

# Artificial Intelligence (Ai)

Prediction

4 Main Domain

## Machine Learning

### Number(Data)

**Definition:** A subset of AI where algorithms learn patterns from data to make predictions.

**Data Size:** Small → Medium datasets.

**Focus:** General predictive models.  
**Feature Extraction:** Humans need to manually select important features

#### Examples:

1. Predicting employee resignations
2. Spam email classification
3. loan approval prediction

## Deep Learning

### Image, Speech, Number (Data), Big data, complex data

**Definition:** A subset of ML using neural networks with multiple hidden layers.

**Data Size:** Requires large datasets.

**Focus:** Works well with images, speech, text, and complex data.

#### Feature Extraction :

Automatically extracts features from raw data.

#### Examples:

1. image recognition (face detection in employees).
2. Speech-to-text assistants
3. Medical image diagnostics

## Natural Language Processing

Prediction Based on Data Type

### Text

**Definition:** A field of AI (often powered by ML/DL) that helps computers understand, interpret, and generate human language.

**Data Type:** Text & Speech.

**Focus:** Language understanding and generation.

**Feature Extraction:**  
Tokenization, embeddings

#### Examples:

1. Chatbots for employee queries
2. Sentiment analysis of resignation letters
3. Machine translation (English → French)

### Date

**Definition:** A method in ML/statistics for analyzing sequential data over time.

**Data Type:** Time-based data (chronological).

**Focus:** Trend, seasonality, forecasting.

**Feature Extraction:** Lags, seasonality, ARIMA

#### Examples:

1. Predicting stock prices
2. Sales forecasting
3. Employee resignation prediction based on monthly trends
4. Weather prediction

1. Supervised Learning
2. Semi-Supervised Learning
3. Unsupervised Learning

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1. Supervised Learning

## Learning

### Supervised Learning

**Definition:** Model is trained on labeled data (input + correct output).

**Goal:** Learn a mapping from input → output.

#### Examples:

1. Predict if employee will resign (Yes/No).
2. Predict house price based on size, location, 3. Email classification: Spam / Not Spam.

**Algorithms:** Linear Regression, Logistic Regression, Decision Trees, Random Forests, SVM, Neural Networks.

### Semi-Supervised Learning

**Definition:** Uses a small amount of labeled data + a large amount of unlabeled data.

**Goal:** Improve accuracy when labeling is expensive/difficult.

#### Examples:

1. Group employees into clusters (happy, stressed, at-risk).
2. Market segmentation: Group customers by buying behavior.
3. Anomaly detection: Detect unusual employee activity.

**Techniques:** Self-training, Co-training, Graph-based models

### Unsupervised Learning

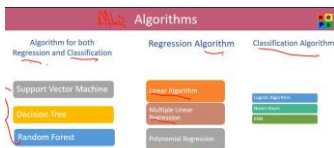
**Definition:** Model is trained on **unlabeled data** (only input, no output).. (Cluster)

**Goal:** Find hidden patterns or groupings

**Algorithms:** K-Means Clustering, Hierarchical Clustering, PCA (Dimensionality Reduction), Autoencoders.

#### Examples:

1. Group employees into clusters (happy, stressed, at-risk).
2. Market segmentation: Group customers by buying behavior.
3. Anomaly detection: Detect unusual employee activity.



Ai

Two Phase

### Model Creation/Learning

Data Collection

Data Preprocessing

Split: Input and Output

Split: Train and test set

Train Set

Model Creation

Evaluation Metrics

Save the best Model

### Deployment/Production/Implement

Load the Best Saved Model

Get inputs

Predicts

Call to Action