Visualizing Network Data

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Module Overview

Introduce and understand network visualization methods

Introduce and understand adjacency matrices

Implement an adjacency matrix

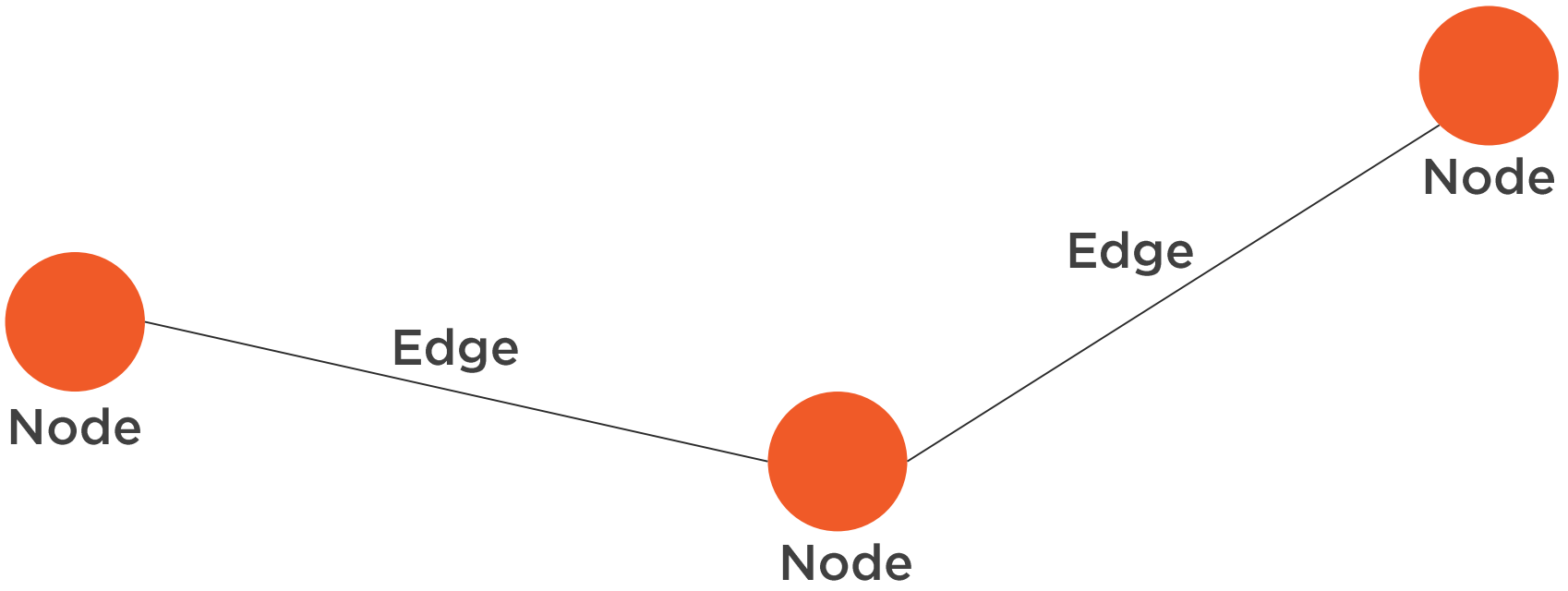
Discuss additional methods for network data visualization

Understanding Network Data Visualization

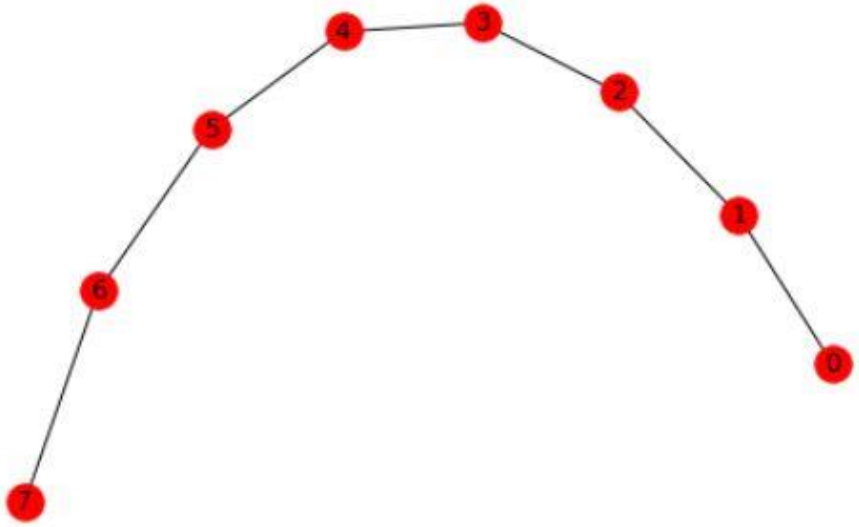
Network Visualization

Used to visualize and understand complex relationships within network data.

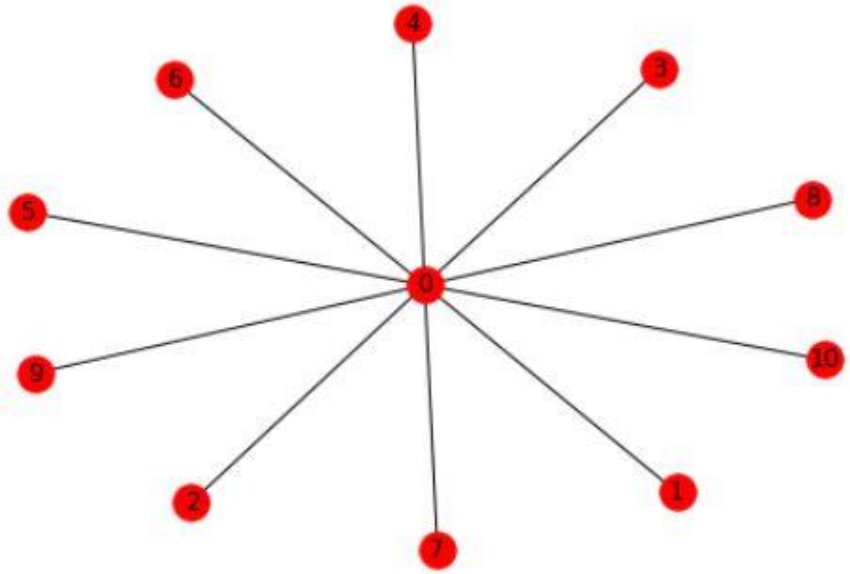
Visualization: Network Graph



Visualization: Network Graph

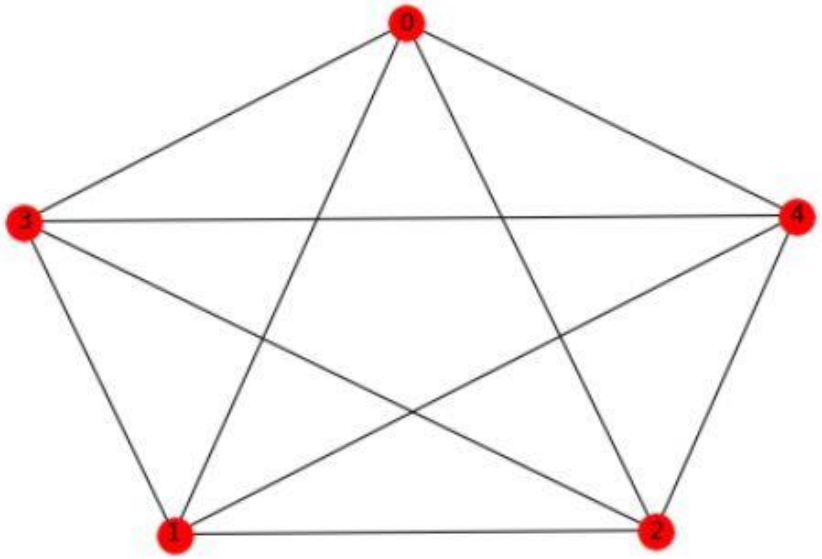


Path Graph
path_graph(8)

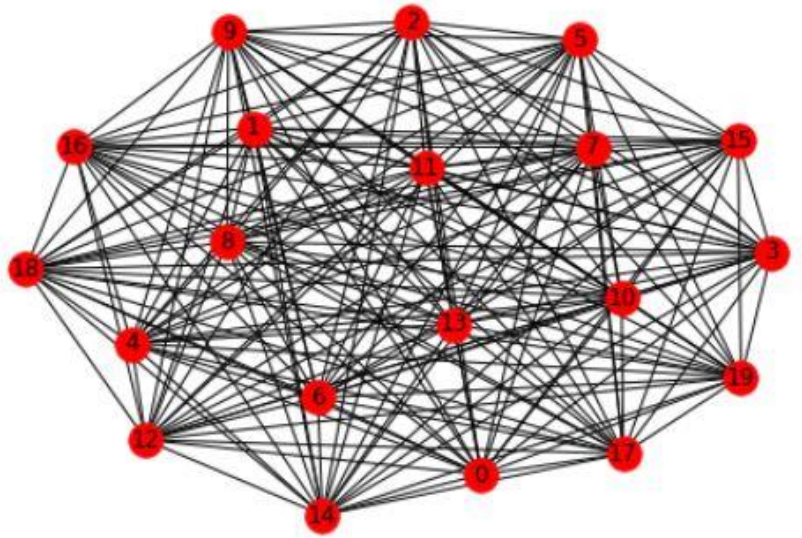


Star Graph
star_graph(10)

Visualization: Network Graph



Complete Graph
complete_graph(5)



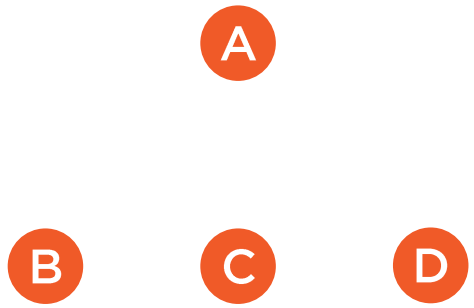
Complete Graph
complete_graph(20)

Understanding Adjacency Matrices

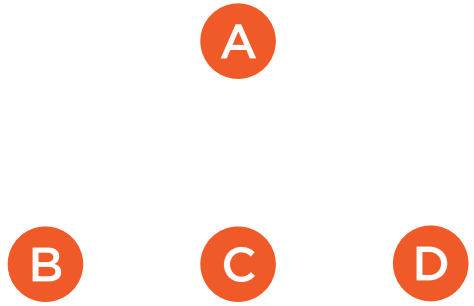
Adjacency Matrix

Used to visualize and understand complex relationships within network data. Specifically how nodes are related to each other.

Adjacency Matrix

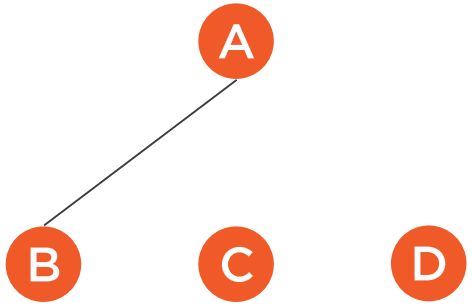


Adjacency Matrix



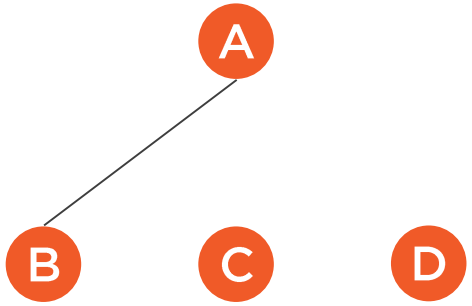
	A	B	C	D
A				
B				
C				
D				

Adjacency Matrix



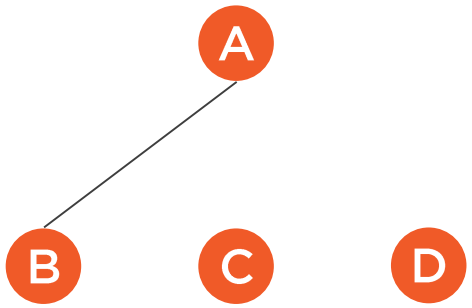
	A	B	C	D
A				
B				
C				
D				

Adjacency Matrix



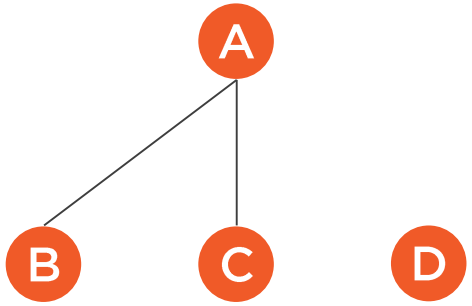
	A	B	C	D
A		1		
B				
C				
D				

Adjacency Matrix



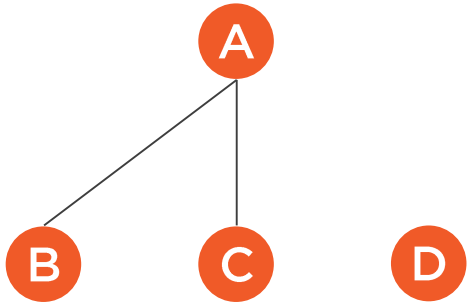
	A	B	C	D
A		1		
B	1			
C				
D				

Adjacency Matrix



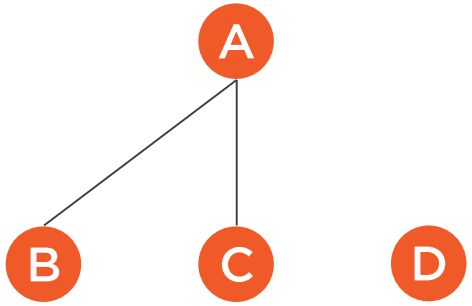
	A	B	C	D
A		1		
B	1			
C				
D				

Adjacency Matrix



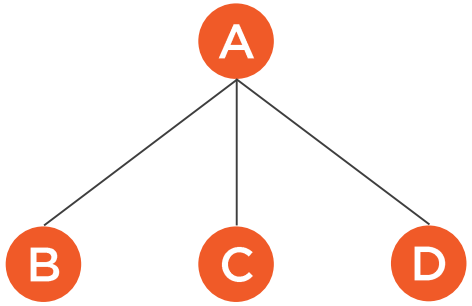
	A	B	C	D
A		1	1	
B	1			
C				
D				

Adjacency Matrix



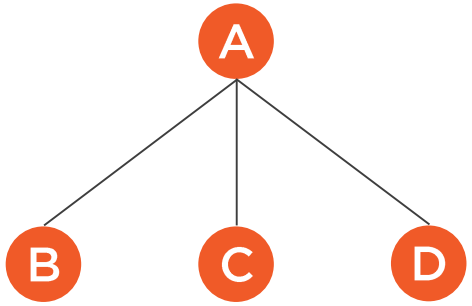
	A	B	C	D
A		1	1	
B	1			
C	1			
D				

Adjacency Matrix



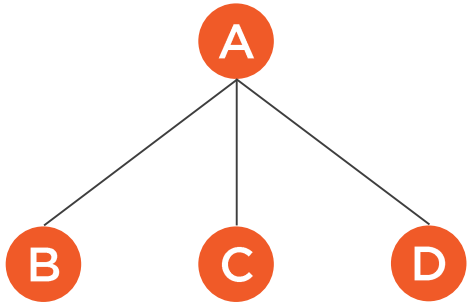
	A	B	C	D
A		1	1	1
B	1			
C	1			
D				

Adjacency Matrix



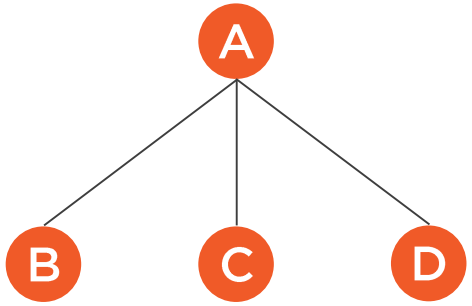
	A	B	C	D
A		1	1	1
B	1			
C	1			
D	1			

Adjacency Matrix



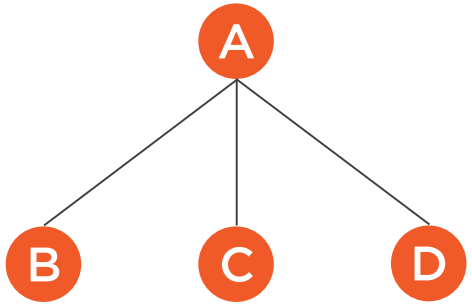
	A	B	C	D
A		1	1	1
B	1		0	
C	1	0		
D	1			

Adjacency Matrix



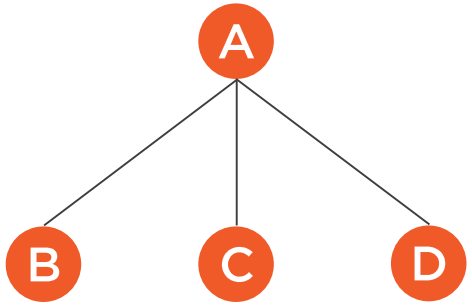
	A	B	C	D
A		1	1	1
B	1		0	0
C	1	0		
D	1	0		

Adjacency Matrix



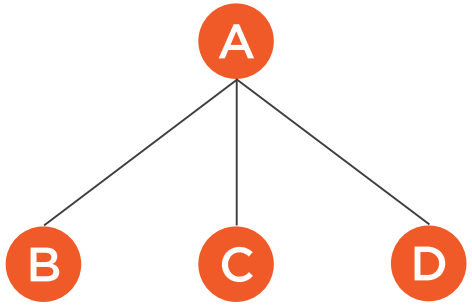
	A	B	C	D
A		1	1	1
B	1		0	0
C	1	0		0
D	1	0	0	

Adjacency Matrix



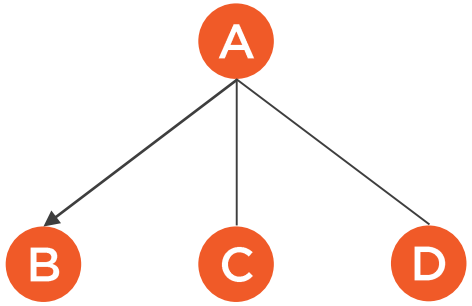
	A	B	C	D
A	0	1	1	1
B	1	0	0	0
C	1	0	0	0
D	1	0	0	0

Adjacency Matrix – Directed Graphs



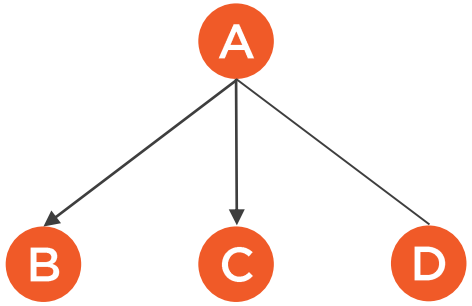
	A	B	C	D
A	0	1	1	1
B	1	0	0	0
C	1	0	0	0
D	1	0	0	0

Adjacency Matrix – Directed Graphs



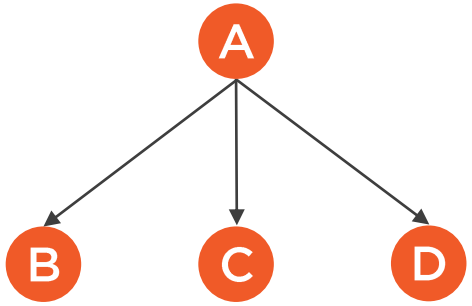
	A	B	C	D
A	0	1	1	1
B	0	0	0	0
C	1	0	0	0
D	1	0	0	0

Adjacency Matrix – Directed Graphs



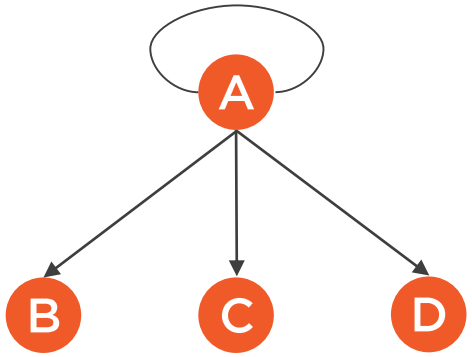
	A	B	C	D
A	0	1	1	1
B	0	0	0	0
C	0	0	0	0
D	1	0	0	0

Adjacency Matrix – Directed Graphs



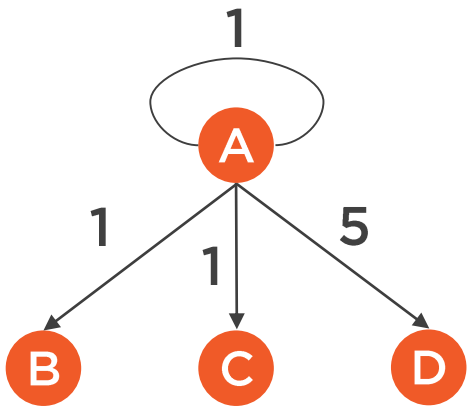
	A	B	C	D
A	0	1	1	1
B	0	0	0	0
C	0	0	0	0
D	0	0	0	0

Adjacency Matrix – Self Looping Graphs



	A	B	C	D
A	1	1	1	1
B	0	0	0	0
C	0	0	0	0
D	0	0	0	0

Adjacency Matrix – Weighted Connections



	A	B	C	D
A	1	1	1	5
B	0	0	0	0
C	0	0	0	0
D	0	0	0	0

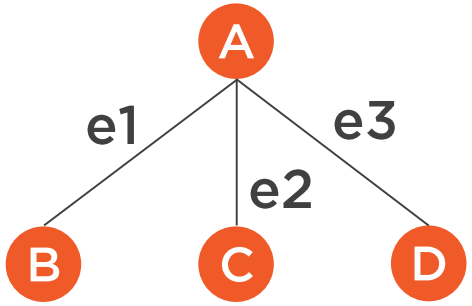
Implementing Adjacency Matrices

Understanding and Implementing Incidence Matrices

Incidence Matrix

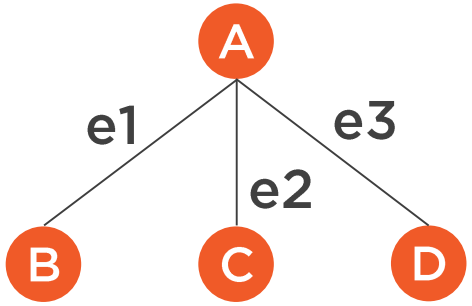
A matrix that shows the relationship between two classes of objects. Specifically how nodes are related to edges.

Incidence Matrix



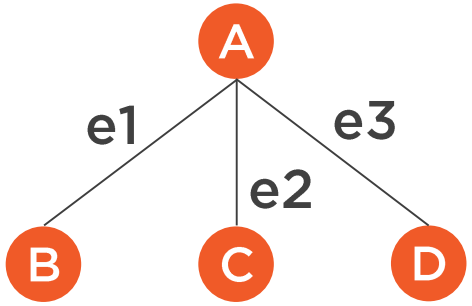
	e1	e2	e3
A			
B			
C			
D			

Incidence Matrix



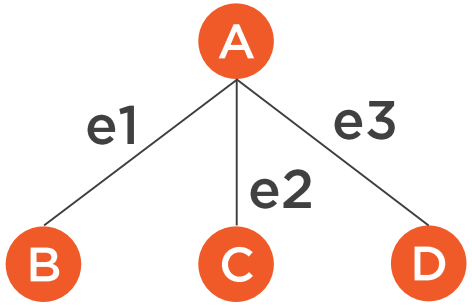
	e1	e2	e3
A	1	1	1
B			
C			
D			

Incidence Matrix



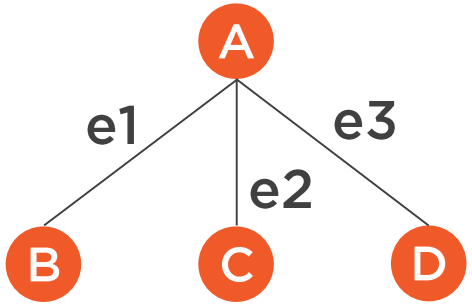
	e1	e2	e3
A	1	1	1
B	1	0	0
C			
D			

Incidence Matrix



	e1	e2	e3
A	1	1	1
B	1	0	0
C	0	1	0
D			

Incidence Matrix



	e1	e2	e3
A	1	1	1
B	1	0	0
C	0	1	0
D	0	0	1

Additional Methods for Network Visualization

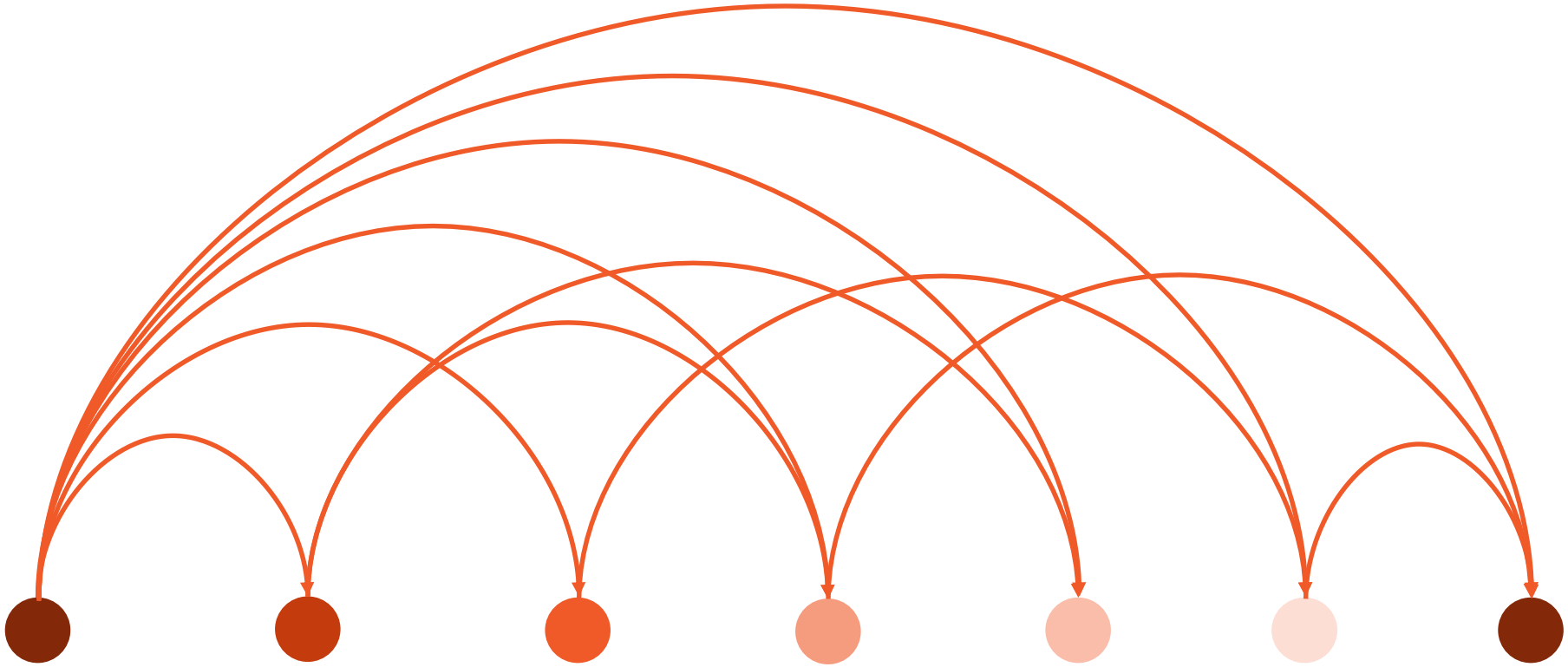
Additional Tools for Visualization

GraphViz

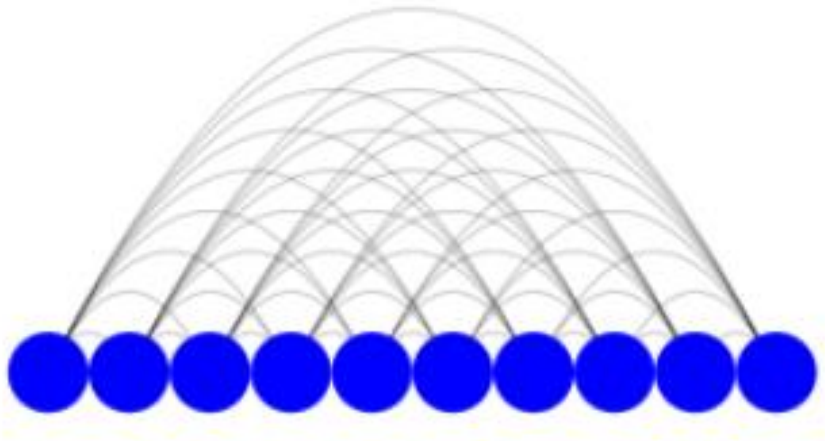
Gephi

Nxviz

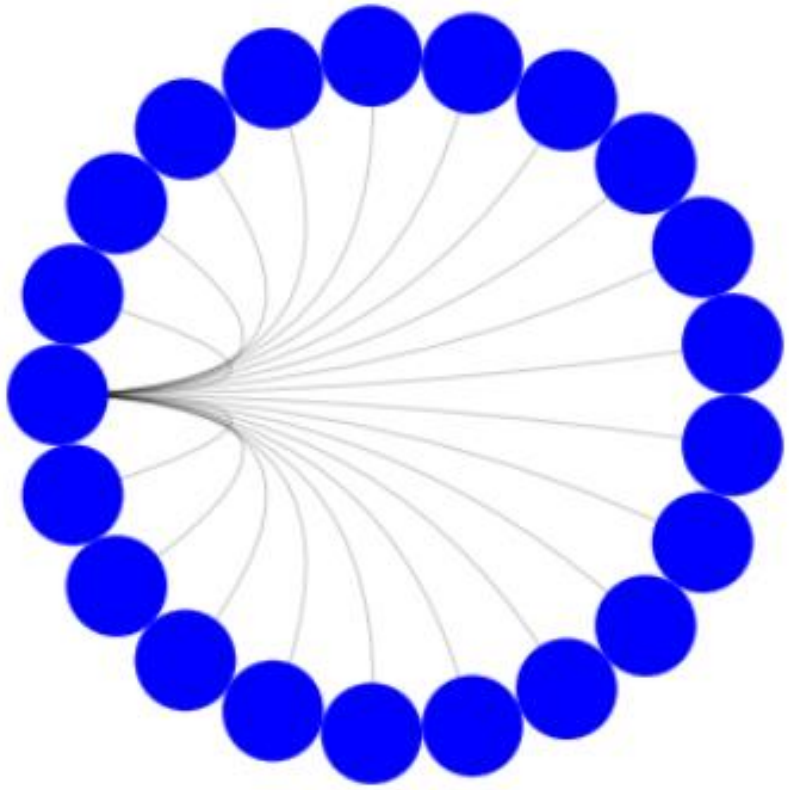
Visualization: Arc Diagram



Visualization: Arc Diagram



Visualization: Circos Plot



Summary

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Introduced and understood adjacency matrices

Implemented an adjacency matrix

Discussed additional methods for network data visualization