Data Algorithms and Structures

# Data algorithms

## Depth First

[**DFS** stands for **Depth First Search**](https://www.geeksforgeeks.org/depth-first-search-or-dfs-for-a-graph/) is a edge based technique. It uses the [Stack data structure](http://www.geeksforgeeks.org/stack-data-structure/), performs two stages, first visited vertices are pushed into stack and second if there is no vertices then visited vertices are popped.

A picture containing text, device, screen, meter

Description automatically generated

## Breadth First

[**BFS** stands for **Breadth First Search**](https://www.geeksforgeeks.org/breadth-first-search-or-bfs-for-a-graph/) is a vertex based technique for finding a shortest path in graph. It uses a [Queue data structure](https://www.geeksforgeeks.org/queue-data-structure/) which follows first in first out. In BFS, one vertex is selected at a time when it is visited and marked then its adjacent are visited and stored in the queue. It is slower than DFS.

Graphical user interface

Description automatically generated with medium confidence

## Depth-First vs Breadth First

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## A\*

[A\* Search Algorithm - GeeksforGeeks](https://www.geeksforgeeks.org/a-search-algorithm/)

# Data Structures

## Stack

A picture containing diagram

Description automatically generated

* **Stack** – a data structure in which all insertions and deletions are made at one end, called the **top of the stack**.
* **LIFO data structure** – last in, first out

### Common Stack Operations

A screenshot of a computer

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### Applications of the Stack

A screenshot of a computer

Description automatically generated with medium confidence

In computer science, **recursion** is a **programming technique using function or algorithm that calls itself one or more times until a specified condition is met at** which time the rest of each repetition is processed from the last one called to the first. [CS240: Data Structures & Algorithms I (cpp.edu)](https://www.cpp.edu/~ftang/courses/CS240/lectures/recursion.htm#:~:text=In%20computer%20science%2C%20recursion%20is,one%20called%20to%20the%20first.)

**Reverse Polish notation (RPN),** also known as **Polish postfix notation** or simply **postfix notation**, is a mathematical notation in which operators follow their operands, in contrast to Polish notation (PN), in which operators precede their operands. It does not need any parentheses as long as each operator has a fixed number of operands.

[Reverse Polish notation - Wikipedia](https://en.wikipedia.org/wiki/Reverse_Polish_notation)

### Write a Stack Class in Python

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#### LIFO

Text

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## 2D List Data Structures

### Applications of 2D Lists

Graphical user interface, text, application

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### Representation of 2D Lists in Python

Diagram

Description automatically generated

# Time Complexity and Big O Notation

[Essential Programming | Time Complexity | by Diego Lopez Yse | Towards Data Science](https://towardsdatascience.com/essential-programming-time-complexity-a95bb2608cac)