

There are numerous algorithms in programming, categorized based on their purpose. Below is a comprehensive list of important algorithms used across various domains:

1. Sorting Algorithms

- **Bubble Sort**
 - **Selection Sort**
 - **Insertion Sort**
 - **Merge Sort**
 - **Quick Sort**
 - **Heap Sort**
 - **Counting Sort**
 - **Radix Sort**
 - **Bucket Sort**
 - **Shell Sort**
 - **Tim Sort**
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2. Searching Algorithms

- **Linear Search**
 - **Binary Search**
 - **Jump Search**
 - **Exponential Search**
 - **Interpolation Search**
 - **Fibonacci Search**
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3. Graph Algorithms

- **Depth-First Search (DFS)**
- **Breadth-First Search (BFS)**
- **Dijkstra's Algorithm** (Shortest Path)
- **Bellman-Ford Algorithm** (Shortest Path)
- **Floyd-Warshall Algorithm** (All-Pairs Shortest Path)
- *A (A-Star) Algorithm**
- **Kruskal's Algorithm** (Minimum Spanning Tree)
- **Prim's Algorithm** (Minimum Spanning Tree)
- **Topological Sorting**
- **Tarjan's Algorithm** (Strongly Connected Components)

- **Kosaraju's Algorithm** (Strongly Connected Components)
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4. Dynamic Programming Algorithms

- **Fibonacci Sequence (DP)**
 - **Knapsack Problem (0/1 and Fractional)**
 - **Longest Common Subsequence (LCS)**
 - **Longest Increasing Subsequence (LIS)**
 - **Matrix Chain Multiplication**
 - **Coin Change Problem**
 - **Rod Cutting Problem**
 - **Subset Sum Problem**
 - **Egg Dropping Problem**
 - **Edit Distance Algorithm**
 - **Kadane's Algorithm** (Maximum Subarray Sum)
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5. String Algorithms

- **KMP Algorithm (Knuth-Morris-Pratt)**
 - **Rabin-Karp Algorithm**
 - **Z Algorithm**
 - **Boyer-Moore Algorithm**
 - **Aho-Corasick Algorithm**
 - **Suffix Array Construction**
 - **Longest Palindromic Substring (Manacher's Algorithm)**
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6. Bit Manipulation Algorithms

- **Bitwise AND, OR, XOR**
 - **Finding the Only Non-Repeating Element**
 - **Checking If a Number is a Power of Two**
 - **Counting Set Bits (Brian Kernighan's Algorithm)**
 - **Swapping Two Numbers Without a Temporary Variable**
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7. Tree and Binary Search Tree (BST) Algorithms

- **Inorder, Preorder, Postorder Traversal**

- Lowest Common Ancestor (LCA)
 - Binary Tree to BST Conversion
 - AVL Tree Rotations
 - Trie (Prefix Tree) Operations
 - Segment Tree (Range Queries)
 - Fenwick Tree (Binary Indexed Tree - BIT)
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8. Greedy Algorithms

- Huffman Coding
 - Activity Selection Problem
 - Job Sequencing with Deadlines
 - Fractional Knapsack
 - Dijkstra's Algorithm (Greedy Approach)
 - Prim's Algorithm (Greedy Approach)
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9. Number Theory Algorithms

- Greatest Common Divisor (GCD) – Euclidean Algorithm
 - Least Common Multiple (LCM)
 - Sieve of Eratosthenes (Prime Numbers)
 - Modular Exponentiation
 - Extended Euclidean Algorithm
 - Chinese Remainder Theorem
 - Fermat's Primality Test
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10. Divide and Conquer Algorithms

- Merge Sort
 - Quick Sort
 - Binary Search
 - Closest Pair of Points
 - Strassen's Matrix Multiplication
 - Karatsuba Algorithm (Fast Multiplication)
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11. Backtracking Algorithms

- N-Queens Problem
 - Sudoku Solver
 - Subset Sum Problem
 - Graph Coloring Problem
 - Hamiltonian Cycle
 - Rat in a Maze Problem
 - Word Break Problem
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12. Computational Geometry Algorithms

- Convex Hull (Graham's Scan, Jarvis March)
 - Line Intersection Algorithm
 - Closest Pair of Points Algorithm
 - Sweep Line Algorithm
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13. Machine Learning and AI Algorithms

- Gradient Descent
 - Backpropagation (Neural Networks)
 - K-Means Clustering
 - Decision Trees
 - Support Vector Machines (SVM)
 - Naïve Bayes Algorithm
 - Random Forest Algorithm
 - Reinforcement Learning Algorithms
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14. Cryptographic Algorithms

- RSA Algorithm
 - AES (Advanced Encryption Standard)
 - DES (Data Encryption Standard)
 - SHA (Secure Hash Algorithm)
 - Diffie-Hellman Key Exchange
 - Elliptic Curve Cryptography (ECC)
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15. Parallel and Distributed Algorithms

- **MapReduce Algorithm**
- **Lock-Free Data Structures**
- **Parallel Prefix Sum**
- **Parallel Sorting Algorithms (Bitonic Sort, Parallel Merge Sort)**