk Assessment, Fraud Detection, Trading
3. Retail - Dynamic Pricing, Recommendations, Managing Inventory
4. Manufacturing - Robotics, Quality Control, Predictive Maintenance
5. Transportation - Autonomous Vehicles, Traffic Optimization
6. Energy - Forecasting, Efficiency, Monitoring
7. Entertainment - Content Creation, Recommendations, Editing
8. Agriculture - Precision Farming, Yield Optimization, Monitoring
9. Security - Surveillance, Intrusion Detection, Autonomous Drones
10. Space (HELLO NASA!) - CIMON, Rovers, Planning, Robotics

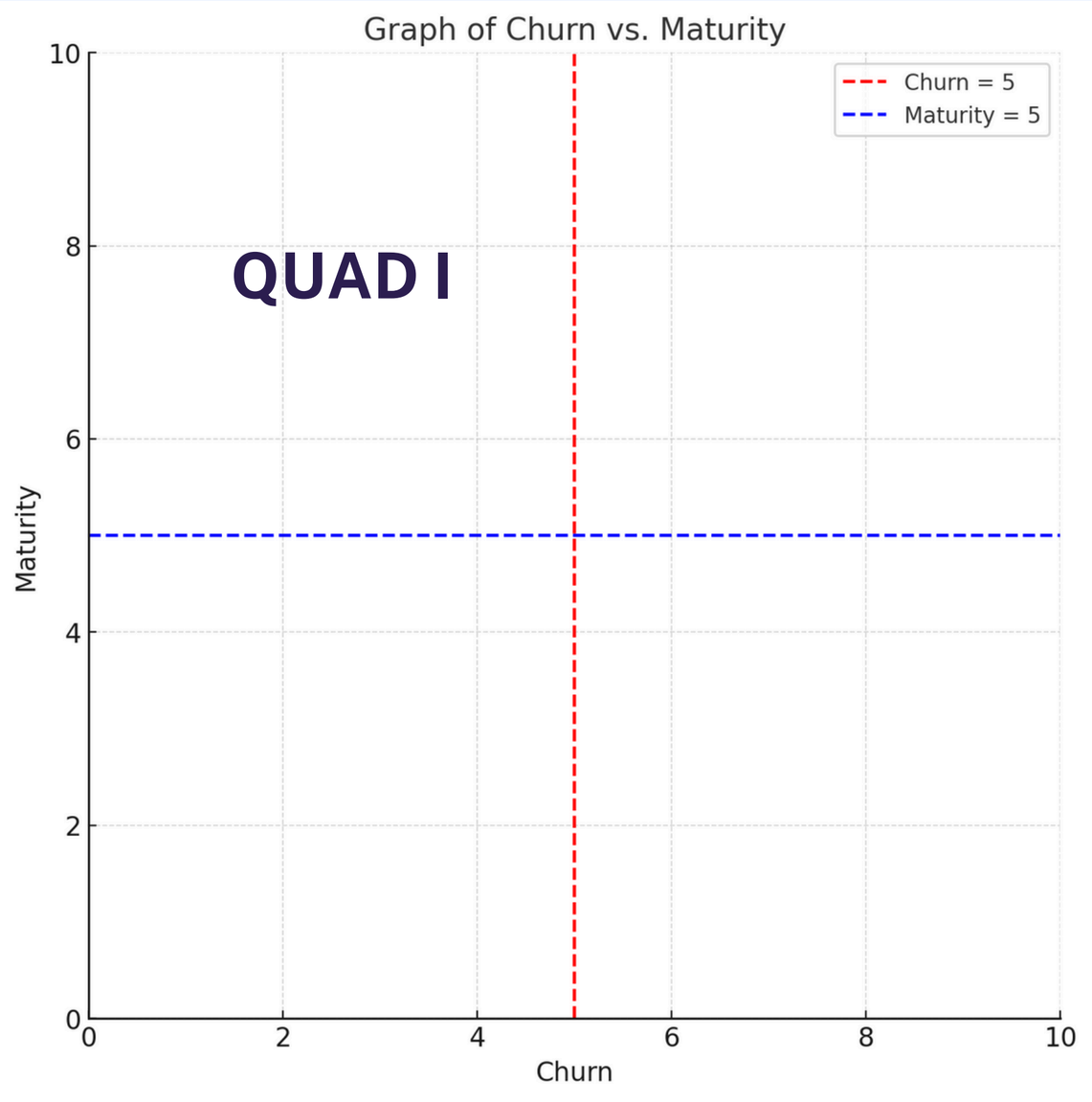
INTRODUCING THE GRID

This is an approach I use often, usually to force a priority or categorization to make further decisions. The attributes for axes can be of your own choosing. For this exercise, I'm using Maturity & Churn.

Maturity - loosely based on NASA Technology Readiness Levels

Churn - made up term to evaluate the amount of change within a short period of time. Similar to Instability but with fewer letters.

INTRODUCING THE GRID (QUAD I)

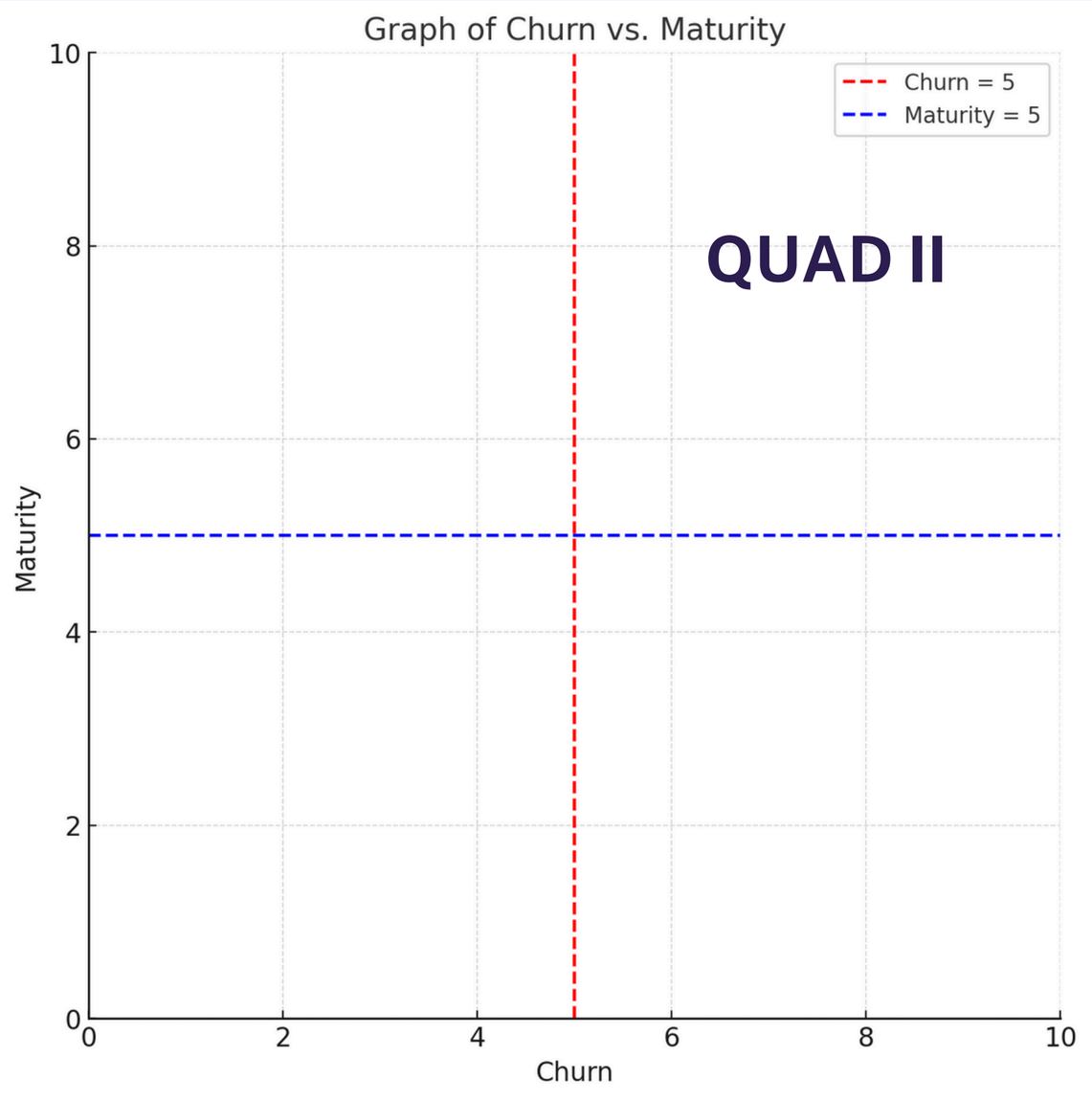


This is your “**Safe Place**”

Everything here is mature and well understood. Success and failure are well defined. Users know what to expect and how to use capabilities.

This is a great entrypoint if you are new to working with AI. Or a good place to be if you don’t have the time to invest in continuous learning.

INTRODUCING THE GRID (QUAD II)

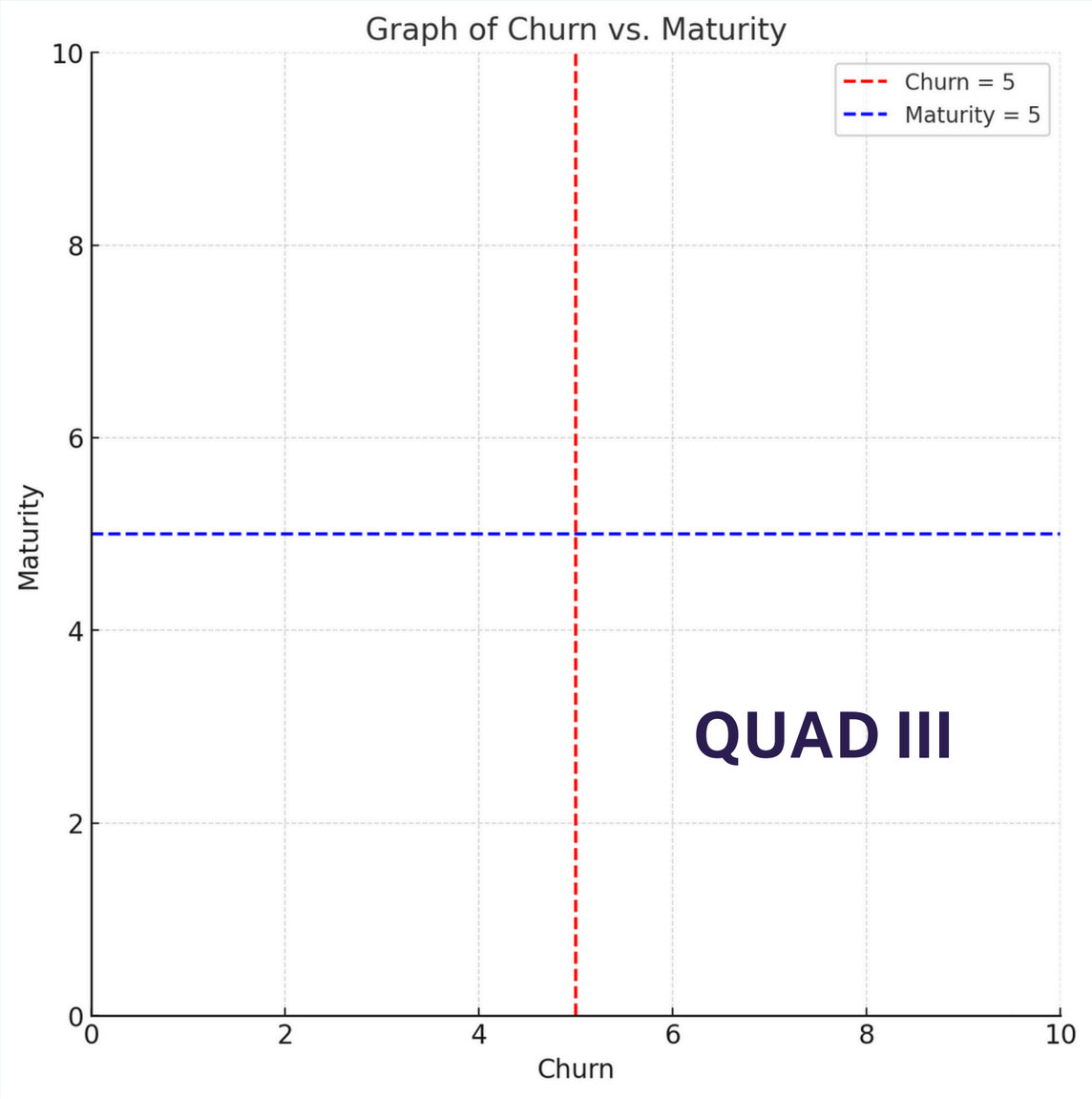


This is “**AdventureLand**”

Same maturity as the “Safe Place” but don’t get comfortable with the details. The AI Techniques change iteratively, but could be replaced with a new AI Technique altogether.

This is where most AI practitioners live. It’s a fun, lively place. It requires energy and time investment to keep up.

INTRODUCING THE GRID (QUAD III)

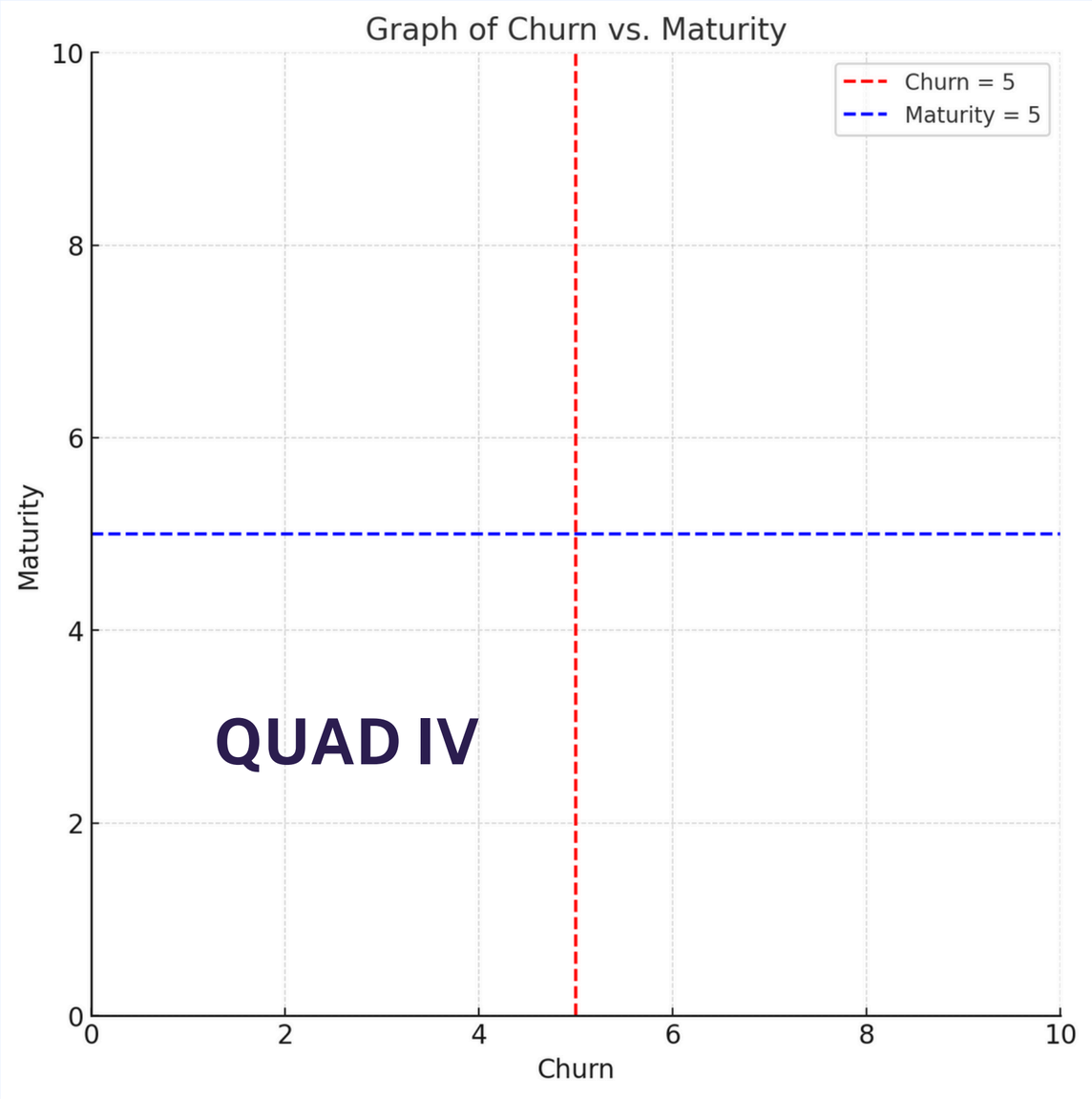


This is “**The Frontier**”

Cutting edge technology or new use cases. Nobody knows how (or if) things work. Success/Failure is loosely defined. You have to educate the technical community as well as your users.

This is can be a lonely place, with a high research paper consumption.

INTRODUCING THE GRID (QUAD IV)

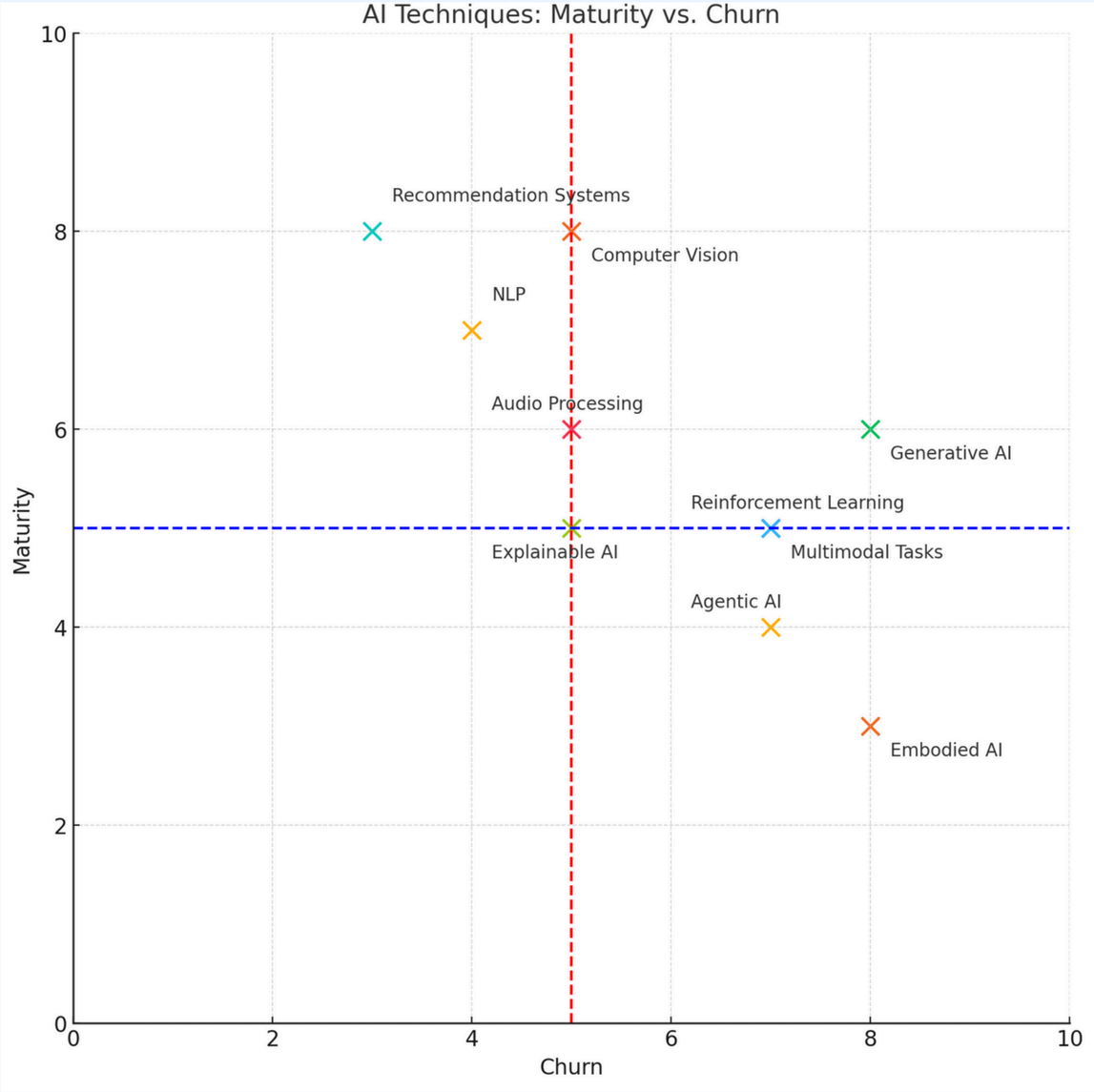


Why are you here?

This is “**The Boneyard**”, sometimes referred to as “**The Desert**”. You can think of this as the land of discarded models.

This area is best suited for occasional trips to see if there are any AI Techniques waiting on the right use case, dataset, or hardware advancement to take off.

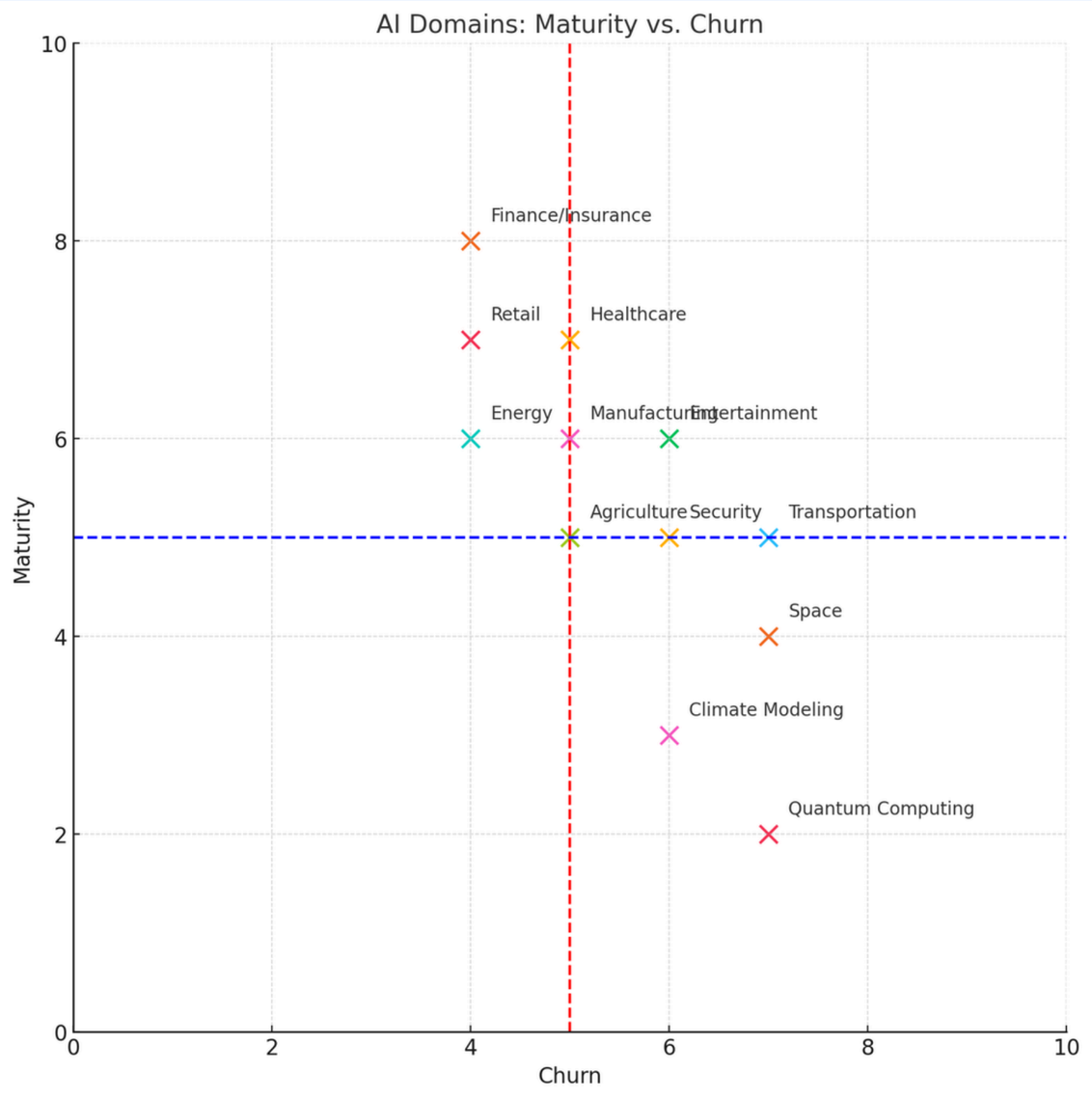
APPLYING THE GRID (AI TECHNIQUES)



Here is where ChatGPT 4o assigned the list of AI Techniques from the previous slide.

Keep in mind that these are still wide groupings that have many sub-categories that could be placed in a different quadrant.

APPLYING THE GRID (AI USE CASES)



Here is where ChatGPT 4o assigned the list of AI Domains and Use Cases from the previous slide.

I also asked for additional Domains that are below a threshold of 4, which turned out to be:

- Quantum Computing
- Climate Modeling

LEARNING APPROACHES (KNOW THYSELF)

Apart from the AI Technique or Use case, the other thing to consider is your own learning approach. So far, I have noticed two distinct approaches:

Learning from a trusted source:

- College Classes (in person or online)
- Certificate Programs - Udemy, Coursera,
- Other courses - https://course.fast.ai/, Stanford Lectures (youtube)

Learning through experimentation:

- HuggingFace
- PyTorch tutorials
- Tensorflow tutorials

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PRACTICAL TIPS

- Use AI to learn AI. Be aware that it’s often wrong and you need to verify the source, but it’s a great way to explore.
- Join a learning cohort - find some others interested in the same thing. Find a way to stay accountable.
- Newsletters - TLDR, Beware if they are full of sales pitches or product demonstrations.
- Podcasts (my favorite) - Gradient Dissent, TWIML, Data Skeptic, Last Week in AI.
- Join (or start) a local group of AI enthusiasts
    - Caveat: Check your sources
- Start with a framework - PyTorch, Tensorflow, Amazon, Google, Microsoft
    - Caveat: Learn the concepts, not the specific vendor tool

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Thank you!

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