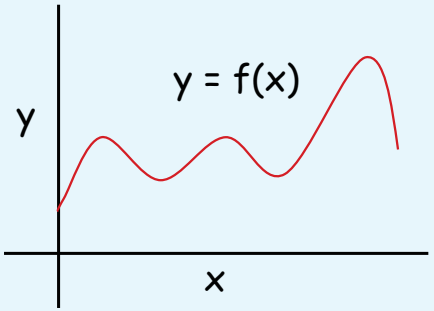
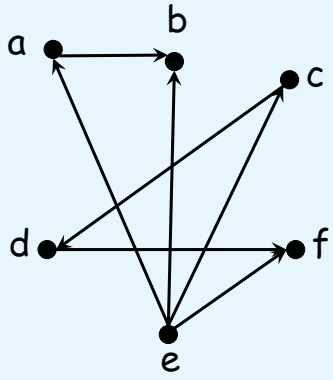
Mathematics for Computer Science
MIT 6.042J/18.062J

Directed Graphs (Digraphs)

Normal Person's Graph



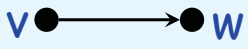
Computer Scientist's Graph



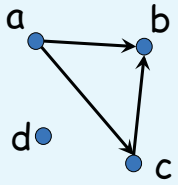
Digraphs

- a set, V, of vertices
- a set, $E \subseteq V \times V$ of directed edges

$(v,w) \in E$ notation: $v \to w$



Relations and Graphs



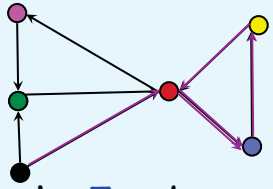
V= {a,b,c,d}
E = {(a,b), (a,c), (c,b)}

Digraphs

Formally, a digraph with vertices V is *the same* as a binary relation on V.

Walks & Paths

Walk: follow successive edges

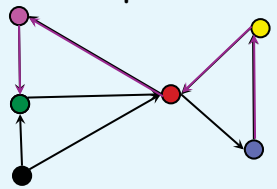


length: 5 edges

(not the 6 vertices)

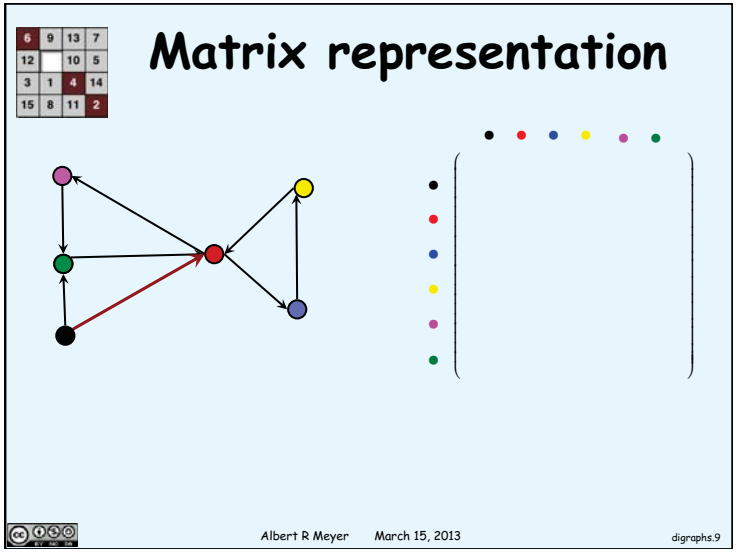
Walks & Paths

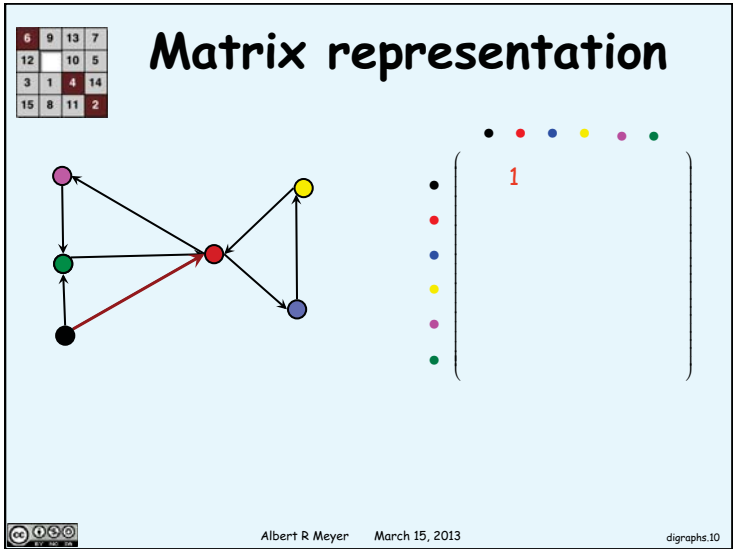
Path: walk thru vertices without repeat vertex

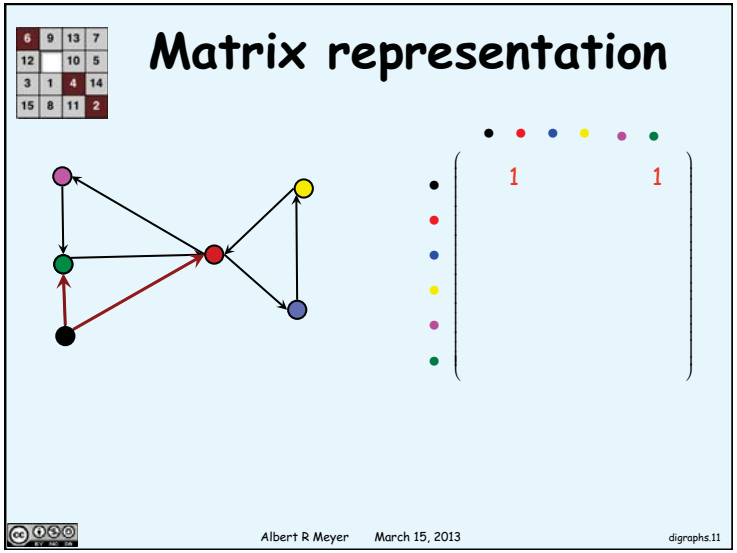


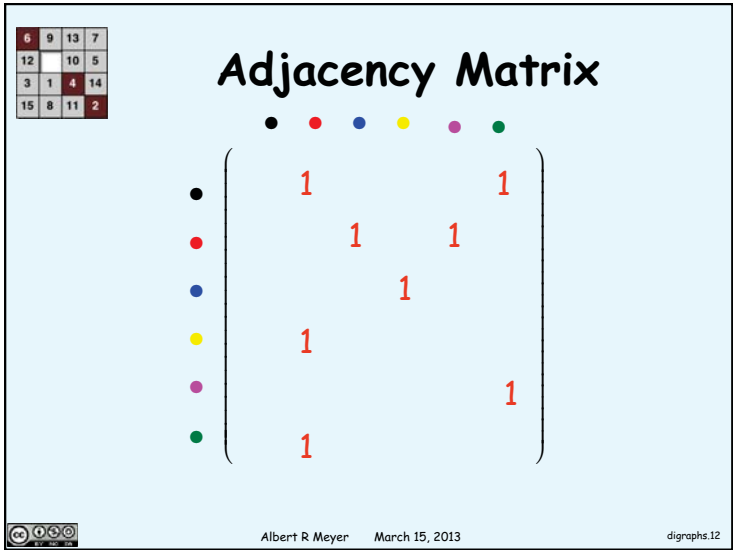
length: 4 edges

stuck!

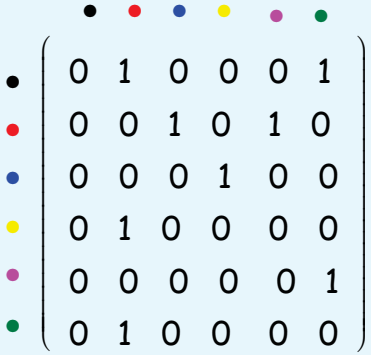

Matrix representation
Albert R Meyer March 15, 2013
digraphs.9


Matrix representation
1
Albert R Meyer March 15, 2013
digraphs.10


Matrix representation
1 1
Albert R Meyer March 15, 2013
digraphs.11


Adjacency Matrix
1 1
1 1
1
1
1
1
Albert R Meyer March 15, 2013
digraphs.12

Adjacency Matrix



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