**Supervised learning**

This a ML algorithm in which the data label is provided along with the outputs for the algorithm to learn from. That's why it's called supervised learning. The ML algorithm trains itself on the given data and then proceeds to make predictions on the new data.

Examples include :

- Image classification
- Regression analysis
- Sentiment analysis

Some examples of supervised learning models are neural networks , linear regression and logistic regression

**Unsupervised learning:**

Unsupervised learning is a type of ML algorithm in which the model trains on the un-labelled data without any pre existing categories and differentiations.

It's done to discover patterns and relationships and structures within the data without any explicit guidance or supervision. It's examples are:

- Clustering
- Dimensionality reduction
- Anomaly reduction
- Association rule learning

Some real world examples are recommendation systems , network analysis , etc.

**Reinforcement learning**

Reinforcement learning is the type of ML algorithm in which the model learns through trial and error . It works on feedback systems which gives either positive reward or negative reward according to the requirement. It has various examples like Q-learning models that do the same .

Some real world examples would be playing chess , finance, video games , etc.

**Classification vs regression vs clustering:**

| Feature | Classification | Regression | Clustering |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Task | Predict category (discrete) | Predict continuous value | Group data points (unsupervised) |
| Output | Class label (e.g., spam/not spam) | Real number (e.g., house price) | Cluster (group) identifier |
| Training Data | Requires labeled data | Requires labeled data | Unlabeled data |
| Example | Is an email spam? (Yes/No) | Predict house price based on size | Group customers by purchase history |
| Goal | Organize data into categories | Forecast future values | Discover hidden patterns |