

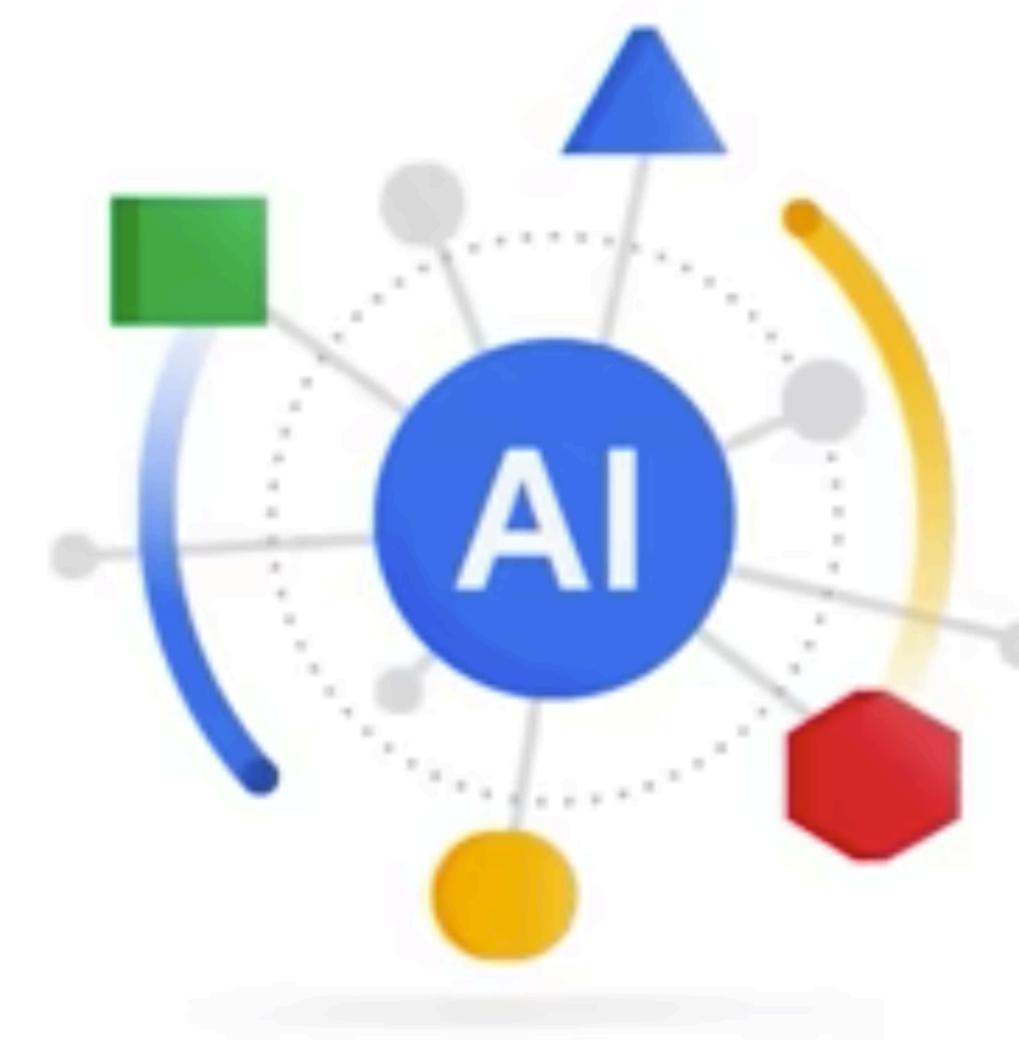
# **Generative AI & LLMs**

## **Empowering Educators with AI-Enhanced Content Creation**

**07-Sept-2023**

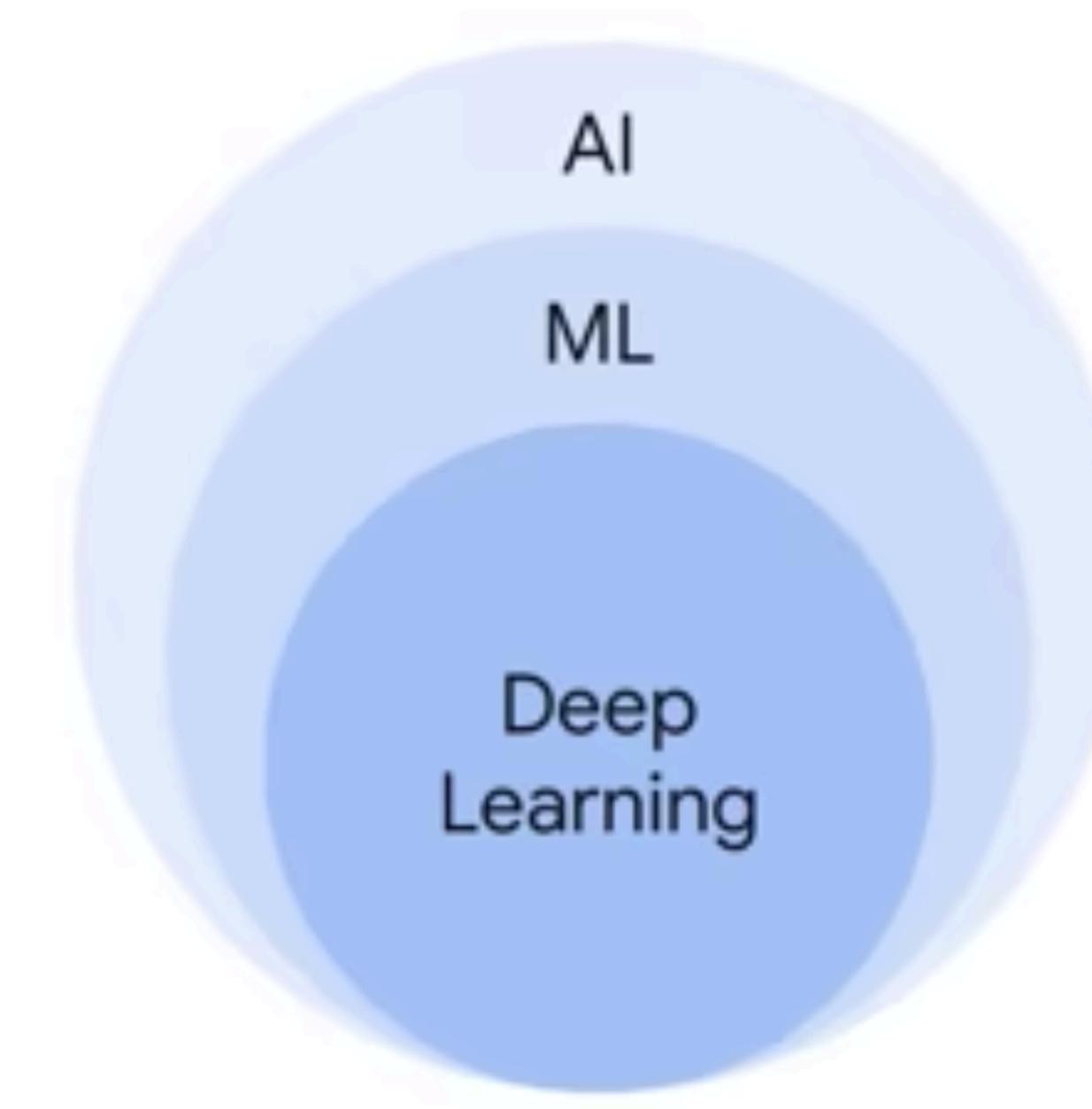
# Agenda

- Hello World Generative AI
- Introduction to LLMs
- Text-to-Text
- Text-to-Image
- Google Vertex AI
- Prompt tuning
- QA



Artificial Intelligence

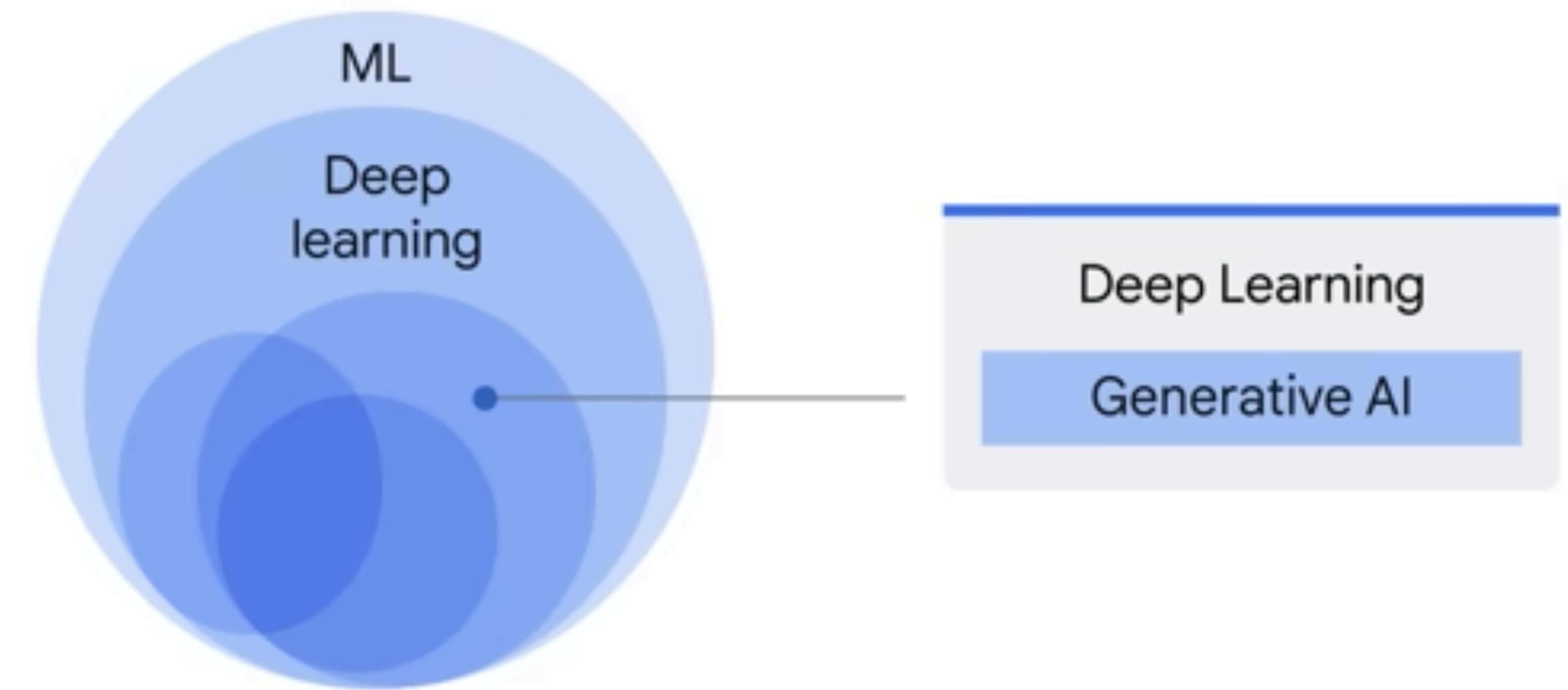
is a discipline



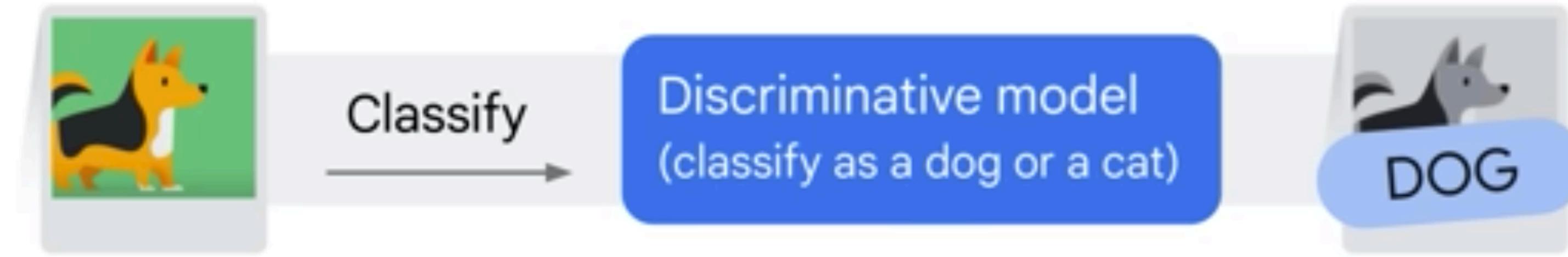
Machine Learning

is a subfield

**Generative AI**  
is a **subset of**  
**Deep Learning**



Discriminative  
technique



Generative  
technique

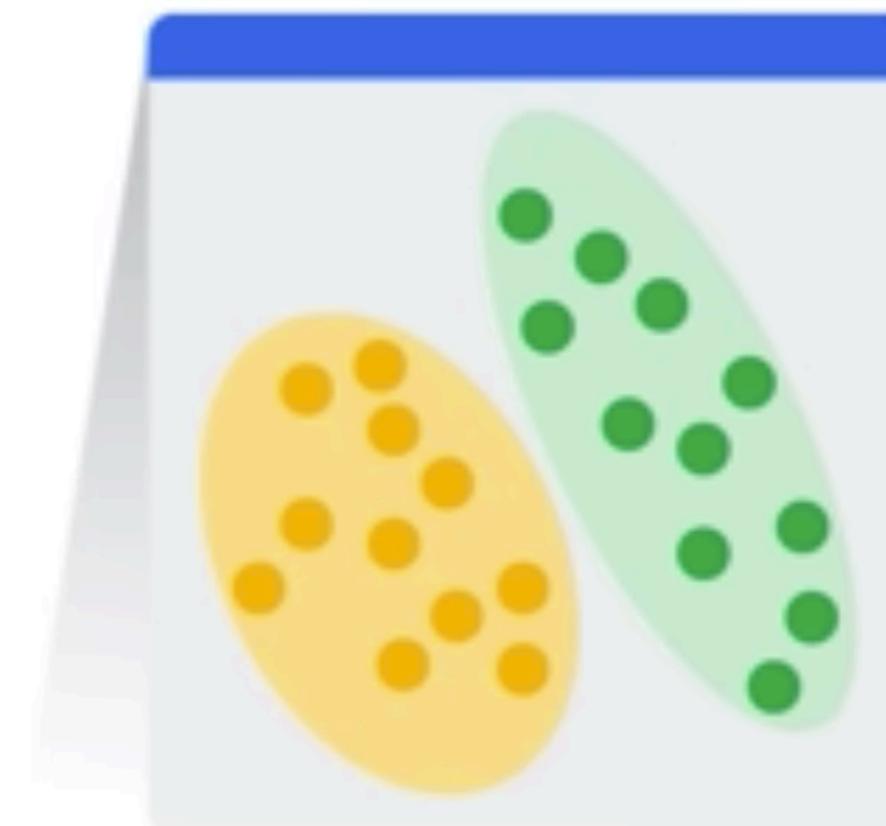


# Deep Learning Model Types



## Discriminative

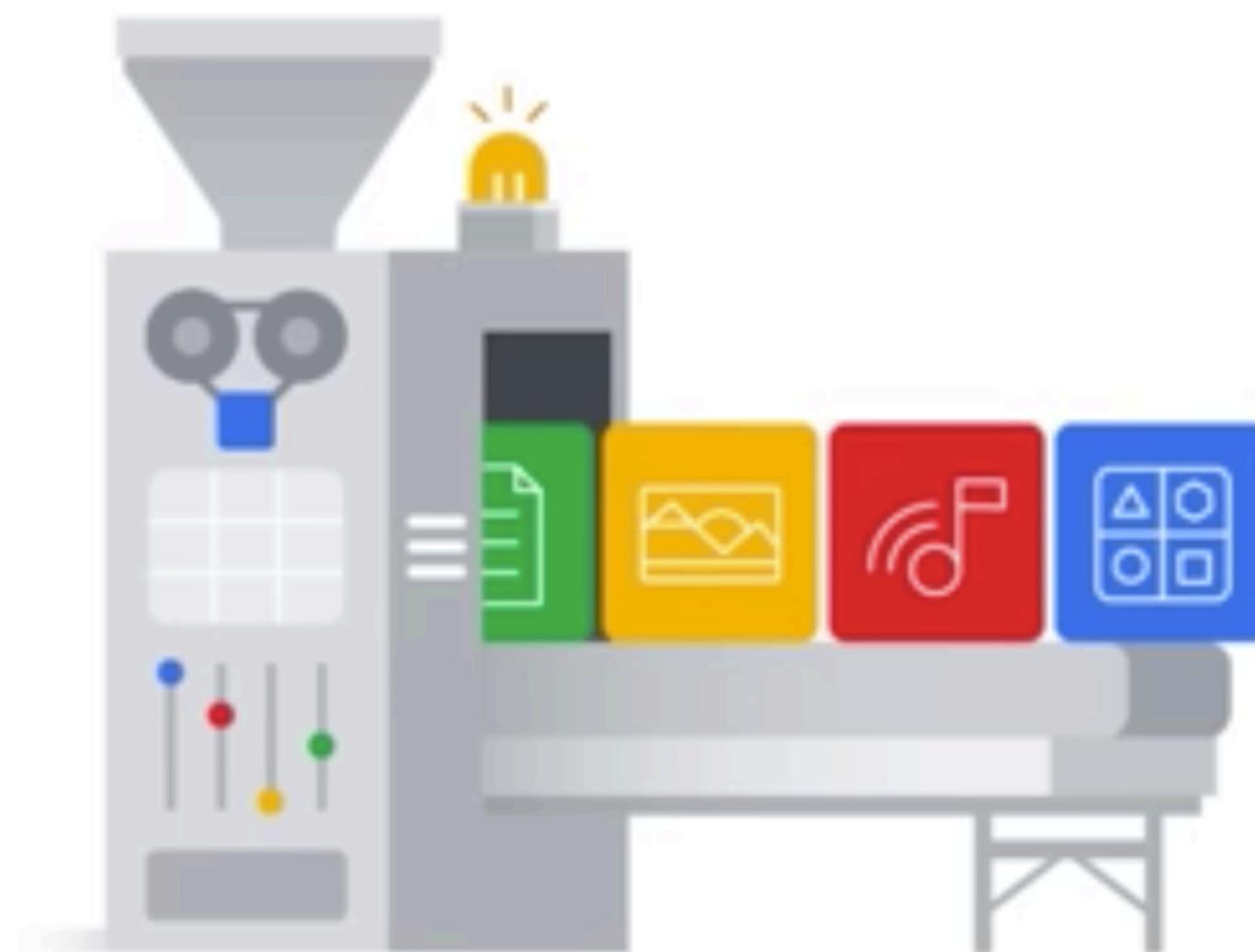
- Used to classify or predict
- Typically trained on a dataset of labeled data
- Learns the relationship between the features of the data points and the labels



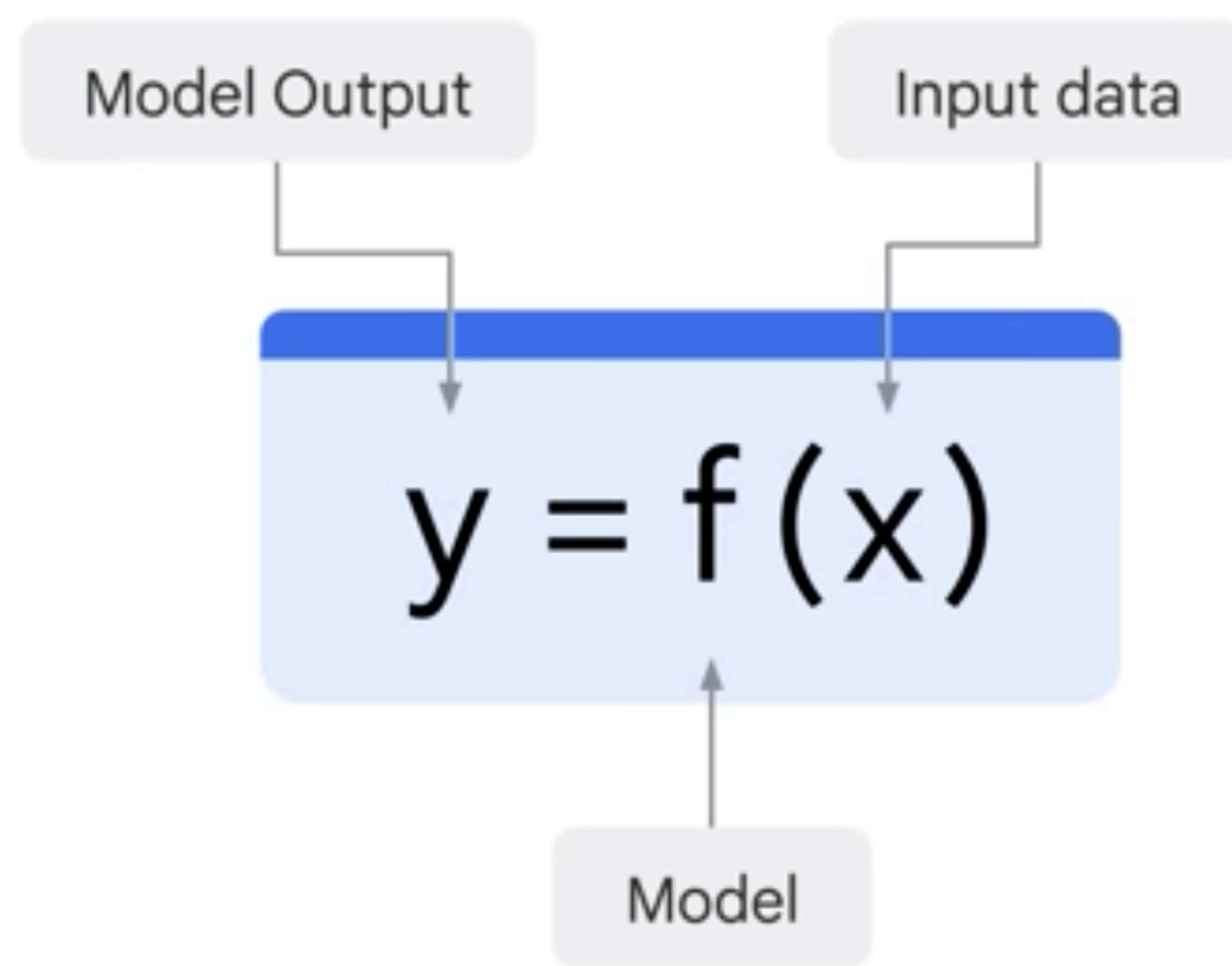
## Generative

- Generates new data that is similar to data it was trained on
- Understands distribution of data and how likely a given example is
- Predict next word in a sequence

## What is Generative AI?



- GenAI is a type of Artificial Intelligence that creates new content based on what it has learned from existing content.
- The process of learning from existing content is called training and results in the creation of a statistical model.
- When given a prompt, GenAI uses this statistical model to predict what an expected response might be—and this generates new content.

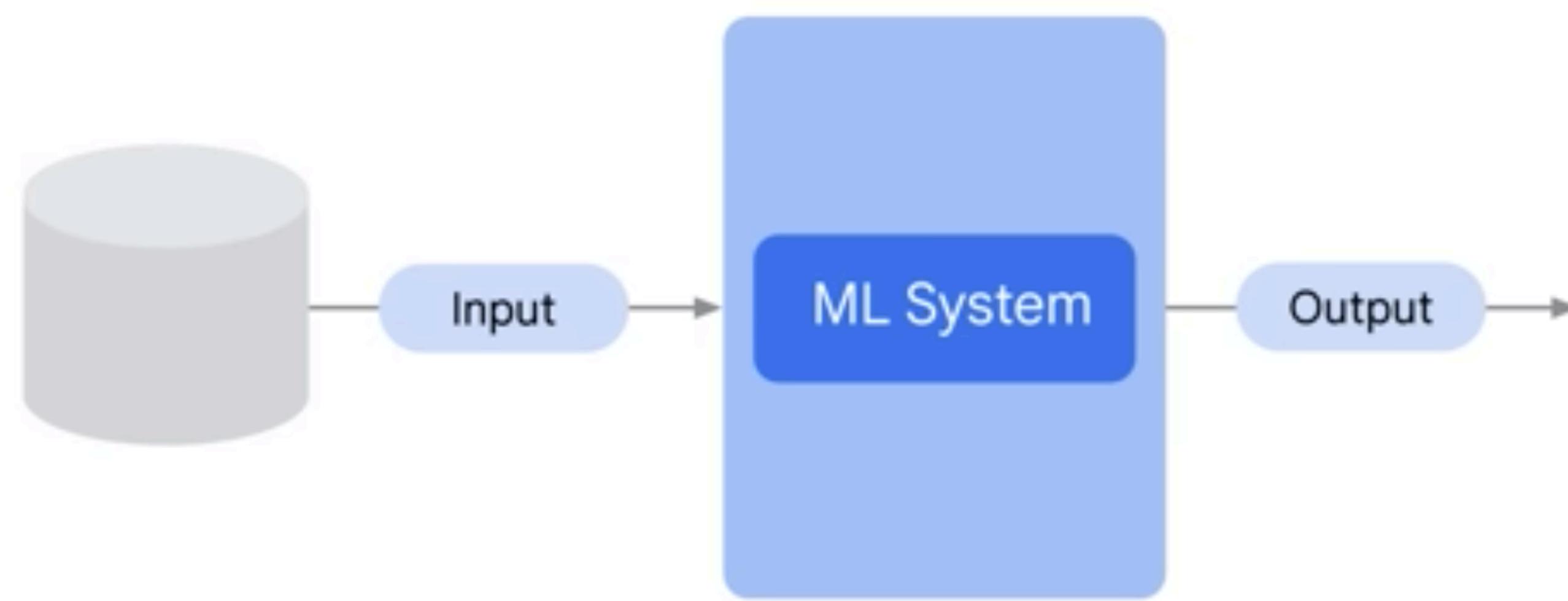


Not GenAI when  $y$  is a:

- Number
- Discrete
- Class
- Probability

Is GenAI when  $y$  is:

- Natural language
- Image
- Audio



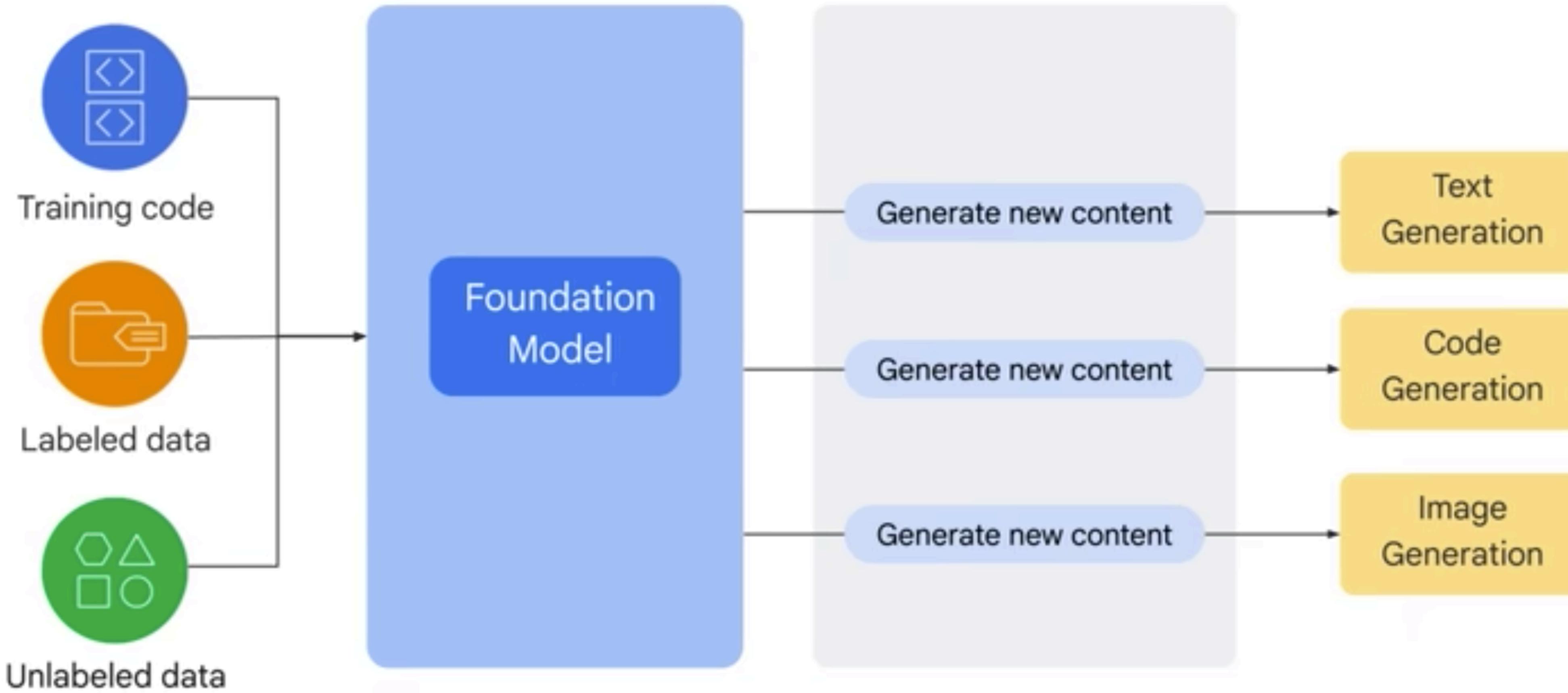
Not GenAI when  $y$  is a:

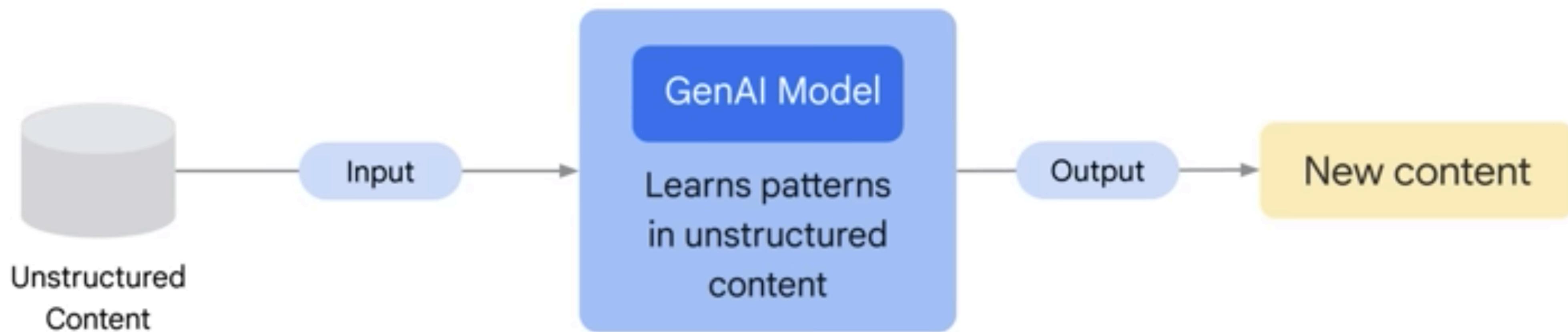
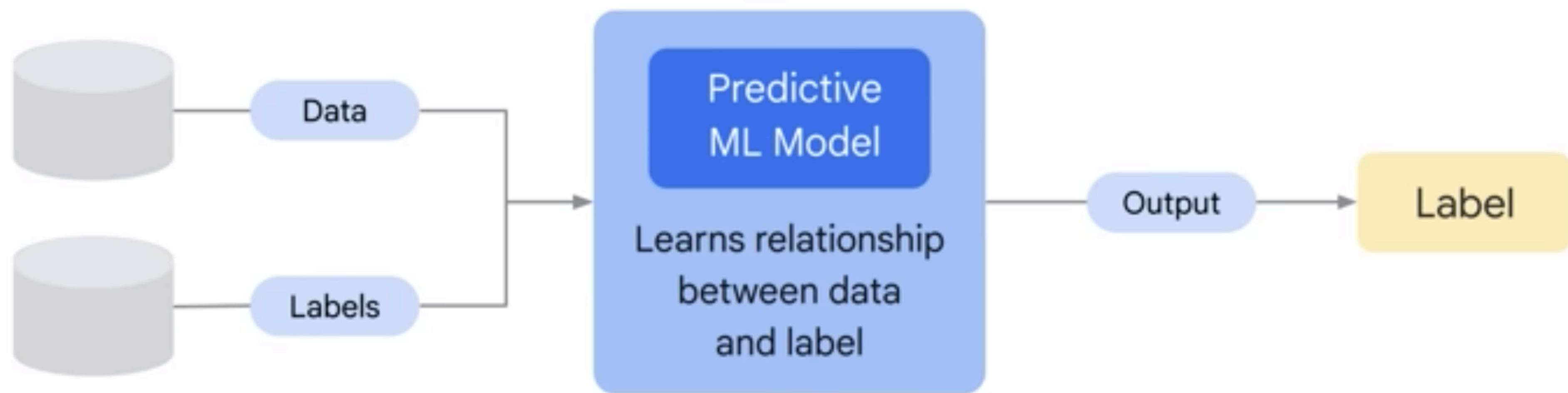
- Number
- Discrete
- Class
- Probability

Is GenAI when  $y$  is:

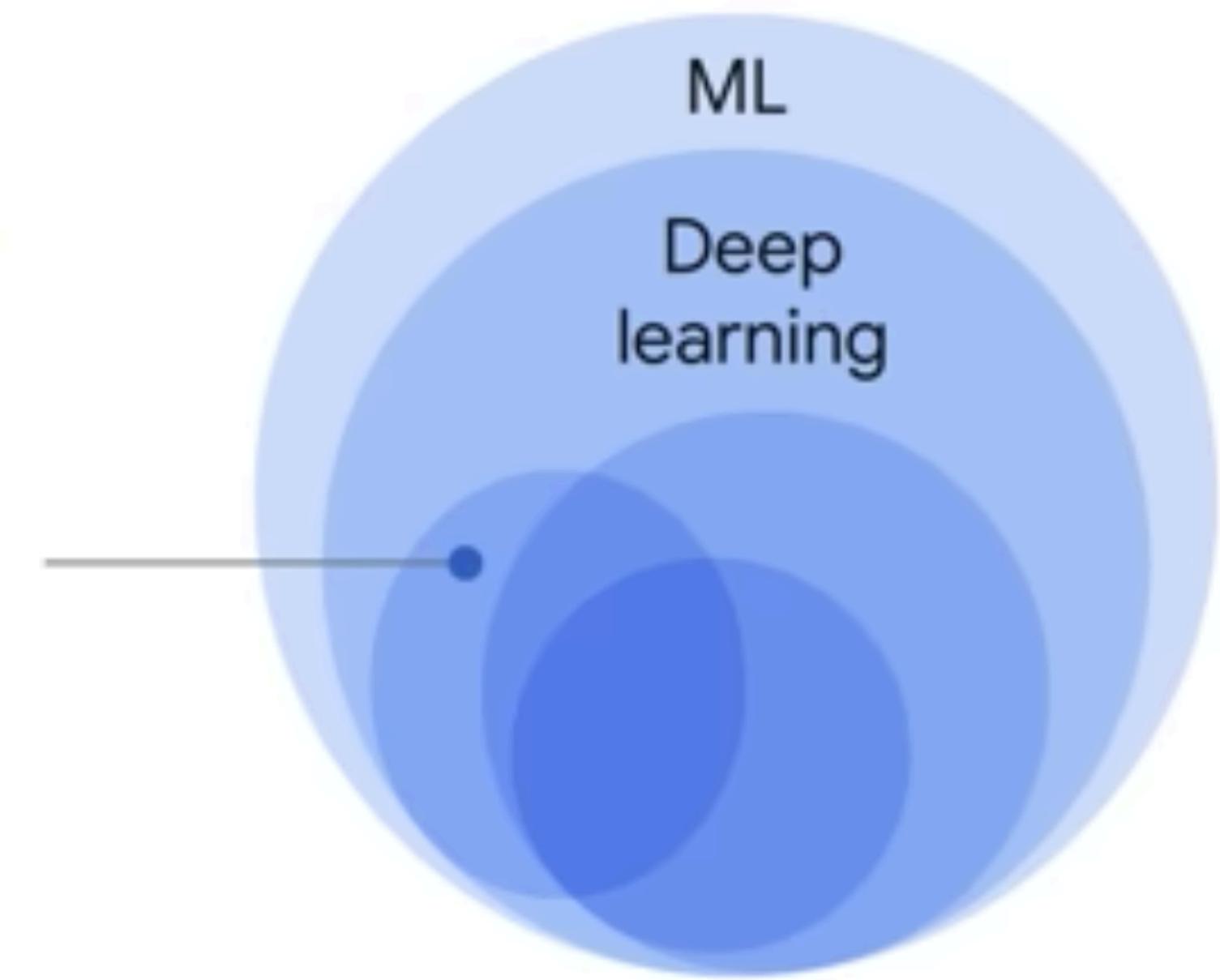
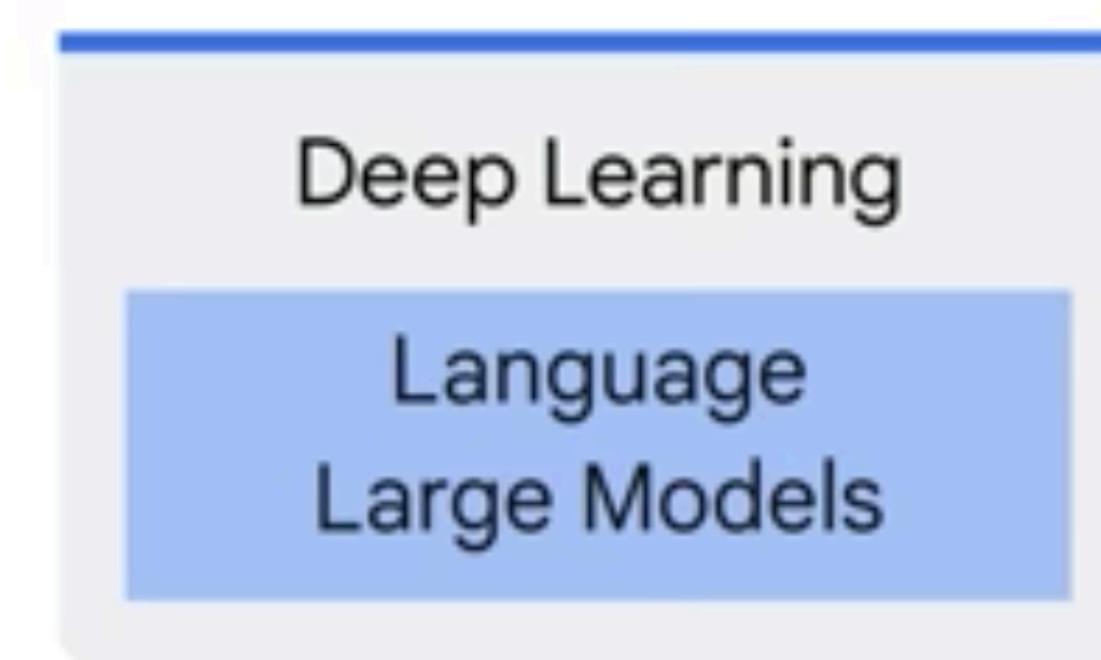
- Natural language
- Image
- Audio

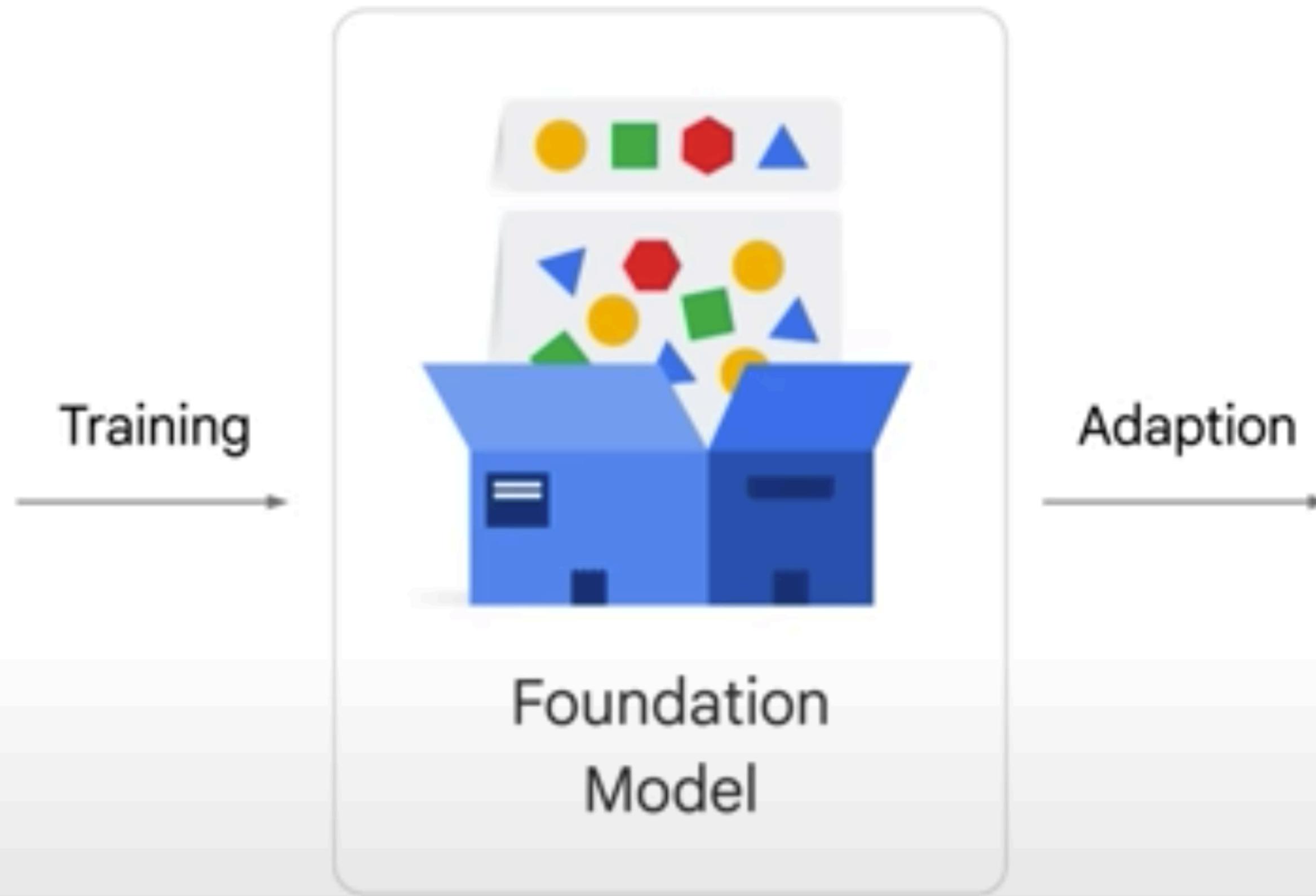
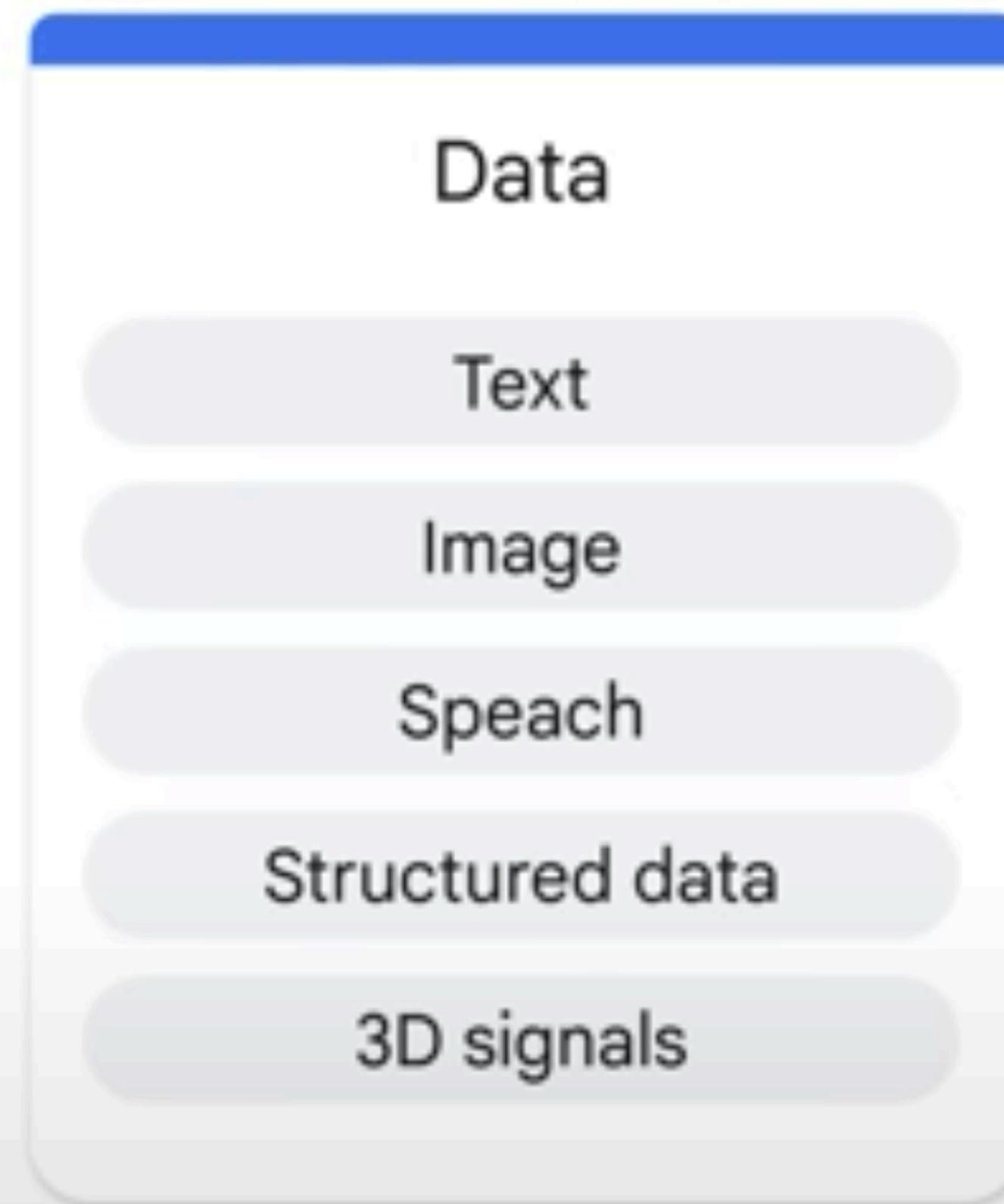
# Gen AI Supervised, Semi-Supervised & Unsupervised Learning





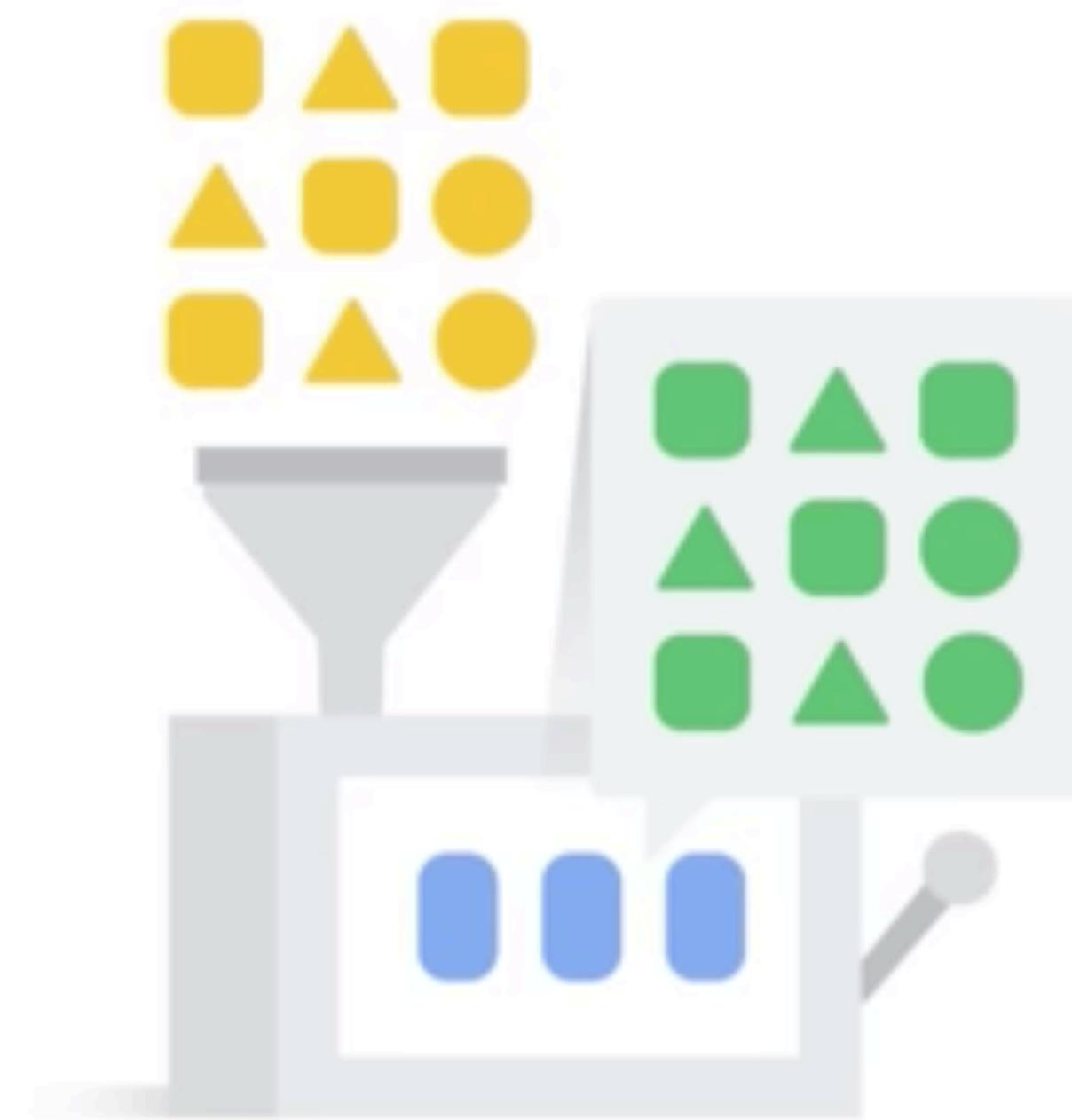
**Large Language  
Models (LLMs)**  
are also a **subset**  
of Deep Learning





# Large language models

- ✓ Large
- Large training dataset
- Large number of parameters
- ✓ General purpose
- Commonality of human languages
- Resource restriction
- ✓ Pre-trained and fine-tuned



# LLM Development vs. Traditional Development

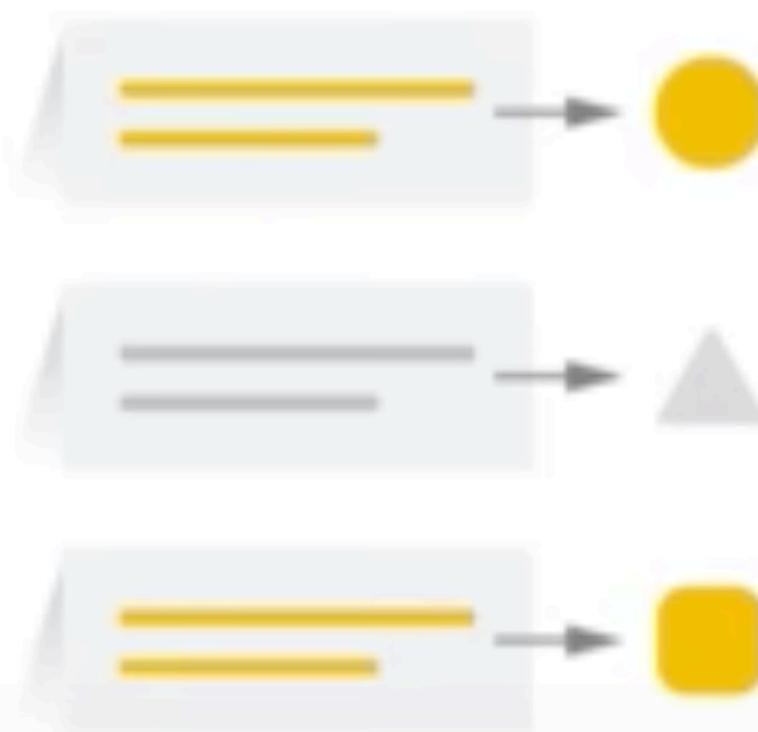
## LLM Development (using pre-trained APIs)

- NO ML expertise needed
- NO training examples
- NO need to train a model
- Thinks about prompt design

## Traditional ML Development

- YES ML expertise needed
- YES training examples
- YES need to train a model
- YES compute time +  
+ hardware
- Thinks about minimizing  
a loss function

Large language models are trained to solve common language problems, like...



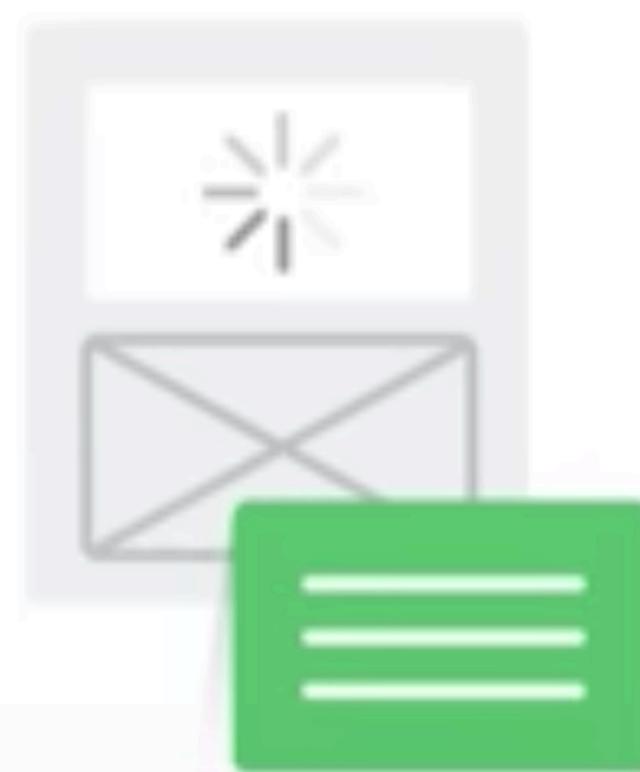
Text  
classification



Question  
answering



Document  
summarization



Text  
generation

# Model Types

## text-to-text

Text-to-text models take a natural language input and produce text output. These models are trained to learn the mapping between a pair of texts (e.g. translation from one language to another).

## Applications

Generation

Classification

Summarization

Translation

(Re)Search

Extraction

Clustering

Content editing / rewriting

# Model Types

## text-to-image

Text-to-image models are relatively new and are trained on a large set of images, each captioned with a short text description. Diffusion is one method used to achieve this.

## Applications

Image generation

Image editing

**Prompt Design:  
the quality of the  
input determines the  
quality of the output.**

