Algorithm Lab

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April 27, 2025

1 Graph Algorithm

Implement the following graph algorithms using C++.

1. BFS
2. DFS Recursive
3. DFS Iterative

Algorithm 1 BFS

```
procedure BFS($G, v$)
    $queue < int > Q$
    $Q.push(v)$
    $visited[v] = TRUE$
    $distance[v] = 0$
    while $!Q.empty()$ do
        $p = Q.front()$
        $Q.pop()$
        for $i \leftarrow 0, G[v].size()$ do
            $next = graph[v][i]$
            if $visited[next] == 0$ then
                $Q.push(next)$
                $visited[next] = 1$
                $distance[next] = distance[v] + 1$
            end if
        end for
    end while
end procedure
```

Algorithm 2 DFS Recursive

```
procedure DFS($G, v$)
    $visited[v] = TRUE$
    for $i \leftarrow 0, G[v].size()$ do
        $next = graph[v][i]$
        if $visited[next] == 0$ then
            $DFS(next)$
        end if
    end for
end procedure
```

Algorithm 3 DFS Iterative

```
procedure DFS($G, v$)
    $Stack < int > S$
    $S.push(v)$
    $visited[v] = TRUE$
    while $!S.empty()$ do
        $p = S.top()$
        $S.pop()$
        for $i \leftarrow 0, G[v].size()$ do
            $next = graph[v][i]$
            if $visited[next] == 0$ then
                $S.push(next)$
                $visited[next] = 1$
            end if
        end for
    end while
end procedure
```