## 1. Supervised Learning:

Definition: Involves training a model on a labeled dataset, where the algorithm learns a mapping from inputs to corresponding outputs.

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Examples:

 Algorithm: Linear Regression

 Use Case: Predicting house prices based on features like square footage.

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Algorithm: Support Vector Machines (SVM)

 Use Case: Classifying emails as spam or non-spam based on content.

## 2. Unsupervised Learning:

Definition: Involves training a model on an unlabeled dataset, where the algorithm discovers patterns or structures within the data.

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Examples:

Algorithm: K-Means Clustering

Use Case: Grouping customers based on purchasing behavior for targeted marketing.

Algorithm: Principal Component Analysis (PCA)

Use Case: Dimensionality reduction for feature extraction.

## 3. Semi-Supervised Learning:

Definition: Combines both labeled and unlabeled data for training.

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Examples:

Algorithm: Self-training

Use Case: Text classification with iterative labeling of additional data points.

Algorithm: Co-Training

Use Case: Image recognition with models trained on different data views for improved performance.

## 4. Reinforcement Learning:

Definition: Involves an agent making decisions in an environment to achieve a goal, receiving rewards or punishments.

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Examples:

Algorithm: Q-Learning

Use Case: Training a program to play a game and maximize rewards.

Algorithm: Deep Reinforcement Learning (e.g., DQN)

Use Case: Playing video games at a superhuman level.

## 5. Self-Supervised Learning:

Definition: Involves creating its own supervision signal from the input data.

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Examples:

Algorithm: Word2Vec (Skip-Gram)

Use Case: Learning word embeddings from text corpora.

## 6. Transfer Learning:

Definition: Involves training a model on one task and applying it to another related task.

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Examples:

Algorithm: Pre-trained Convolutional Neural Networks (e.g., ResNet)

Use Case: Fine-tuning on a specific image classification task with limited data.

## 7. Ensemble Learning:

Definition: Involves combining multiple models to improve overall performance.

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Examples:

Algorithm: Random Forest

Use Case: Predicting diseases based on medical records by combining predictions from multiple decision trees.

Algorithm: AdaBoost

Use Case: Face detection, combining weak classifiers for a strong classifier.

## 8. Meta-Learning:

Definition: Involves training a model to quickly adapt to new tasks.

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Examples:

Algorithm: Model-Agnostic Meta-Learning (MAML)

Use Case: Few-shot learning scenarios, where the model quickly adapts to new tasks with limited examples.