

Machine learning allows systems to learn from data without explicit programming.

Supervised learning uses labeled datasets to train models.

Unsupervised learning identifies hidden patterns in data.

Reinforcement learning learns through trial and reward feedback.

Neural networks contain interconnected nodes inspired by the human brain.

Deep learning uses multi-layered neural networks for complex tasks.

Classification algorithms categorize data into predefined groups.

Regression predicts continuous numerical values.

Clustering groups similar data points together.

Decision trees split data based on feature values.

Random forests combine multiple decision trees for better accuracy.

Support vector machines find optimal separating boundaries.

Naive Bayes uses probability for classification.

K-means clustering partitions data into K clusters.

Gradient descent optimizes model parameters iteratively.

Overfitting occurs when a model memorizes training data and performs poorly on new data.

Underfitting occurs when a model is too simple to capture relationships.

Training data is used to fit the model.

Test data evaluates how well a model performs on unseen data.

Cross-validation improves model reliability.

Feature engineering improves algorithm performance.

Dimensionality reduction simplifies high-dimensional data.

Principal Component Analysis reduces correlated features.

Activation functions introduce non-linearity into neural networks.

Convolutional neural networks work well for image recognition.

Recurrent neural networks are effective for sequential data.

Natural language processing allows computers to understand text.

Chatbots use NLP and machine learning to respond to users.

Recommendation systems suggest products based on user behavior.

Spam filters identify unwanted emails.

Medical diagnosis systems support healthcare decisions.

Predictive analytics forecasts future outcomes.

Data preprocessing cleans and formats raw data.

Normalization scales numerical data.

Training epochs indicate how many times data passes through the model.

Accuracy measures correct predictions.

Precision evaluates positive prediction correctness.

Recall measures the ability to find true positives.

F1 score balances precision and recall.

Loss functions measure prediction error.

Hyperparameters control learning behavior.

Model tuning improves performance.

Confusion matrices summarize classification results.

Real-world applications include finance, healthcare, and security.

Data science uses machine learning for analytical insights.

Big data technologies support large-scale computation.

Automation benefits from machine learning decision capabilities.

Machine learning continues to grow across industries.

Artificial intelligence integrates learning, reasoning, and perception.