

# Data Visualization & Design

**Week 11**

This week in **visualization**...



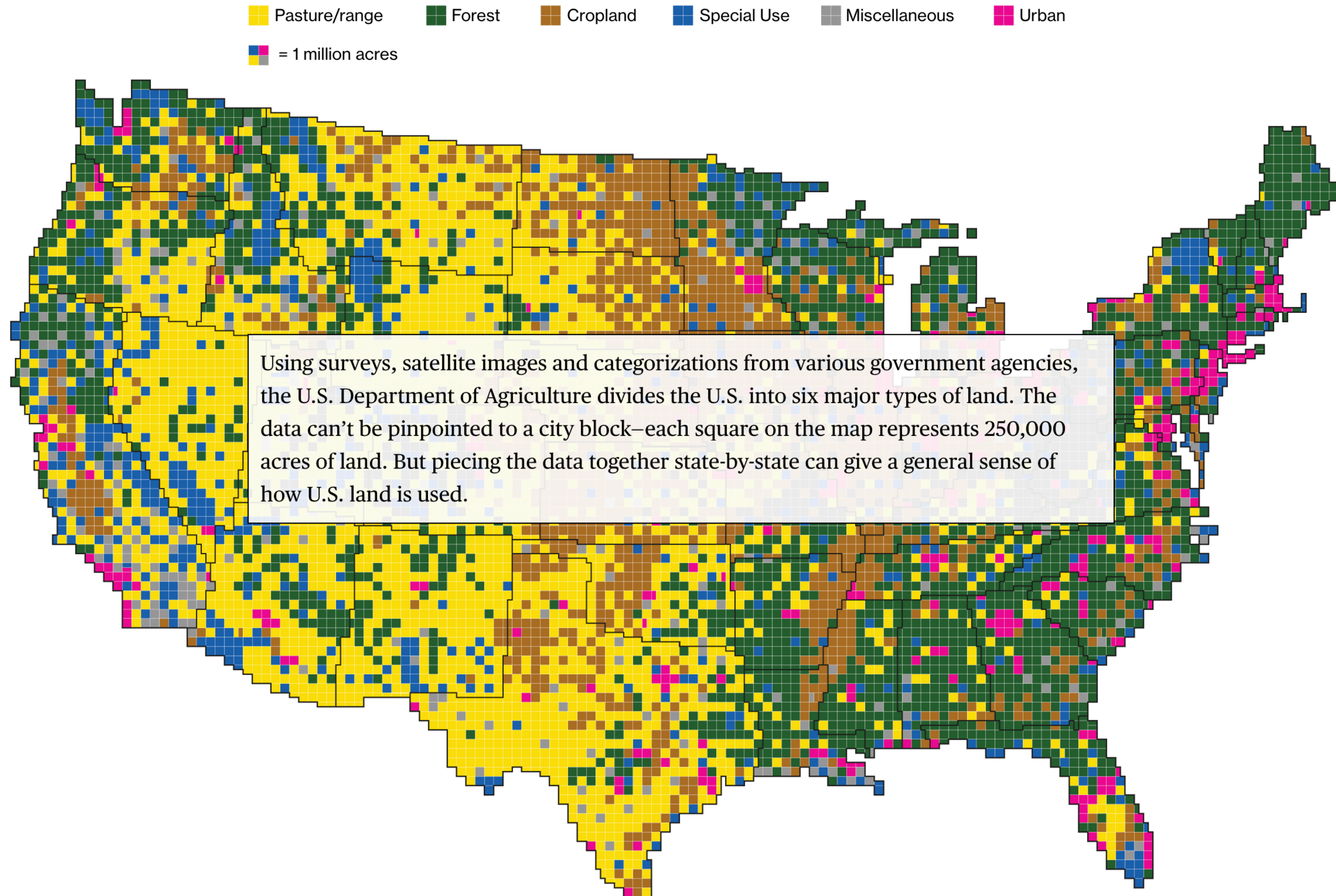
# An Extremely Detailed Map of the 2016 Election


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JOLITO IDEAS 07.30.18 07:00 AM

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# WHY WESTERNERS FEAR ROBOTS AND THE JAPANESE DO NOT



GET WIRED  
UNLIMITED  
ACCESS +  
A FREE YUBIKEY



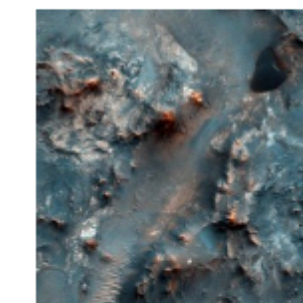
## MOST POPULAR



SCIENCE

The Peculiar Math That  
Could Underlie the Laws of  
Nature

NATALIE WOLCHOVER



SCIENCE

Sorry, Nerds: Terraforming  
Might Not Work on Mars

ADAM ROGERS



TRANSPORTATION

Much of the US Electric  
Grid Could Go the Way of  
the Landline Phone

[Source](#)

1. Introduction to **Network Analysis**
2. Final Project **Critique**
3. Introduction to **Network Visualization**

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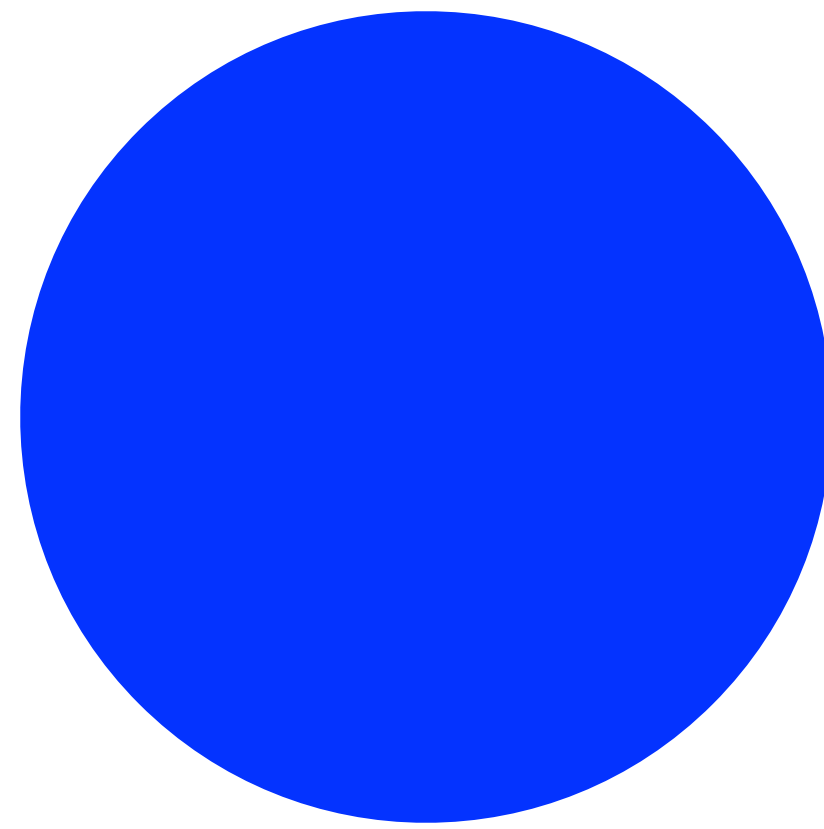
A network is a graph where nodes are connected and positioned depending on their **mutual relationship**.



Use a network to identify **clusters** in large and complex relationship datasets.

# **Anatomy** of a Network Representation

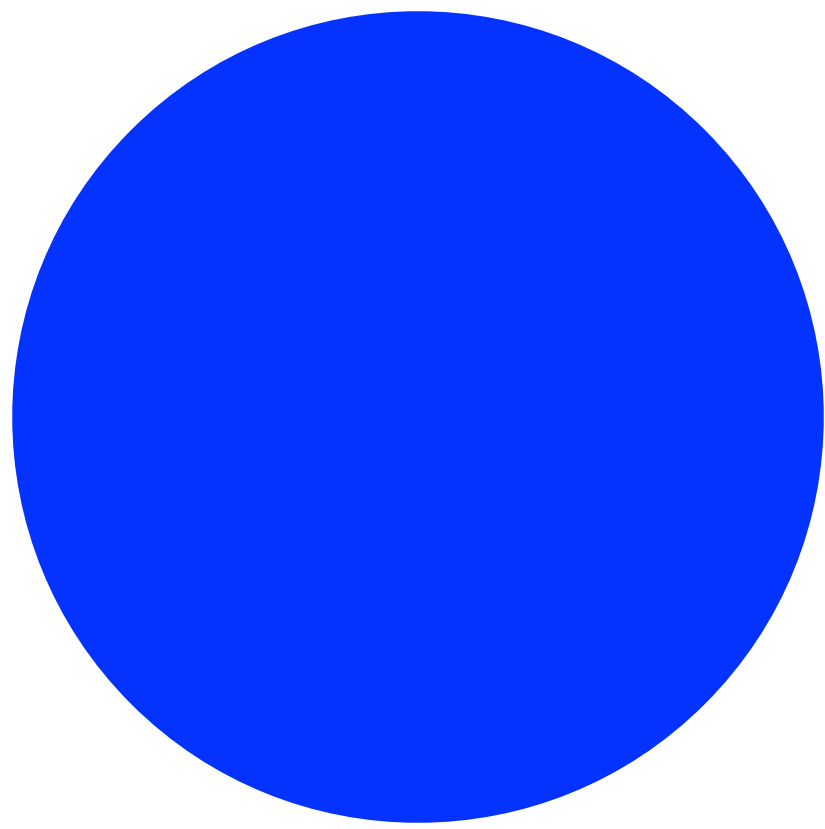
# Anatomy of a network representation



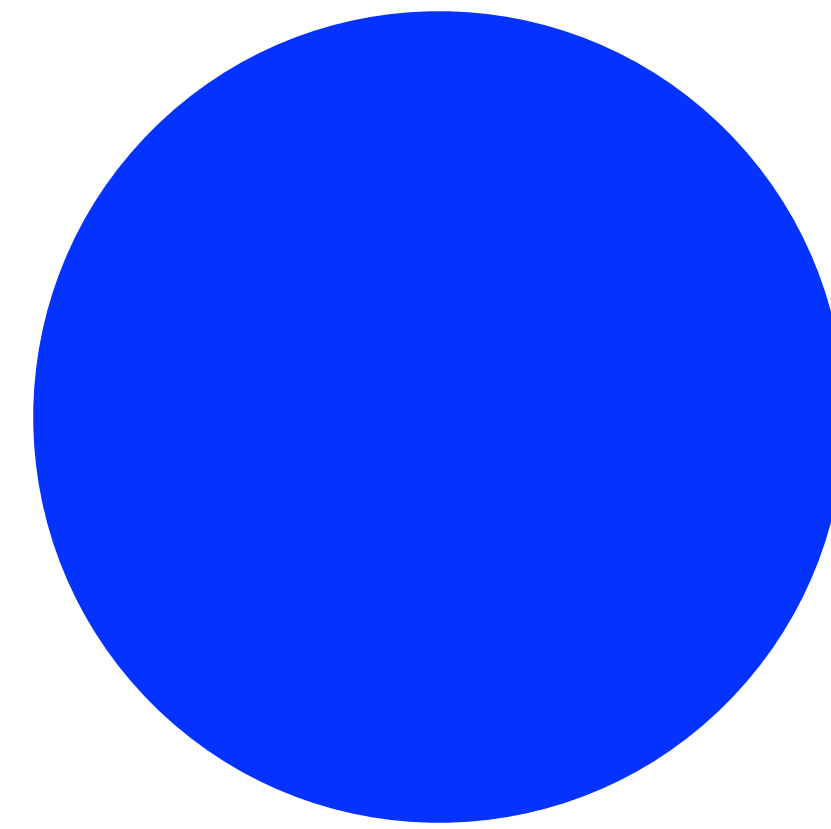
**NODE**



# Anatomy of a network representation

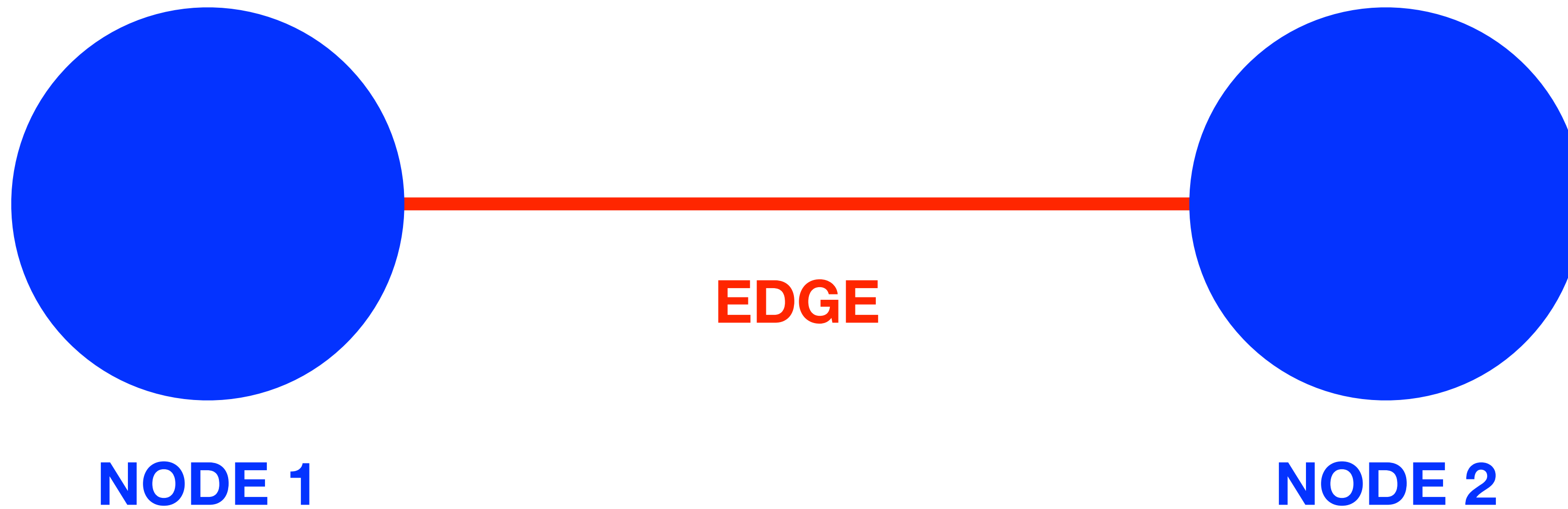


**NODE 1**

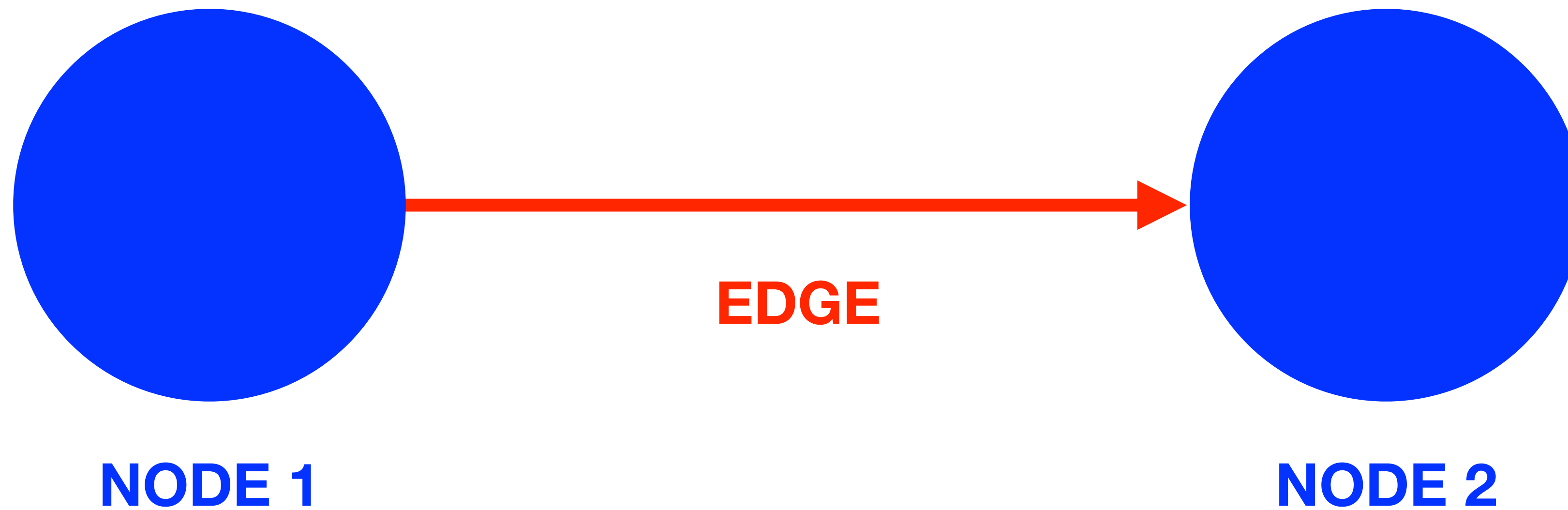


**NODE 2**

# Anatomy of a network representation

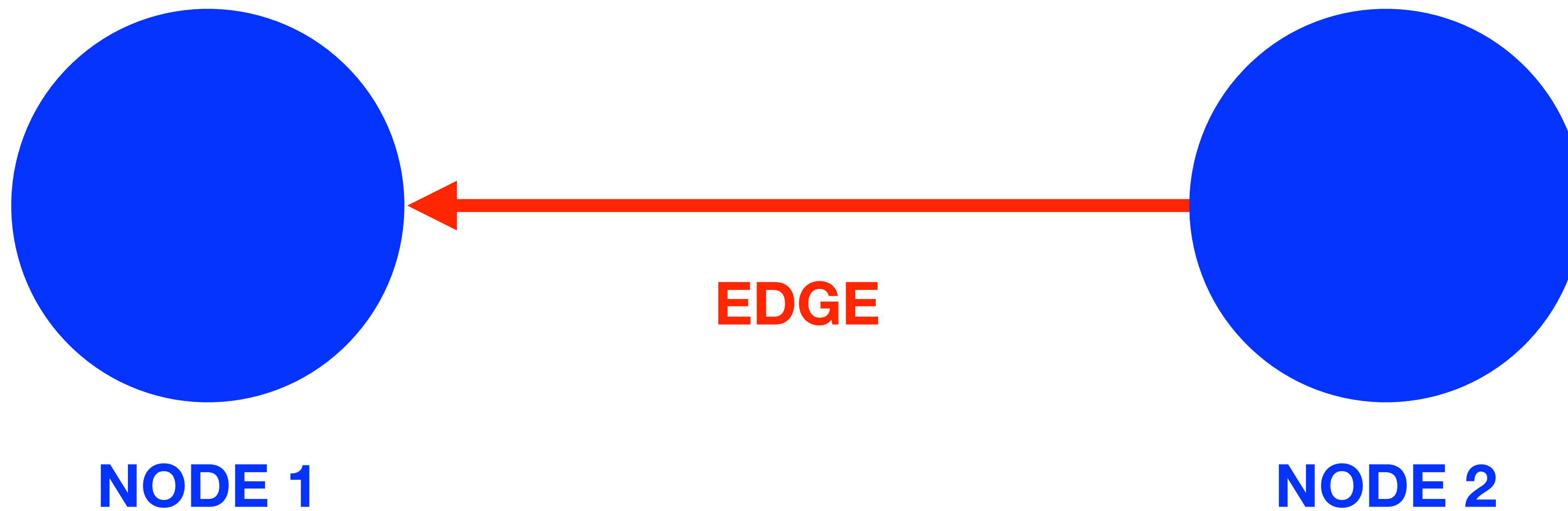


# Anatomy of a network representation

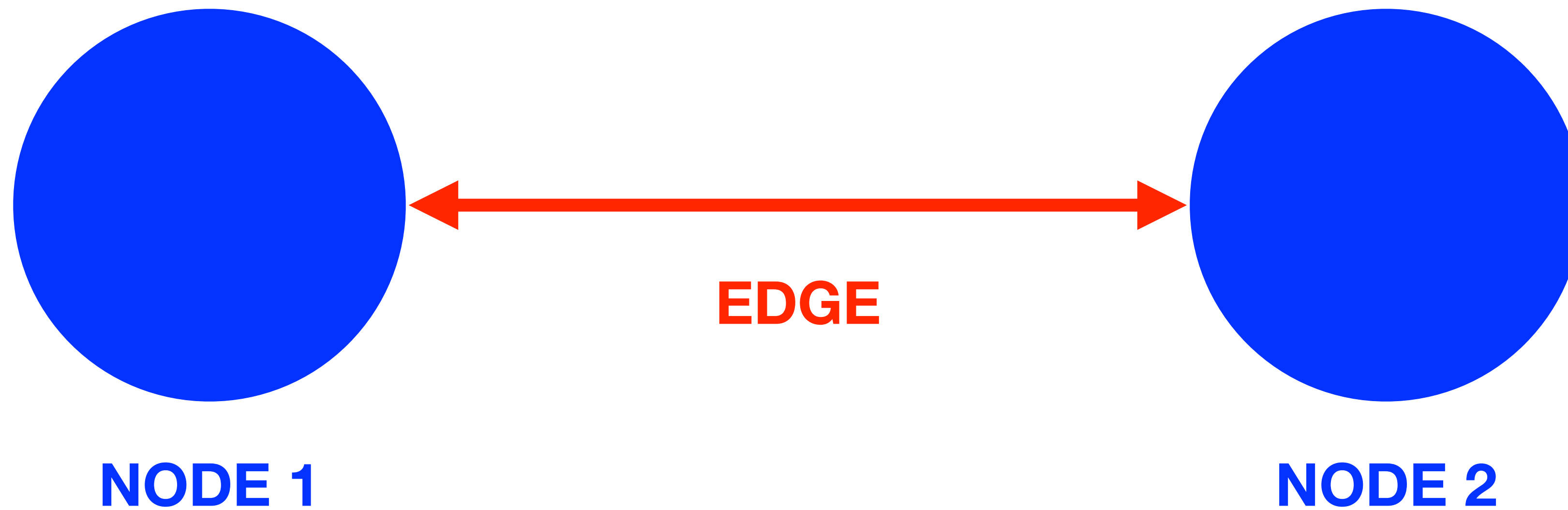




# Anatomy of a network representation



# Anatomy of a network representation



# Example: **Facebook friends**





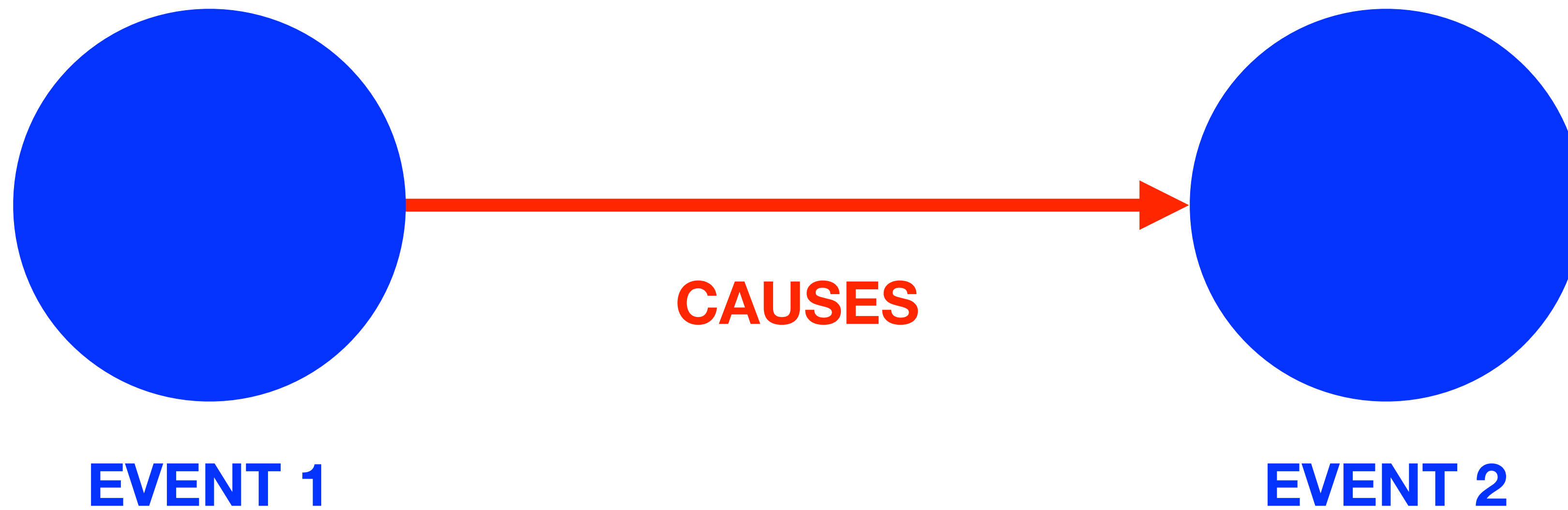
Example: **Conversation between two people**



# Example: **Subway stops**

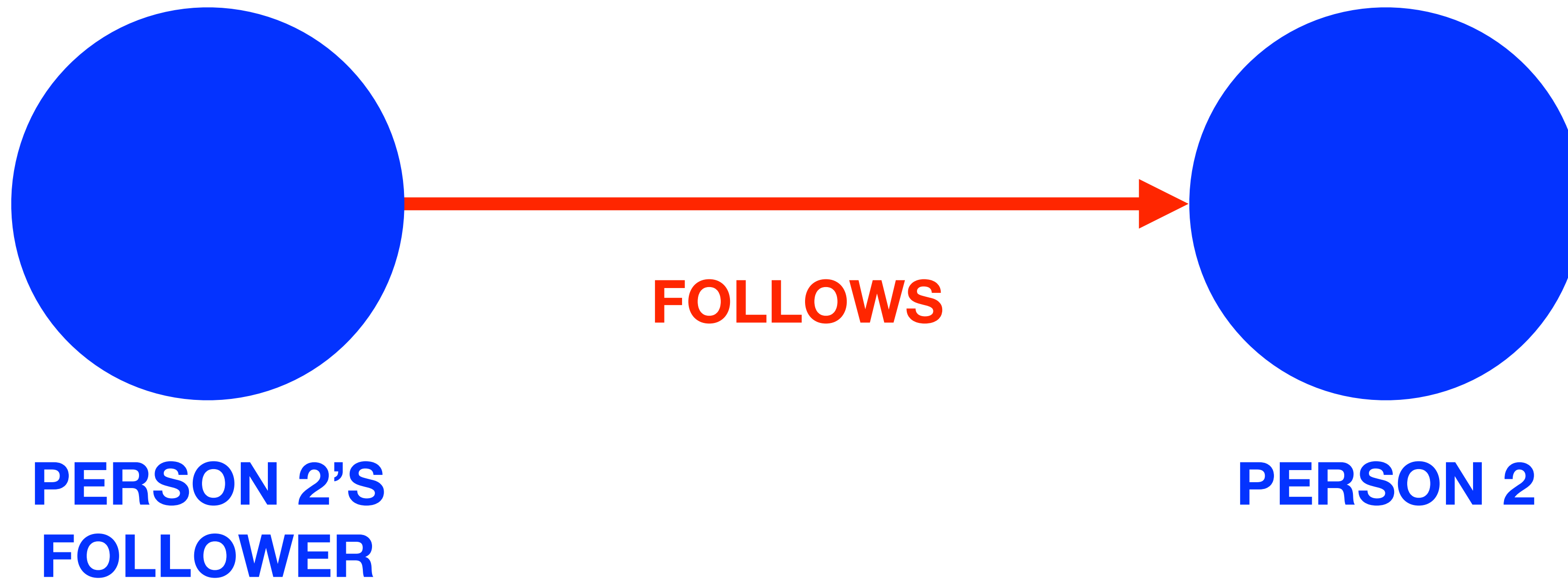


# Example: **Cause & effect**

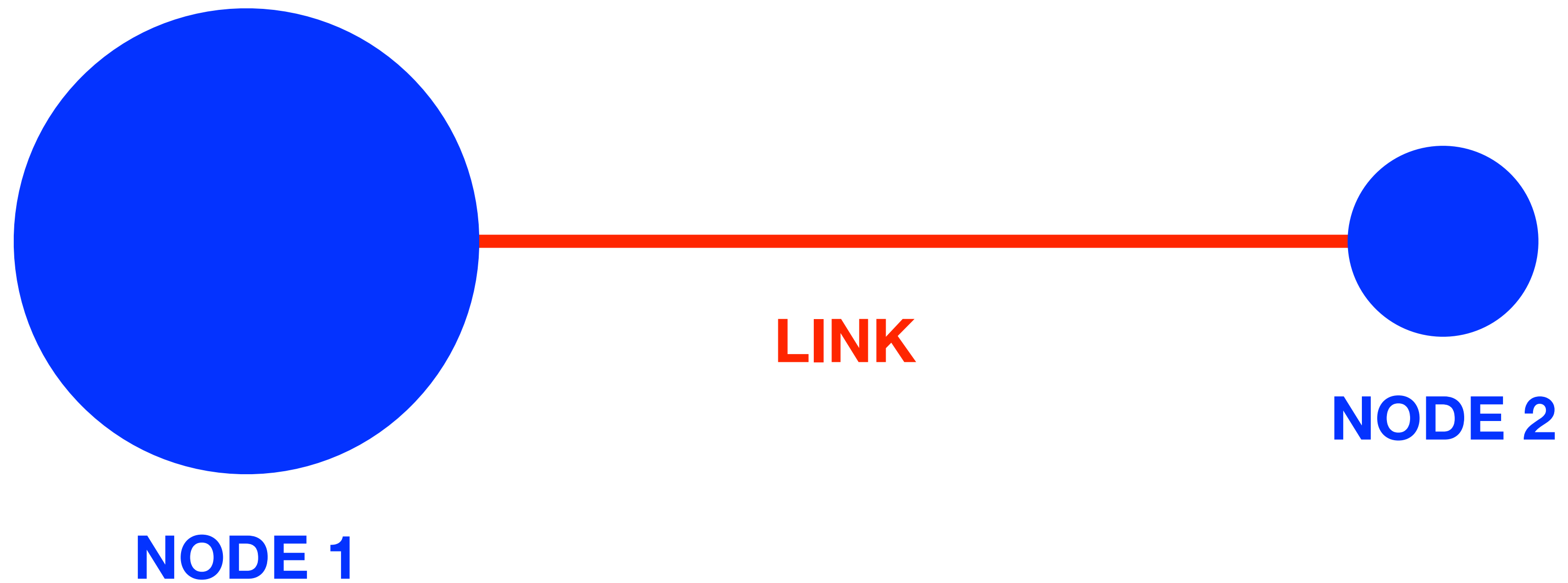




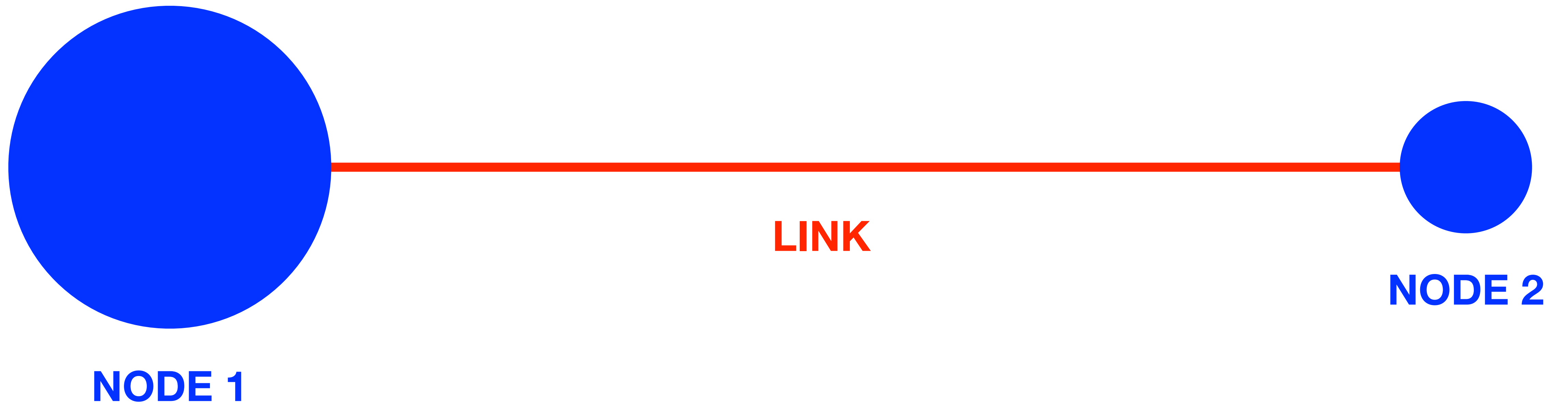
Example: **Twitter follower**



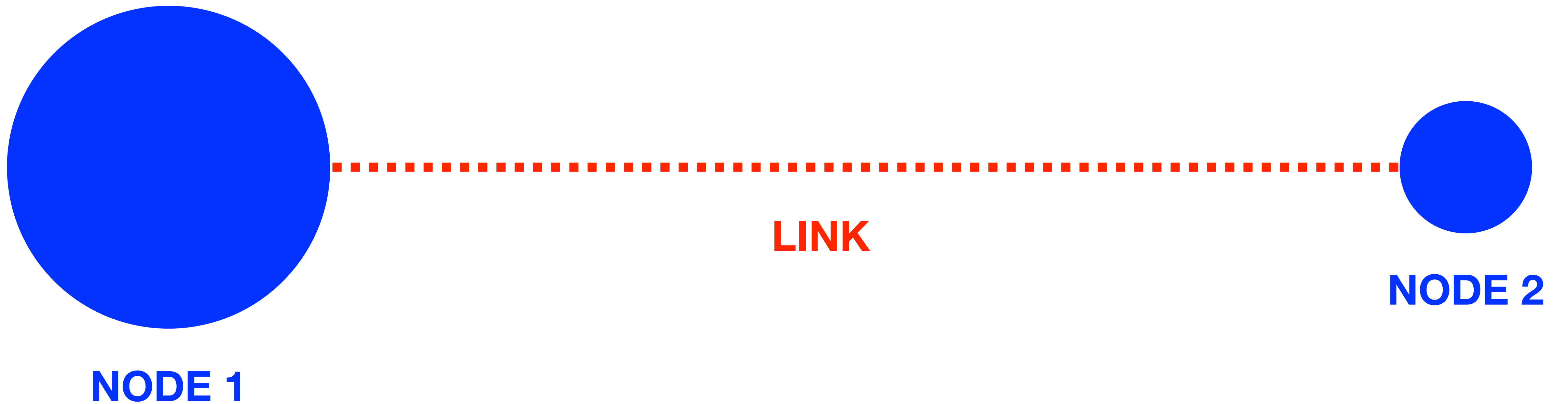
# Anatomy of a network representation



# Anatomy of a network representation



# Anatomy of a network representation





# Network **Data**

Network representations require data to be in a certain **format**.

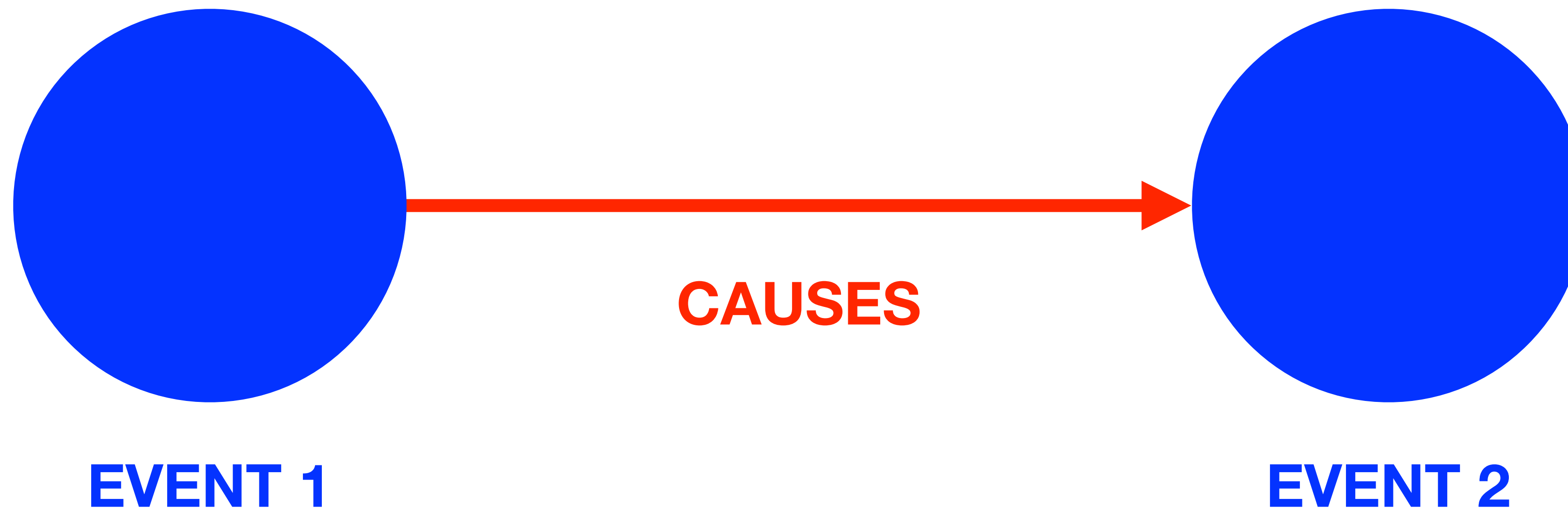
Typically, this takes the form of two datasets: one with **edge data**, and another with **node data**.

# Edge list

- Dataset that contains a minimum of **two columns**:
  - One column of nodes that are the **source** of the connection
  - One column of nodes that are the **target** of the connection

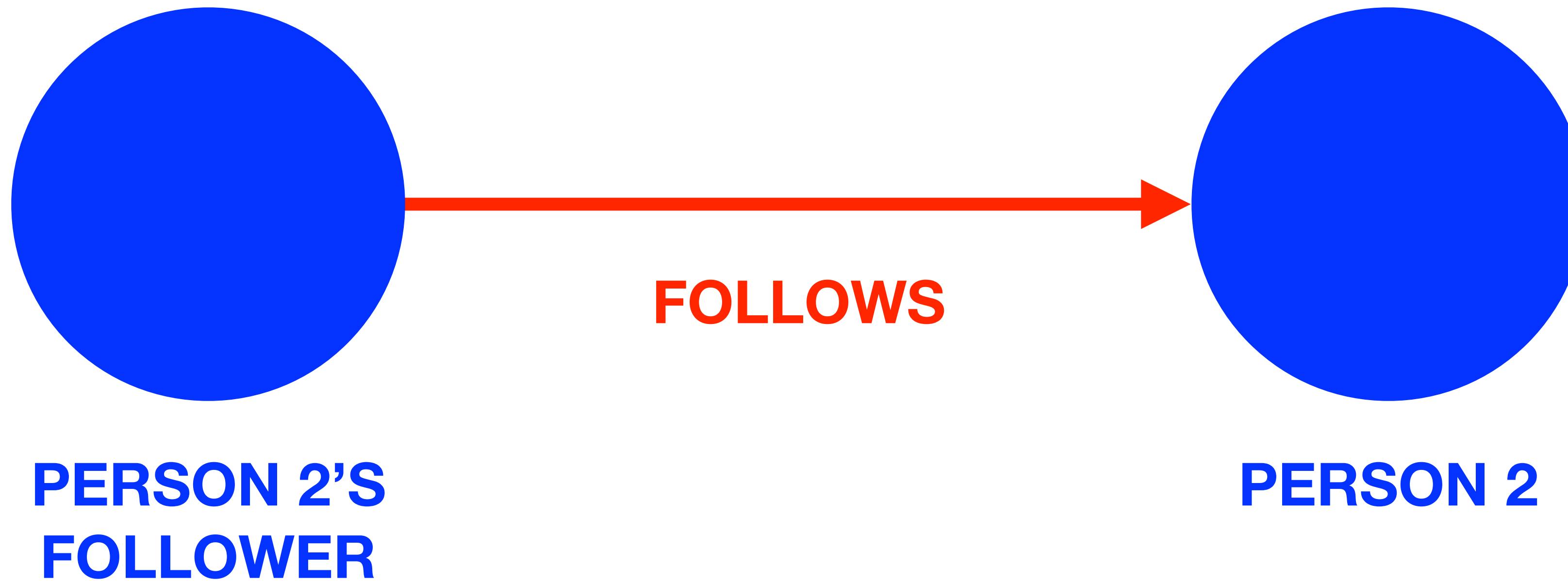
If the distinction between source and target is **meaningful**, the network is **directed**...

# Example: **Cause & effect**





Example: **Twitter follower**



...and if the distinction is ***not meaningful***, the network is **undirected**.

# Example: **Facebook friends**



Example: **Conversation between two people**



Edge lists contain all the necessary data to create a network diagram. But sometimes it is desirable to create a **node list**, too.

# Node list

- Dataset that contains a minimum of **one column:**
  - One column of IDs for nodes that exist in the edge list
- The benefit of a node list is that it is simpler to add multiple **attribute columns** without overcomplicating the edge list



## Edge list

N1 - N2

N1 - N4

N1 - N5

N2 - N3

N2 - N4

N4 - N5

## Node list

N1

N2

N3

N4

N5

# Network **Measures**

# Degree

- The number of **connections** a node has to other nodes

# Centrality

- Measures the **most important vertices** within a network representation
- Good for identifying influential nodes (i.e. social media)

# Assortativity

- Preference within a network for nodes to be connected to **similar nodes**
- Measure of similarity may vary (but can use degree)

# Modularity

- Measures the strength of the division of the network into modules (i.e. groups, clusters, communities)
- Networks with **high modularity** have dense connections between nodes within modules, but sparse connections between nodes in different modules
- Suffers a **resolution limit**

# Efficiency

- Measure of how easily a network **exchanges information**
- Useful in analyzing man-made networks, biological networks, etc.



Interesting **Examples**

# Network visualizations **in the wild**

- Who Marries Whom
- How Disinformation Spreads in a Network
- Lexical Distance Among Languages in Europe
- Choose Your Own Adventure Maps
- Introduction to Network Analysis and Representation

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**[https://github.com/emilyfuhrman/  
datavis\\_design/blob/master/  
2018\\_Summer/Studios/  
07\\_Introduction\\_to\\_Network\\_Visualization\\_  
with\\_Gephi.md](https://github.com/emilyfuhrman/datavis_design/blob/master/2018_Summer/Studios/07_Introduction_to_Network_Visualization_with_Gephi.md)**

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