Informatik II

Übung 8

FS 2020

Program Today

1. Repetition Lectures: Graph representation
2. Breadth-First-Search BFS
3. In-Class-Exercise

Quiz: Runtimes of simple Operations

Operation	Matrix	List
Find neighbours/successors of $v \in V$		
find $v \in V$ without neighbour/successor		
$(u, v) \in E$?		
Insert edge		
Delete edge		

Quiz: Runtimes of simple Operations

Operation	Matrix	List
Find neighbours/successors of $v \in V$	$\Theta(n)$	
find $v \in V$ without neighbour/successor		
$(u, v) \in E$?		
Insert edge		
Delete edge		

Quiz: Runtimes of simple Operations

Operation	Matrix	List
Find neighbours/successors of $v \in V$	$\Theta(n)$	$\Theta(\deg^+ v)$
find $v \in V$ without neighbour/successor		
$(u, v) \in E$?		
Insert edge		
Delete edge		

Quiz: Runtimes of simple Operations

Operation	Matrix	List
Find neighbours/successors of $v \in V$	$\Theta(n)$	$\Theta(\deg^+ v)$
find $v \in V$ without neighbour/successor	$\Theta(n^2)$	
$(u, v) \in E$?		
Insert edge		
Delete edge		

Quiz: Runtimes of simple Operations

Operation	Matrix	List
Find neighbours/successors of $v \in V$	$\Theta(n)$	$\Theta(\deg^+ v)$
find $v \in V$ without neighbour/successor	$\Theta(n^2)$	$\Theta(n)$
$(u, v) \in E$?		
Insert edge		
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Quiz: Runtimes of simple Operations

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Find neighbours/successors of $v \in V$	$\Theta(n)$	$\Theta(\deg^+ v)$
find $v \in V$ without neighbour/successor	$\Theta(n^2)$	$\Theta(n)$
$(u, v) \in E$?	$\Theta(1)$	
Insert edge		
Delete edge		

Quiz: Runtimes of simple Operations

Operation	Matrix	List
Find neighbours/successors of $v \in V$	$\Theta(n)$	$\Theta(\deg^+ v)$
find $v \in V$ without neighbour/successor	$\Theta(n^2)$	$\Theta(n)$
$(u, v) \in E$?	$\Theta(1)$	$\Theta(\deg^+ v)$
Insert edge		
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Insert edge	$\Theta(1)$	
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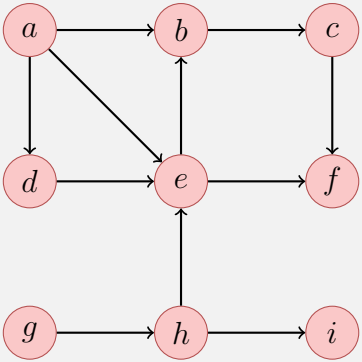
Insert edge	$\Theta(1)$	$\Theta(1)$
Delete edge	$\Theta(1)$	$\Theta(\deg^+ v)$

Breadth-First-Search BFS

BFS starting from a:

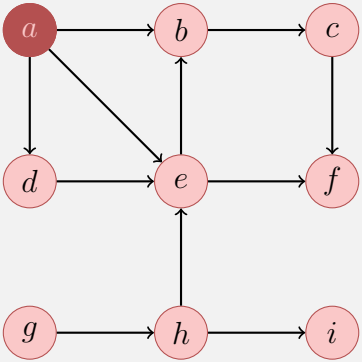


BFS-Tree: Distances and Parents

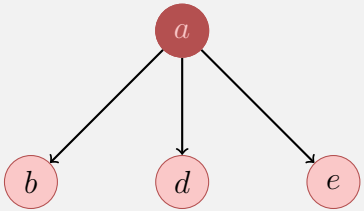
a distance 0

Breadth-First-Search BFS

BFS starting from a:



BFS-Tree: Distances and Parents

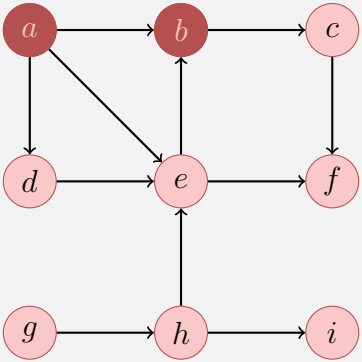


distance 0

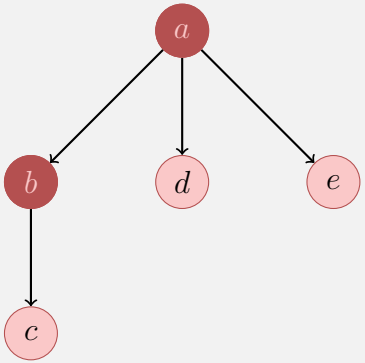
distance 1

Breadth-First-Search BFS

BFS starting from a:



BFS-Tree: Distances and Parents



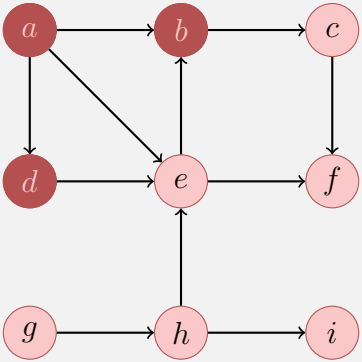
distance 0

distance 1

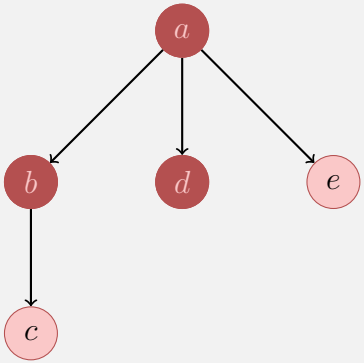
distance 2

Breadth-First-Search BFS

BFS starting from a:



BFS-Tree: Distances and Parents



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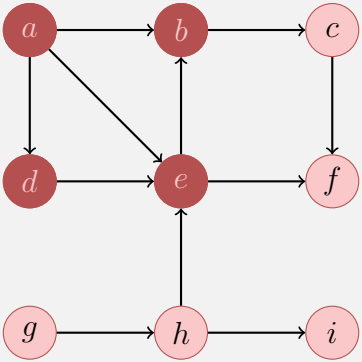
Breadth-First-Search BFS

BFS starting from a:



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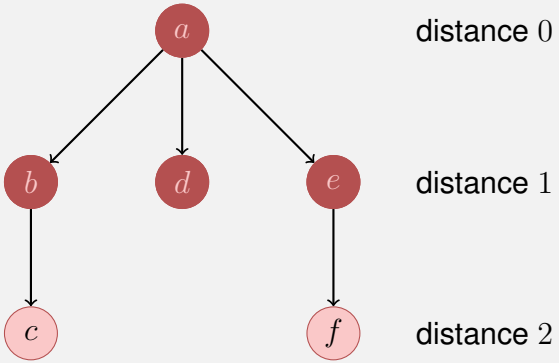
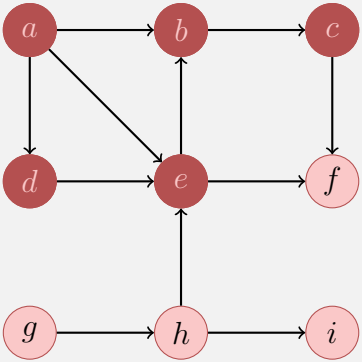
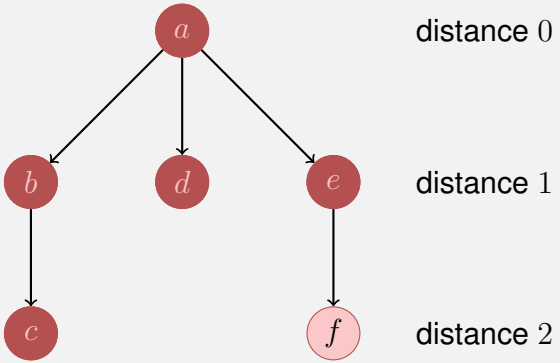


Breadth-First-Search BFS

BFS starting from a:



BFS-Tree: Distances and Parents



Breadth-First-Search BFS

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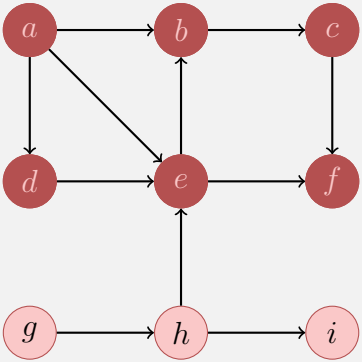
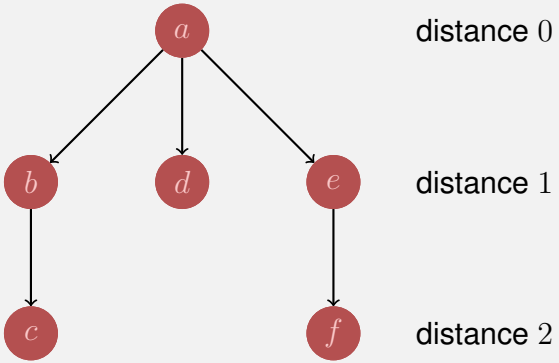
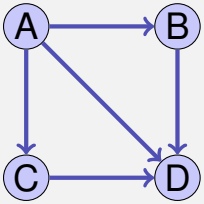


BFS-Tree: Distances and Parents



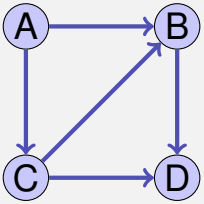
Quiz: Topological Sorting

In how many ways can the following directed graphs be topologically sorted each?



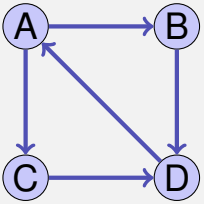
number sortings

?



number sortings

?



number sortings

?

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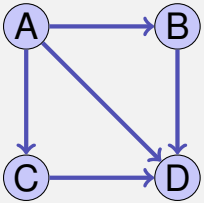
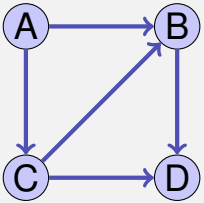


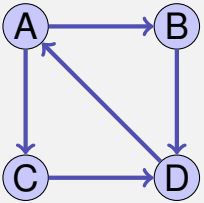
number sortings

2



number sortings

1



number sortings

0

Graph Visualisation

Implement a function to visualize a graph that is given in the form of an adjacency matrix

The visualization of a graph that is given as an adjacency list ist already provided.

Questions / Suggestions?