

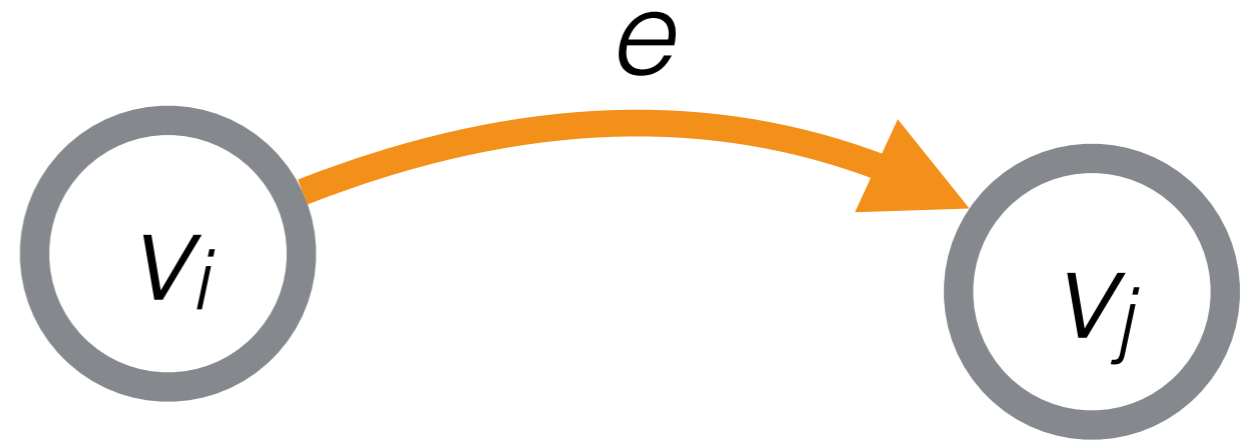
Introduction To Graphs

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Formal Definition

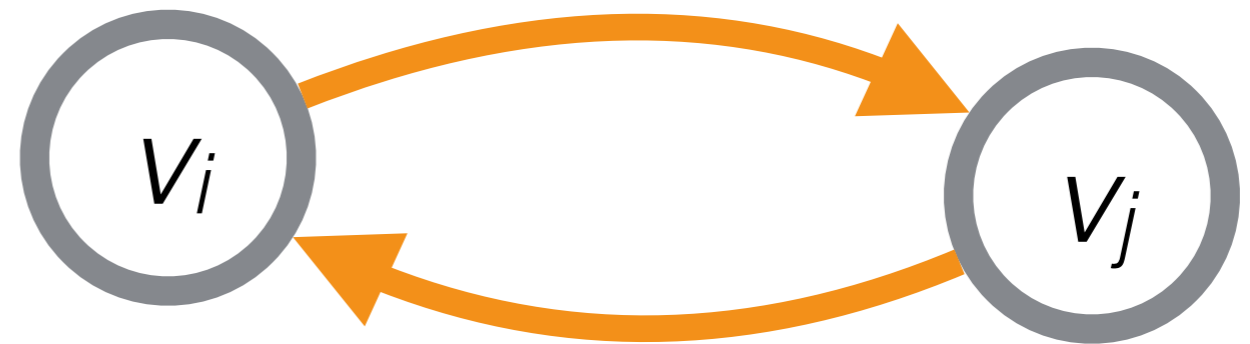
- $G = (V, E)$
- V is the set of **vertices**
- E is the set of **edges**

Directed Graphs



- $G = (V, E)$
- Each element e of E is an ordered pair (v_i, v_j)

Undirected Graphs

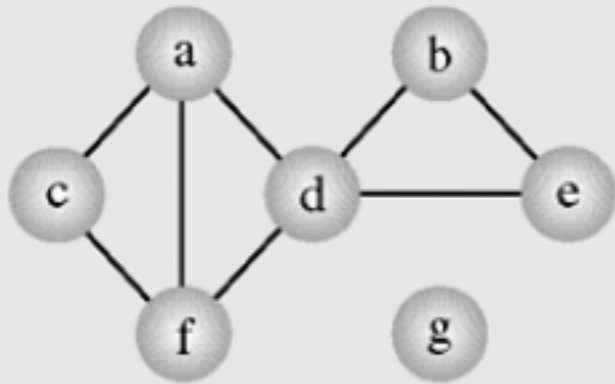


- $G = (V, E)$
- For each edge (v_i, v_j) of E , there is an edge (v_j, v_i)

How Do We Store Graphs?

- Adjacency List
- Adjacency Matrix
- Linked Nodes
- Incidence Matrix

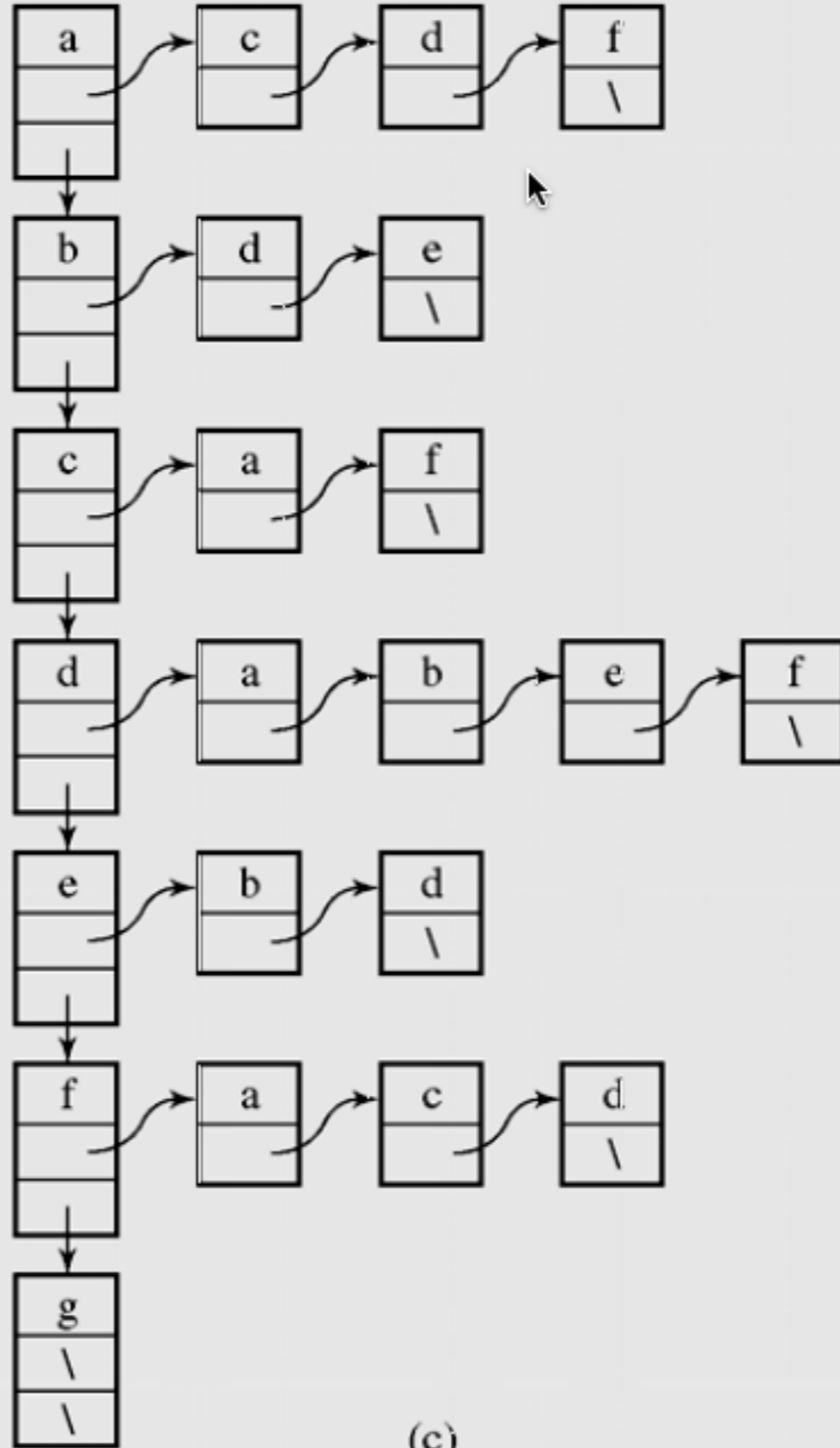
Adjacency List



(a)

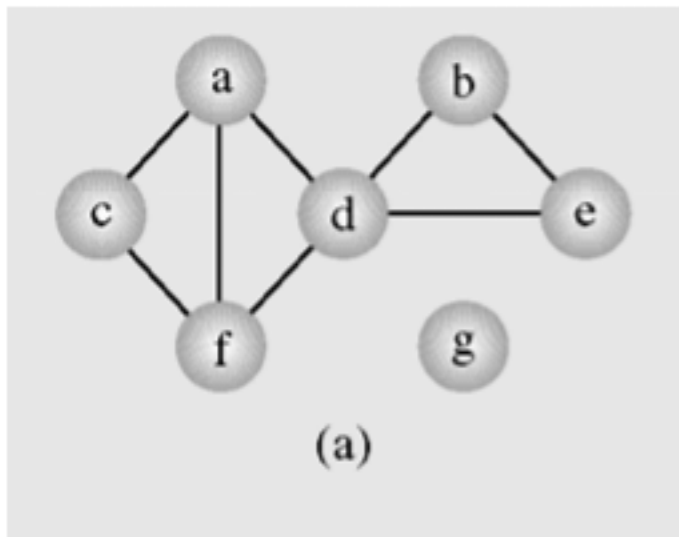
a	c	d	f		
b	d	e			
c	a	f			
d	a	b	e	f	
e	b	d			
f	a	c	d		
g					

(b)



(c)

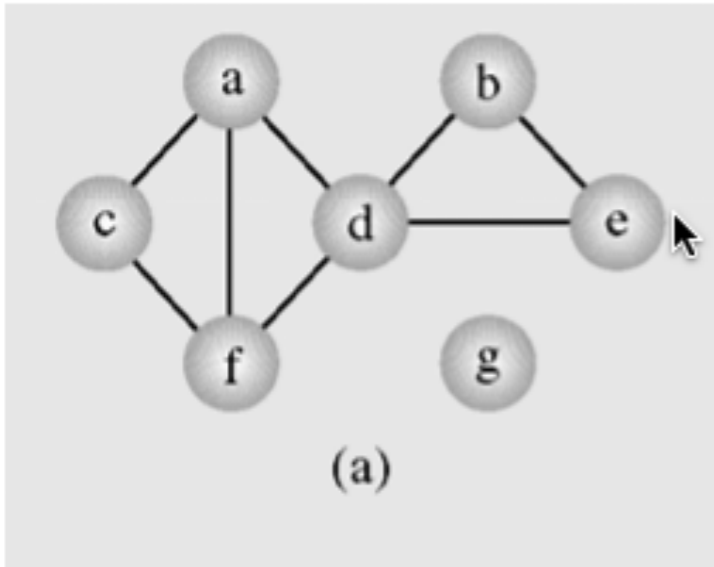
Adjacency Matrix



	a	b	c	d	e	f	g
a	0	0	1	1	0	1	0
b	0	0	0	1	1	0	0
c	1	0	0	0	0	1	0
d	1	1	0	0	1	1	0
e	0	1	0	1	0	0	0
f	1	0	1	1	0	0	0
g	0	0	0	0	0	0	0

(d)

Incidence Matrix



	ac	ad	af	bd	be	cf	de	df
a	1	1	1	0	0	0	0	0
b	0	0	0	1	1	0	0	0
c	1	0	0	0	0	1	0	0
d	0	1	0	1	0	0	1	1
e	0	0	0	0	1	0	1	0
f	0	0	1	0	0	1	0	1
g	0	0	0	0	0	0	0	0

(e)

Why the different data-structure?

