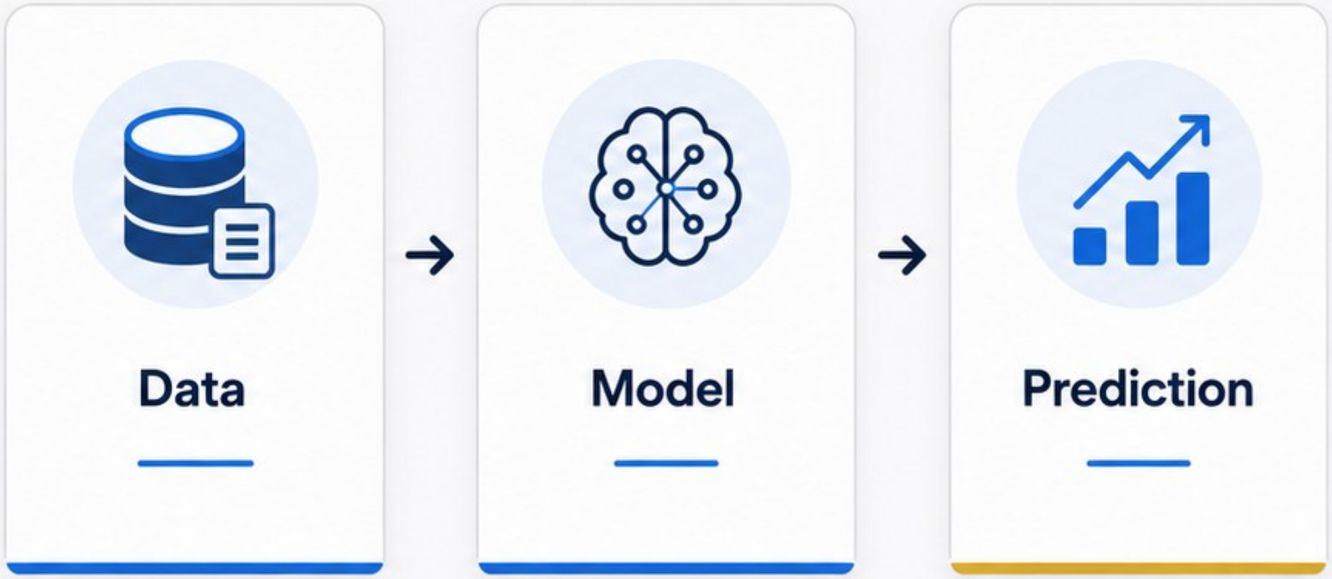
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From Data to Decisions

What Is Machine Learning?

How data becomes predictions.



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Which customer is most likely to leave?

A quick challenge before the definition.

Customer A

Tenure	1 month
Contract	Month-to-month
Monthly Charges	$89
Support Calls (30d)	6

Customer B

Tenure	12 months
Contract	1 Year
Monthly Charges	$69
Support Calls (30d)	1

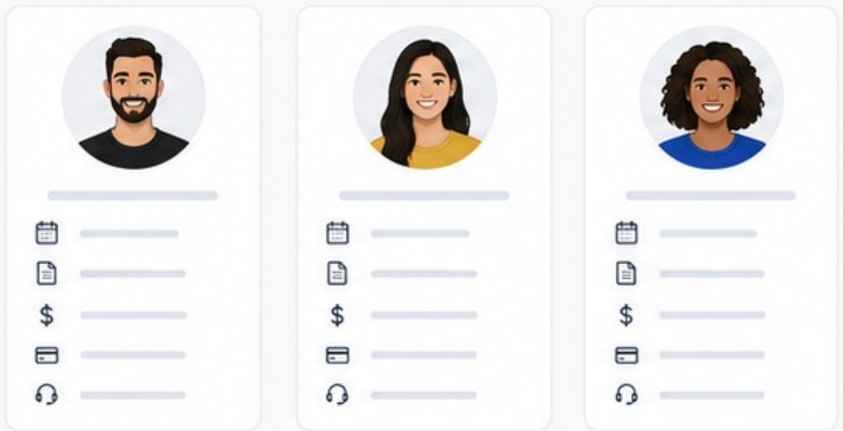
Customer C

Tenure	24 months
Contract	2 Years
Monthly Charges	$79
Support Calls (30d)	2

? Who would you choose?

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Now imagine 100,000 customers





Tenure • Contract • $ Charges • Payment • Support

How do we find patterns at this scale?

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Could we just write rules?

Simple rule chain

If Tenure < 6 months

↓

AND # of Logins < 10

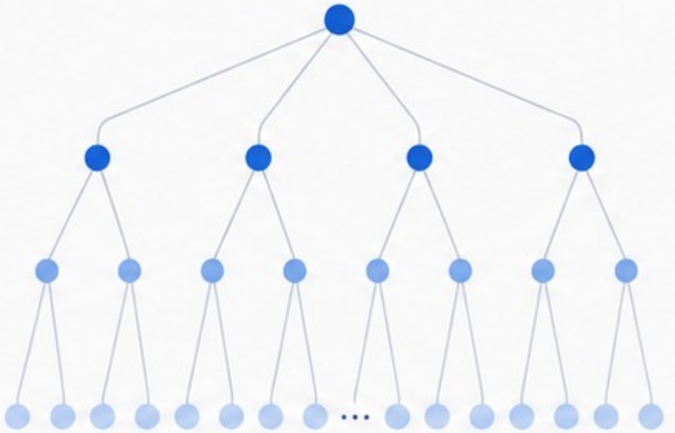
↓

AND Past Due = Yes

↓

Predict Churn

Rules explode



Why it doesn't scale

- Too many combinations
- Patterns interact
- Hard to maintain

Some problems are too complex for hand-written rules alone.

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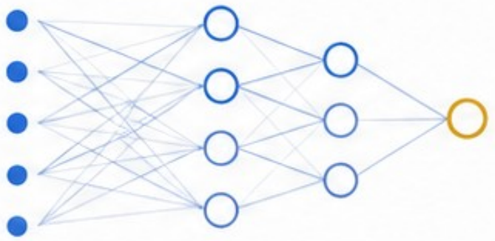
This is where Machine Learning comes in

Historical Customer Data

Customer ID	Tenure	Support Tickets	Churned
1001	12	1	No
1002	3	4	Yes
1003	24	0	No
1004	6	3	Yes
...	...	...	...

→

Machine Learning Model



→

New Customer Prediction

Customer ID: 1050

Tenure: 2 months

Support Tickets: 5

Plan: Basic

Churn Risk

High

Machine Learning **learns patterns** from historical data to make predictions.

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Traditional Programming vs Machine Learning

Example: Customer Churn Prediction

Traditional Programming



Data
Customer Features

Rules
Business Logic

Output
Churn Prediction

Machine Learning



Historical Data
Customer Features

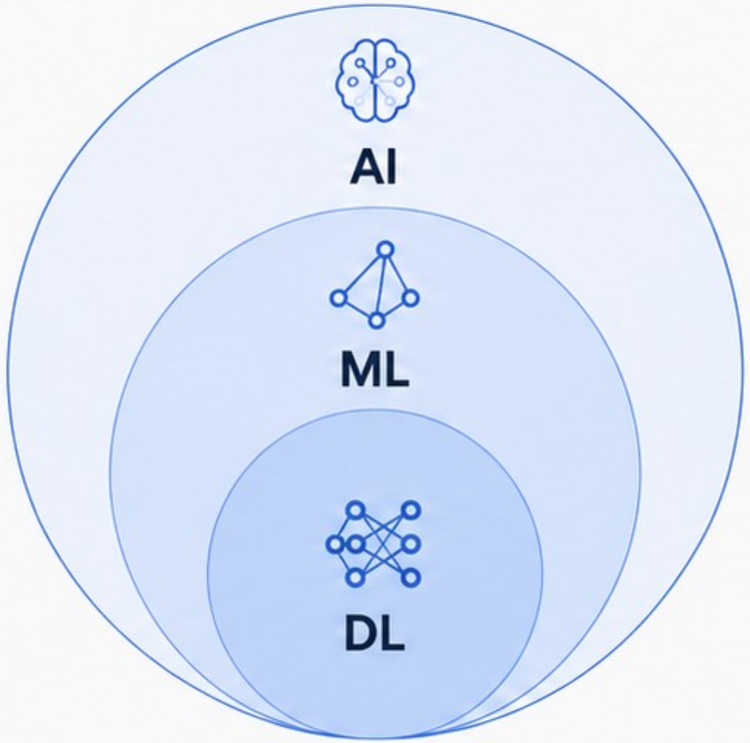
Known Outcomes
Churn (Yes / No)

Model
Learns Patterns

Prediction
Churn Prediction

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Where does Machine Learning fit?



AI: intelligent systems

ML: learns from data

DL: neural-network-based ML

This course focuses on Machine Learning foundations.

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How does a model learn?

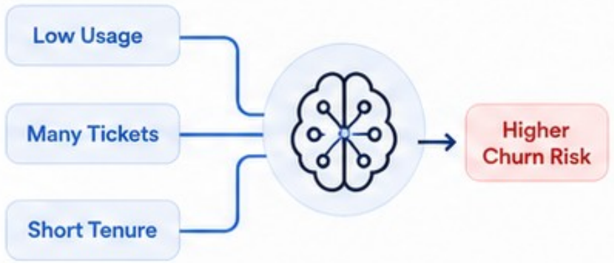
1 Past Customer Examples

The model sees historical customers and their outcomes.

Tenure	Usage	Support Tickets	Churned?
12 mo	High	0	✓
3 mo	Low	3	✗
18 mo	Medium	1	✓
6 mo	Low	4	✗
24 mo	High	0	✓

2 Model Learns Patterns

It analyzes the data to find patterns linked to churn.



3 New Customer

A new customer with unknown outcome.



Tenure	2 mo
Usage	Low
Support Tickets	3

4 Prediction

The model predicts the likelihood of churn.



High Churn Risk

Probability: 76%

The model looks for relationships between features and outcomes.

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Your first ML project starts here

Customer Churn Predictor

Beginner Project

Business Question

Which customers are likely to churn in the next 30 days?

Likely Inputs

Demographics, usage, plan, billing, support, engagement

Expected Output

Churn probability score (0 to 1) for each customer

Why It Matters

Identify at-risk customers and reduce churn.

1. **Understand**
   Define the problem and success metric.
2. **Explore**
   Analyze data and uncover patterns and insights.
3. **Train**
   Build and train a model to predict churn.
4. **Evaluate**
   Measure performance and validate results.

Next: understanding the churn problem.