

# DFS Explained (January 2020)

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**Abstract--** This paper is a research paper describing what Depth First Search is, where it is used, how it is used. There are many search algorithms in computer science. DFS is one of them.

**Index Terms-** AI, DFS, search, algorithm

## 1. INTRODUCTION

Search algorithms are used to search for information within data structures. Search algorithms are divided into 2: Uninformed Search, Informed search.

Uninformed search: It is a search that does not recognize the problem and does not have any problem-specific convenience. Linear Search, Dijkstra Algorithm, Depth First Search, Breadth First Search ...

Informed Search: It means that the information about the problem being searched is found and therefore the search algorithm varies according to the problem. Minimax trees, A \* Search, Hill Climbing Algorithm ...

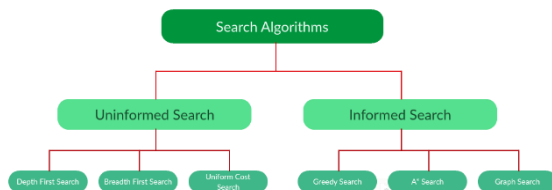


Fig1: Search Algorithms are divided into two

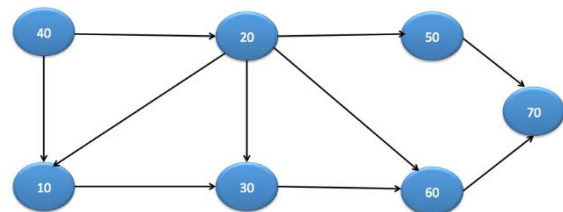
## II. AI

Artificial intelligence is the phenomenon of transferring natural human brains to an artificial machine. It aims to make machines think like human beings and make the most logical decision. They differ from people in several ways. They don't have feelings, they don't get tired.

In the future, they will replace people, because they can do their jobs faster without being tired or complaining. And this will raise the problem of unemployment. At the same time, the issue of robot rights will arise.

## III. DFS

DFS is a Uninformed Search algorithm that travels through a tree with the help of a rule. It is roughly defined as: starting from root, there must be a direct path to the node to look at, and that node must not have been previously navigated. In this way the function continues by calling itself. When we come to the node that has no place to go, we can go back to the last node we visited and see if we can go to another node. When we go through all the nodes, the algorithm ends. [1]



Depth first traversal of above graph can be :40,20,50,70,60,30,10

Fig2: Depth First Search Example

In Fig2, we see the depth first search algorithm in a tree structure. It started at 40. Went to 20 with looking its children. Then went to 50. Then 70. Then, since there was nowhere else to go and no more nodes, it went back and looked for a node that hadn't been there. It went back to 20, and then it went to 60. Since 60 didn't

have a place to go, it went back to 20 and went to 30.

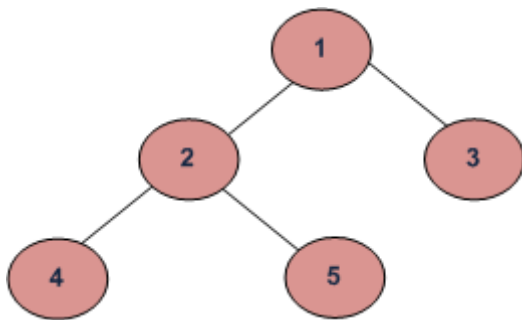


Fig3: Tree for DFS

At the same time, we can walk around the tree in the example in Figure 3 in 3 different ways:

1. Inorder (Left, Root, Right): 4 2 5 1 3
  2. Preorder (Root, Left, Right): 1 2 4 5 3
  3. Postorder (Left, Right, Root): 4 5 2 3 1
- [2]

#### IV. Code Outputs

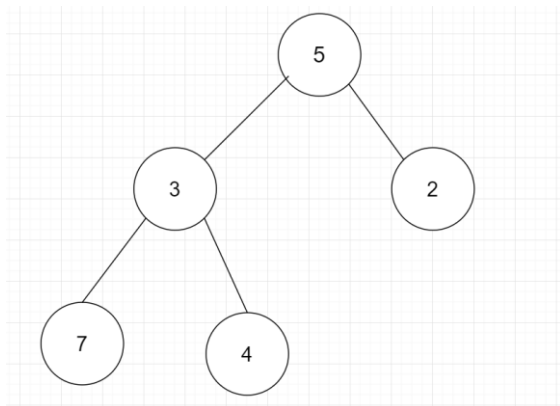


Figure 4: Tree for DFS search

Inorder:

```
Inorder traversal of binary tree is
7 3 4 5 2
```

Preorder:

```
Preorder traversal of binary tree is
5 3 7 4 2
```

Postorder:

```
Postorder traversal of binary tree is
7 4 3 2 5
```

#### CONCLUSION

When artificial intelligence and search algorithms are combined, many problems can be solved quickly. DFS is one of them. DFS is a search algorithm that Uninformed search. And as you can see in the examples, we can find that I'm looking for DFS in a tree structure or any node structure according to specific rules and order.

#### REFERENCES

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