



Introduction to Artificial Intelligence Course

How Do Machines Learn?

Session 2 | How Do Machines Learn?

Previous Session Review & Today's Goals

Goals for Session 2

Learning Logic: Understanding how systems learn from data

Learning Types: Overview of 3 primary learning styles

Hands-on Practice: Building a smart model without code

Recap of Session 1

AI Definition: Simulating human intelligence in machines

Everyday Apps: Balad navigation & Filimo suggestions

Key Difference: Traditional programming vs. learning

How Do Machines Learn?

Just like a child learning to ride a bike!

- 1. Observation & Experience:** Seeing hundreds of real examples
- 2. Trial & Error:** Initial guessing and analyzing mistakes
- 3. Gradual Improvement:** Enhancing accuracy with each new attempt



Three Core Pillars of Machine Learning



3. Prediction

Smart decision-making for the future



2. Model

The thinking brain discovering patterns



1. Data

Raw materials and past experience

Three Main Types of Machine Learning



Reinforcement Learning

Reinforcement Learning

Learning through rewards and penalties



Unsupervised Learning

Unsupervised Learning

Autonomous discovery of hidden patterns



Supervised Learning

Supervised Learning

Learning with guidance and labels

Supervised Learning Explained Simply



Learning with Guided Flashcards!

Labeled Data: Showing thousands of images with exact animal names

House Price Estimation: Predicting home prices based on real estate listings

SMS Filtering: Automatically separating spam texts from banking alerts

Unsupervised Learning Explained Simply

Sorting a fruit basket without knowing their names (by color and shape)

Anomaly Detection

Detecting suspicious banking transactions in real time



Discovering Hidden Patterns

Uncovering invisible similarities across millions of data points



Customer Segmentation

Clustering online shoppers based on purchasing habits

Reinforcement Learning Explained Simply

Mastering Skills Through Rewards and Penalties!

Correct Move (+10 pts): Rewarding the agent to repeat successful paths

Hitting an Obstacle (-10 pts): Penalizing mistakes to avoid future errors

Real-World Application: Autonomous vehicles and AI chess champions



Comparison of the Three Machine Learning Types

Learning Type	Training Approach	Concrete Example	Key Advantage
Supervised	Data paired with correct answers	Email spam detection	Very high accuracy
Unsupervised	Discovering patterns without guidance	Ride-hailing customer segmentation	No labeling required
Reinforcement	Trial and error in an environment	Navigation robots and gaming AI	Solving dynamic problems

Good Data = Good Learning

"Garbage In, Garbage Out!"

Full Diversity

Covering all real-world conditions and angles

High Quality

Clear images and error-free information

Sufficient Quantity

Thousands of examples for reliable learning

What is a Model and How Does It Learn?

A model is like a chef who discovers the secret recipe by tasting the dish:

04

Adjustment & Learning

Reducing errors for next iterations

03

Error Calculation

Comparing guess with reality

02

Initial Guess

Trial prediction of outcomes

01

Data Input

Observing training examples

Practical Example: Email Spam Detection



Step 1 (Data Ingestion): Analyzing thousands of historical emails labeled as 'Ham' and 'Spam'

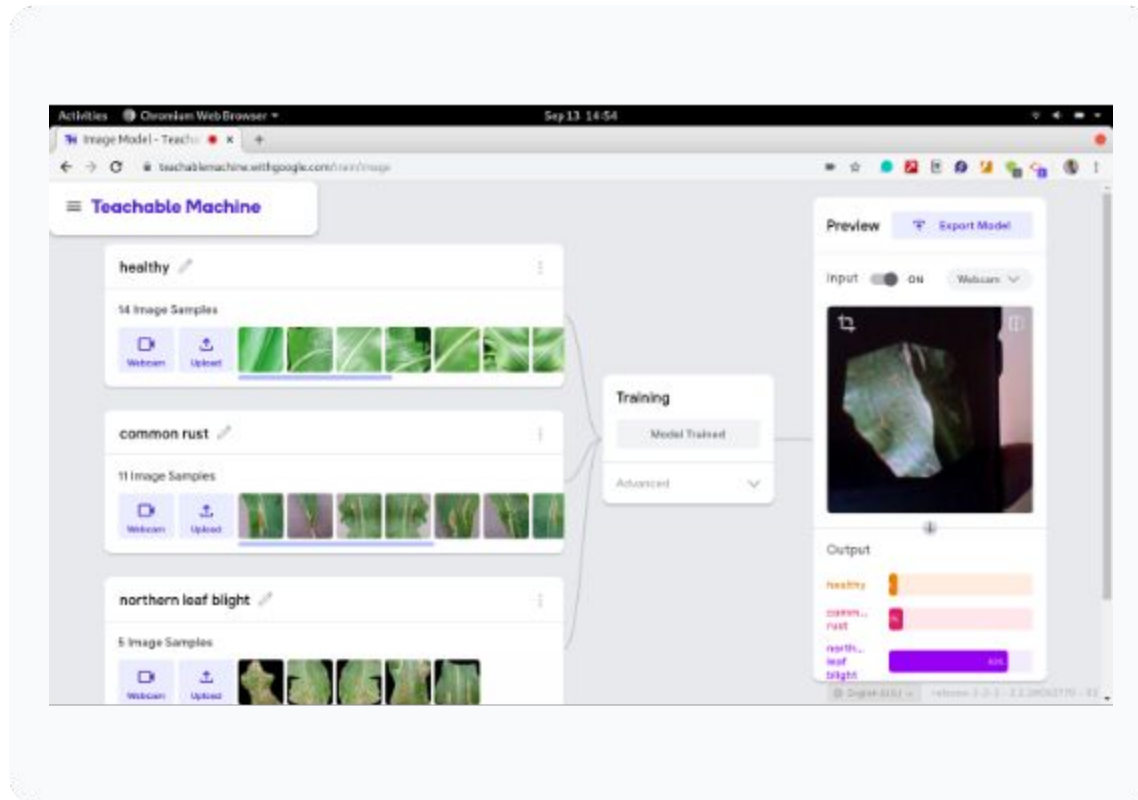


Step 2 (Pattern Extraction): Identifying frequent keywords such as 'You Won' or 'Click Here'



Step 3 (Intelligent Prediction): Automatically filtering new suspicious emails into the Spam folder

Live Demo: Google's Teachable Machine



Build an AI Model in 5 Minutes (No Coding Required!)

1. **Capture Images:** Take webcam photos for two different classes
2. **Train Model:** Click the "Train Model" button in the browser
3. **Live Test:** Observe real-time predictions on the screen

Common Mistakes in Machine Learning



Data Bias

Unfair judgments caused by one-sided, unrepresentative data



Underfitting (Insufficient Data)

Attempting to draw conclusions from only a few sparse examples



Overfitting (Memorization)

Memorizing questions instead of deeply understanding concepts

Summary of Today's Key Takeaways

Experience Over Coding: Machines learn from examples and data

The Golden Triangle: Data, model, and prediction are three inseparable pillars

Three Learning Paradigms: Supervised, unsupervised, and reinforcement learning

Importance of Data Quality: Model intelligence directly depends on data cleanliness

Beginner FAQs

Do We Need Advanced Math?

To get started and use modern tools, understanding the core logic is sufficient.

How Much Data Is Needed for Training?

Depending on problem complexity, anywhere from hundreds of samples to millions of records.

Is the Machine Always Right?

No, machine output is probability-based and always carries a margin of error.

What Is the Difference Between AI and ML?

Machine learning is the primary subfield and driving engine of artificial intelligence.

Your Turn!

Practical Assignment for the Next Session



Part 2: Brainstorming

Write down a real-world problem in your job or daily life that can be solved with machine learning.



Part 1: Hands-On Experiment

Build a simple model on Teachable Machine to distinguish between two objects on your desk.

End of Session 2

Thank You for Your Curiosity & Attention!

Session 3: Introduction to Neural Networks & Deep Learning

Instructor: Amin Maghrebi | Contact: @aminmaghrebi

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