**2. Supervised Learning Algorithms**

* **Linear Regression**
  + Simple linear regression
  + Multiple linear regression
* **Logistic Regression**
  + Binary classification
  + Multiclass classification
* **Decision Trees**
  + Tree-based decision-making
  + Gini index and entropy
* **Random Forest**
  + Ensemble learning
  + Bagging technique
* **Support Vector Machines (SVM)**
  + Margin and kernel tricks
* **K-Nearest Neighbors (KNN)**
  + Distance-based classification

**3. Unsupervised Learning Algorithms**

* **K-Means Clustering**
  + Clustering data points
  + Elbow method
* **Hierarchical Clustering**
  + Agglomerative and divisive methods
* **Principal Component Analysis (PCA)**
  + Dimensionality reduction
  + Eigenvalues and eigenvectors
* **Anomaly Detection**
  + Identifying outliers
  + Applications in cybersecurity

**4. Neural Networks and Deep Learning**

* **Basics of Neural Networks**
  + Perceptron and activation functions
* **Feedforward Neural Networks**
  + Forward and backward propagation
* **Convolutional Neural Networks (CNNs)**
  + Image recognition and processing
* **Recurrent Neural Networks (RNNs)**
  + Sequence prediction and time-series analysis
* **Transfer Learning**
  + Pre-trained models for real-world tasks

**5. Reinforcement Learning**

* **Basics of Reinforcement Learning**
  + Agent, environment, and reward
* **Q-Learning**
  + Value-based learning
* **Deep Q-Learning**
  + Combining deep learning with Q-learning
* **Applications**
  + Game AI, robotics, and simulation

**6. Optimization Algorithms**

* **Gradient Descent**
  + Batch, stochastic, and mini-batch gradient descent
* **Genetic Algorithms**
  + Evolution-inspired optimization
* **Simulated Annealing**
  + Optimization with randomness

**7. Feature Engineering and Preprocessing**

* Data cleaning and handling missing values
* Encoding categorical data
* Feature scaling: Standardization and normalization

**8. Model Evaluation and Validation**

* Train-test split and cross-validation
* Confusion matrix, precision, recall, F1 score
* ROC-AUC curve

**9. Tools and Frameworks**

* **Programming Languages**: Python, R
* **Libraries**: Scikit-learn, TensorFlow, PyTorch
* **Visualization Tools**: Matplotlib, Seaborn

**10. Projects to Solidify Learning**

* Predicting house prices using linear regression
* Classifying handwritten digits with neural networks
* Clustering customers based on purchasing behavior
* Building a recommendation system for movies
* Real-time object detection using a pre-trained CNN model