Data Science, AI, and Machine Learning in Public Health using R

Day 2

December 2025

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Introduction: Directing AI Use in 2025

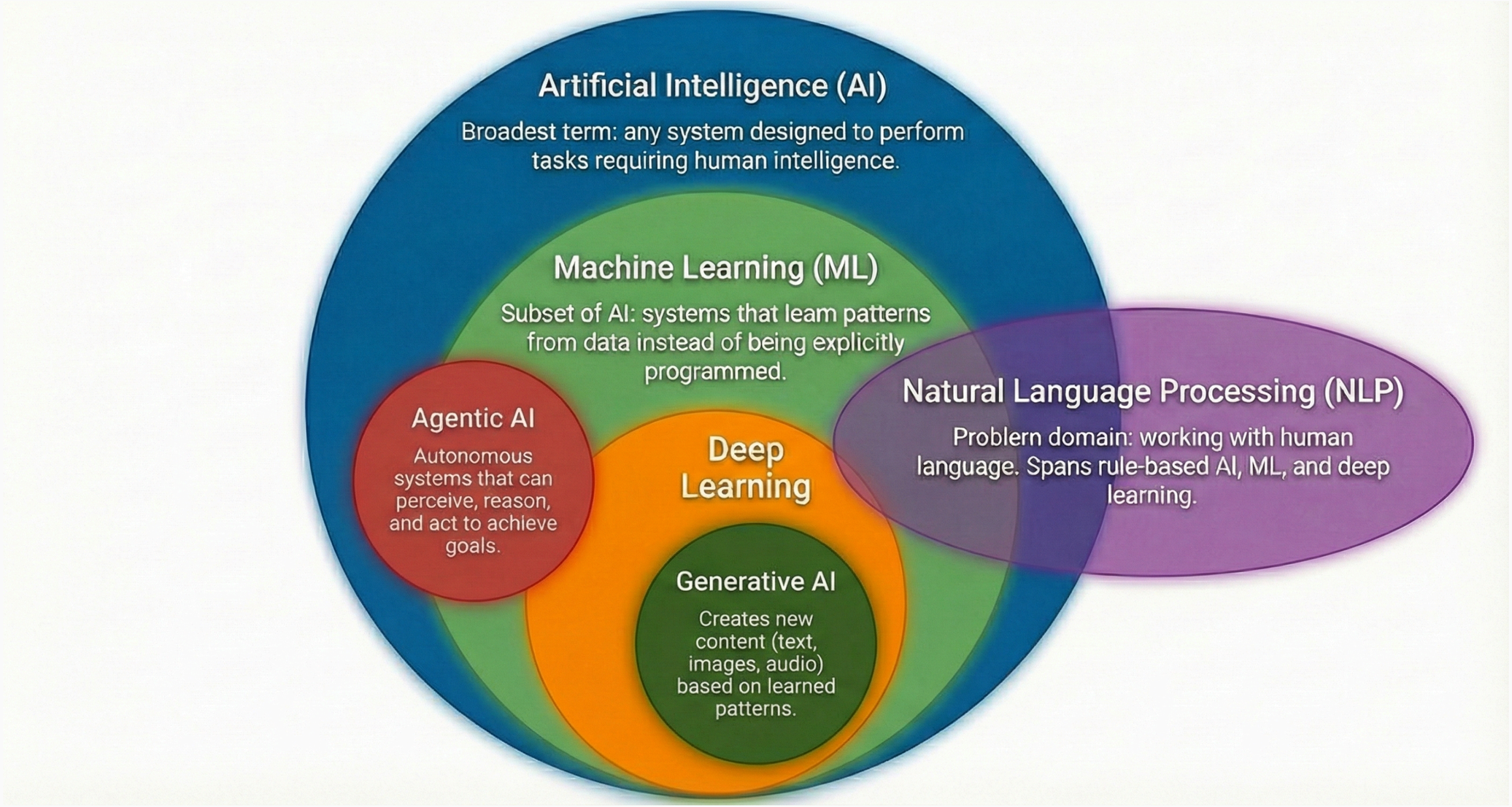
To Do What, Exactly?

That is What We Are Here to Figure Out

Prompt: Create an image related to AI. The image presents the learning objectives for a course. The learning objectives are: Learning AI Foundational Concepts, Problem Triage - Can AI be useful?, and Technologies and Terminology.

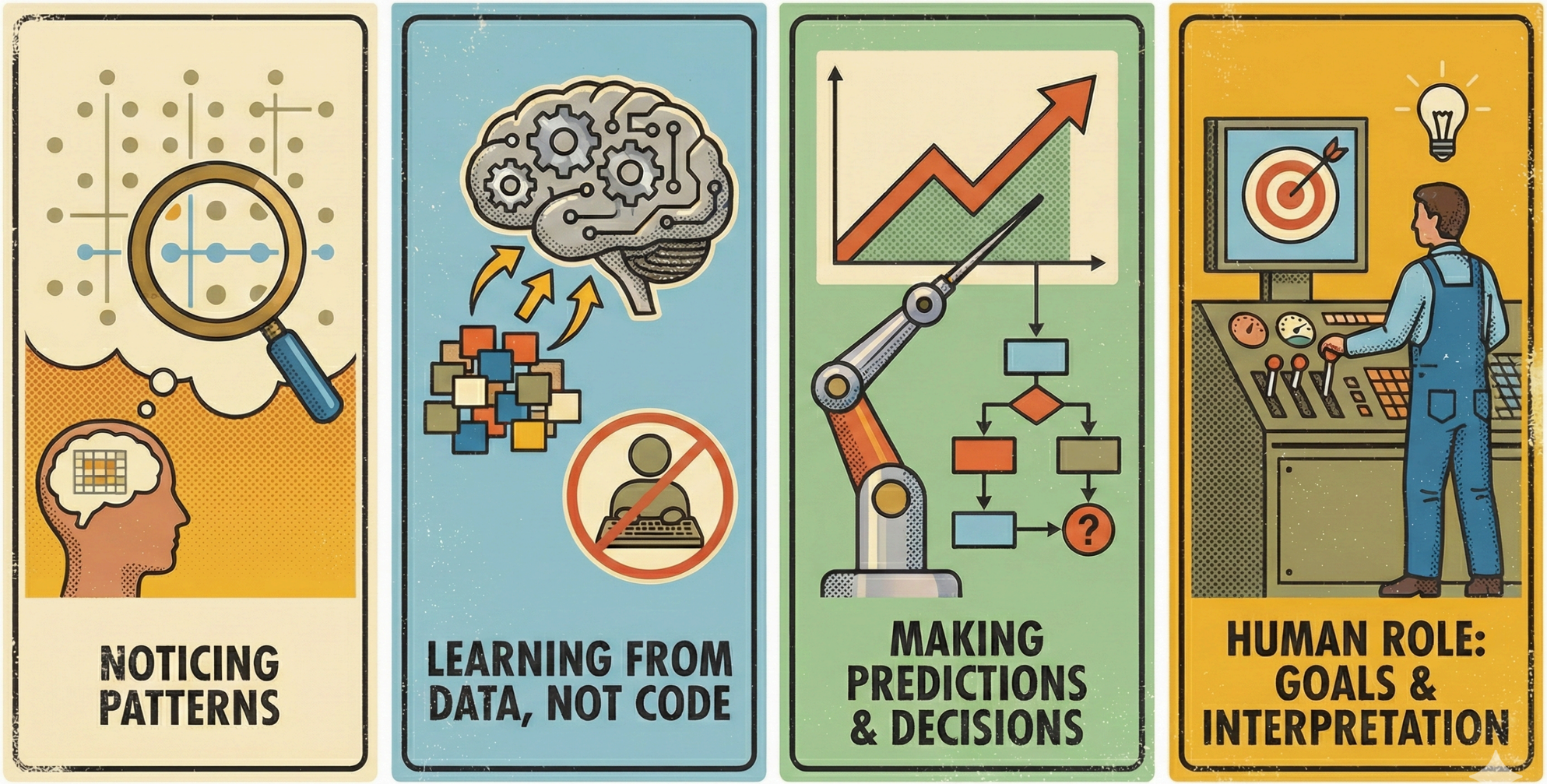
AI Subfields

AI is a field that includes multiple techniques (ML, deep learning, etc.).



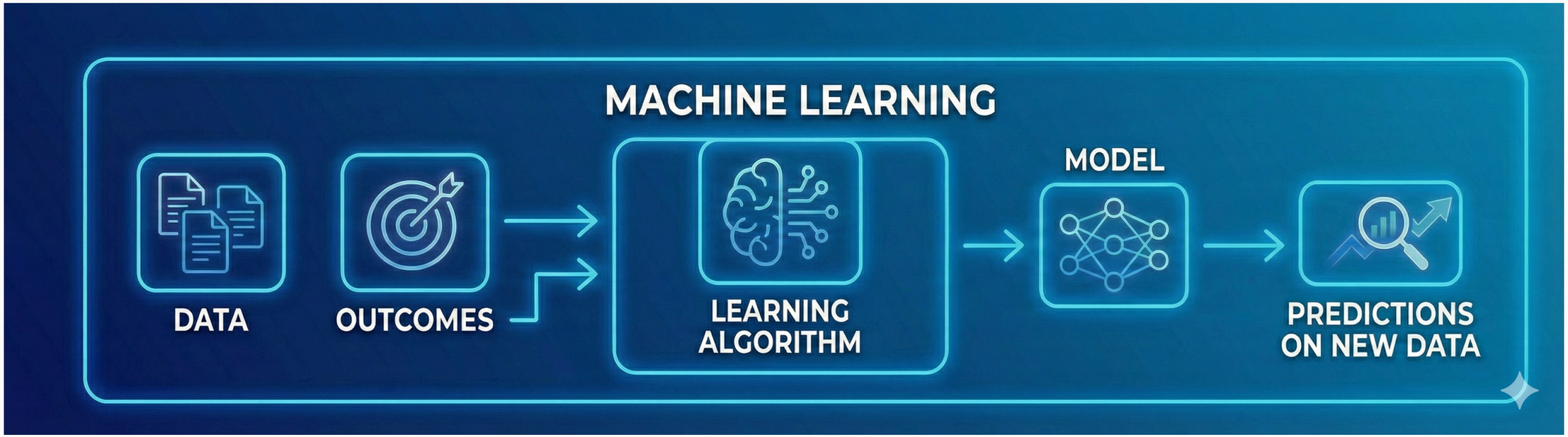
Note: NLP is a **problem domain** that leverages AI. Generative AI and Agentic AI are 'technologies'. They are systems built using the

The key idea: AI is not one thing; it is a collection of methods that let computers:



Prompt: Create an image containing images that represent these statements. AI is not one thing; it is a collection of methods that let computers: Notice patterns in data (like humans noticing trends). Learn from those patterns (without a programmer giving step-by-step instructions). Use that learning to make predictions or decisions. Humans still define the goal, set limits, and interpret the results.

The Learning Process



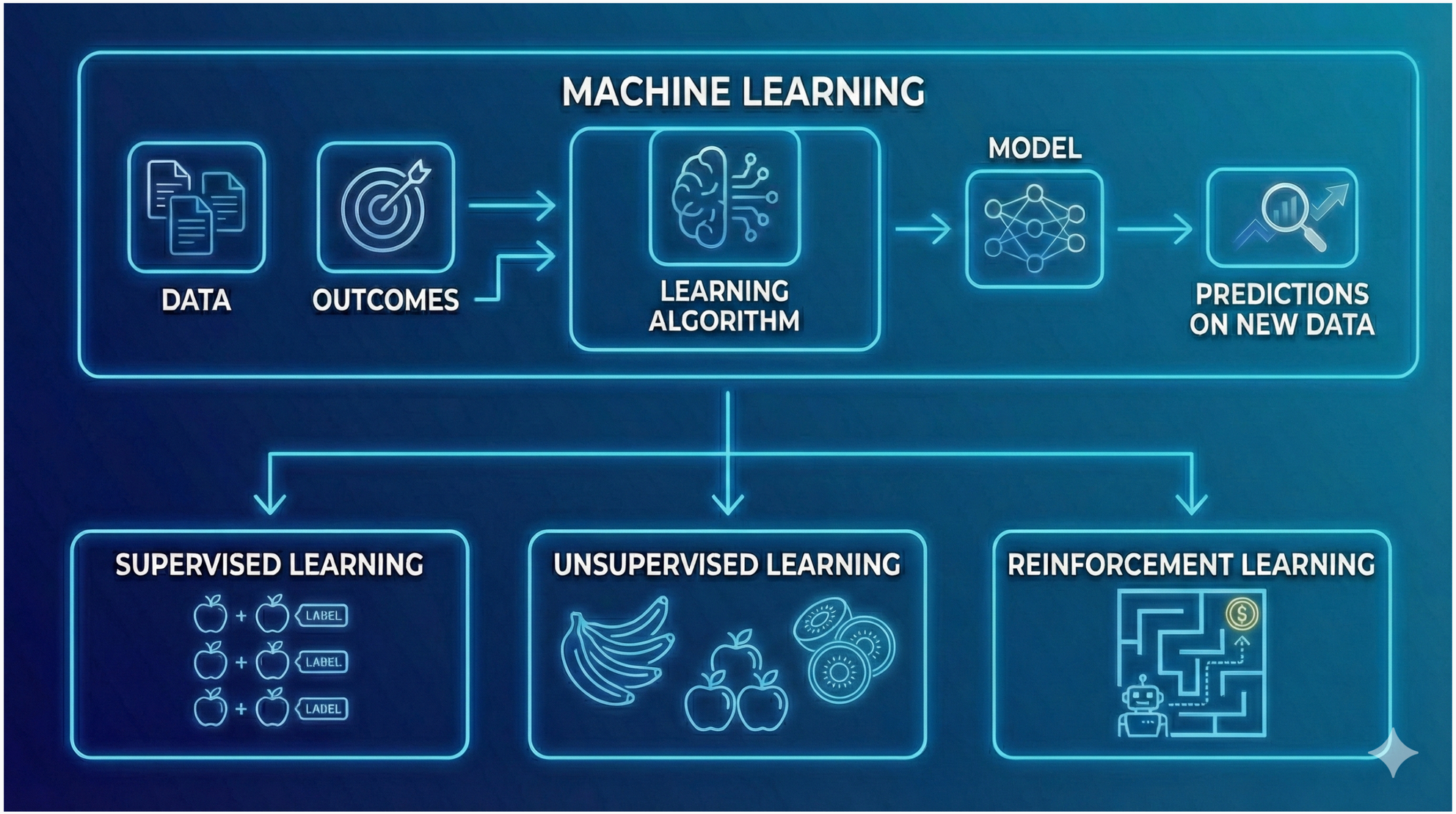
How learning works (intuition, not math):

- The algorithm makes a guess, checks how wrong it is, and adjusts.
- It repeats this process—thousands or millions of times—until it minimizes errors.
- Think of it like learning to throw darts: we throw, see where it lands, adjust our aim, throw again.

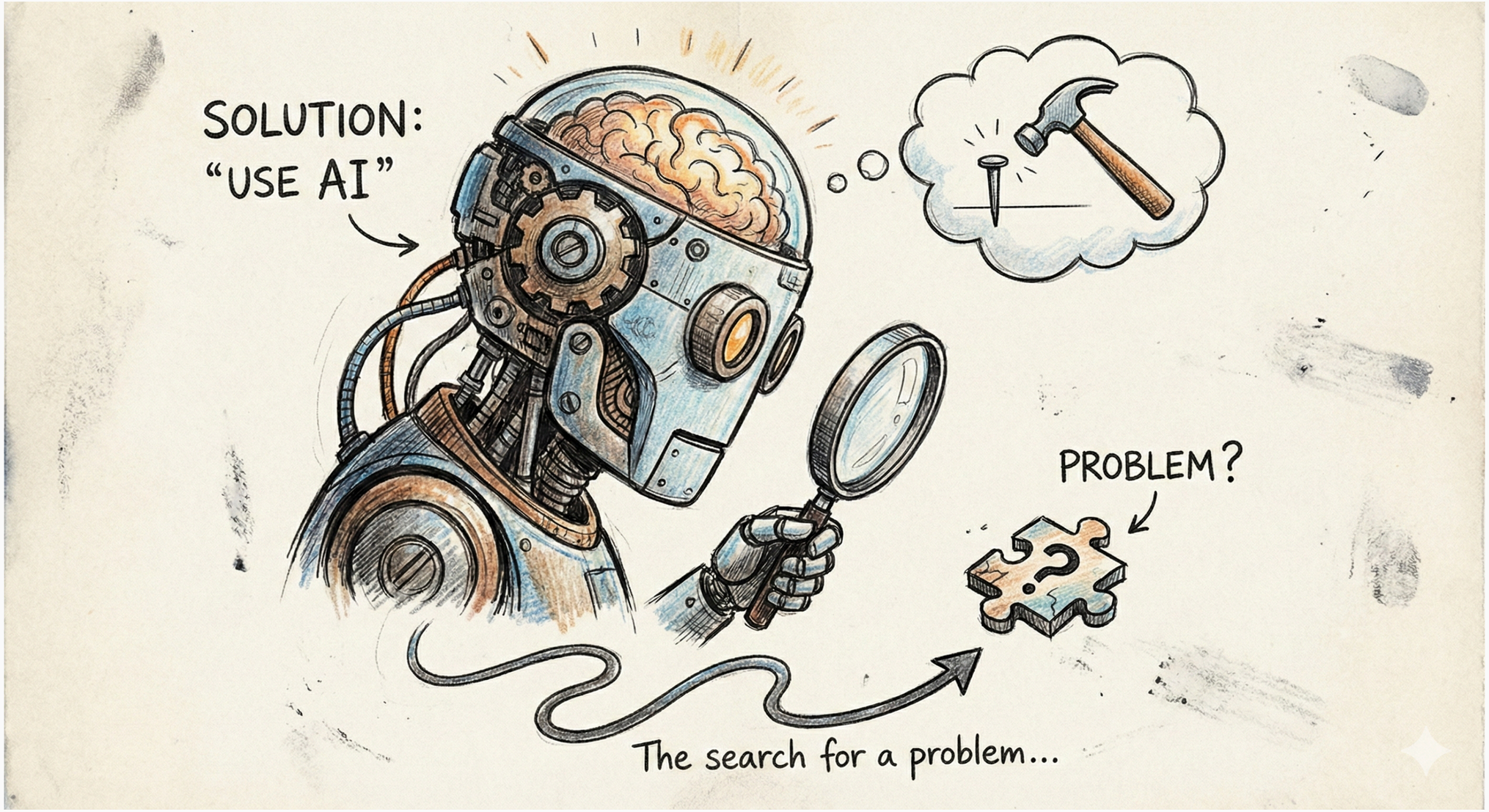
The train/test split:

- We can’t test learning on the same examples we learned from (that’s just memorization).
- So we split the data: learn from some (training data), test on the rest (test data).
- Performance on test data tells us if the model actually learned generalizable patterns.

ML Learning Paradigms



Applying AI: From Directive to Problem Statement



"Use AI" is not a problem statement—it’s a solution looking for a problem. That is a clarifying statement, not a criticism.

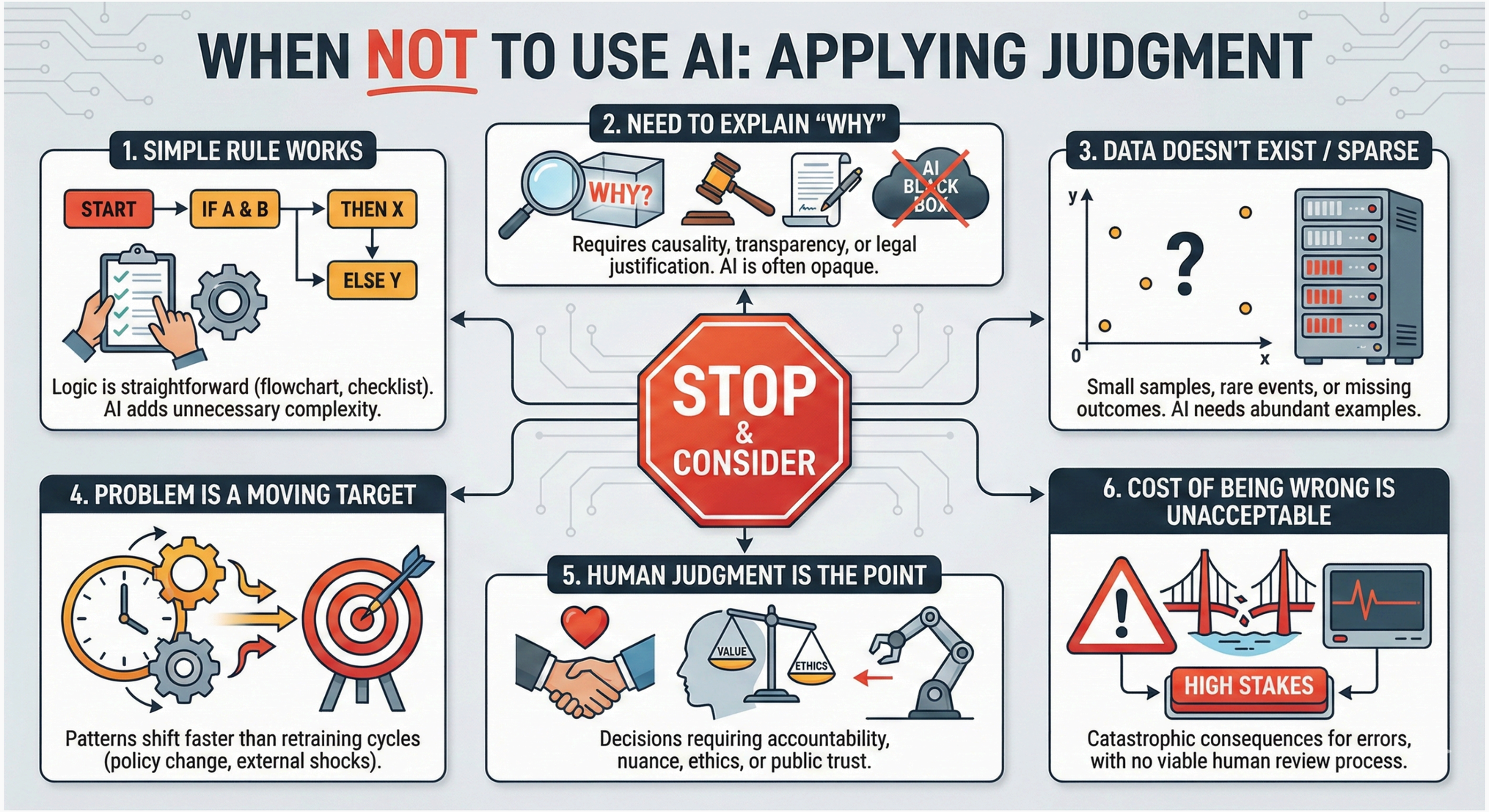
Before we can evaluate whether AI is appropriate, we need to articulate what we’re actually trying to accomplish. This topic builds that skill.

Applying AI: What Makes a Problem AI-Suitable?

- Is there a clear outcome?
- Does data exist?
- Is there a pattern to learn?
- Is the problem repeatable?
- Does the value justify the effort?
- Can action be taken on the output?

Applying AI: When AI is Overkill or Wrong

Knowing when **not** to use AI is as valuable as knowing when to use it.



Applying AI: Writing a Problem Brief