

# *Road Networks: Graphs and Their Types*

Road networks are the foundation of transportation systems. Understanding their structure and characteristics is crucial for efficient navigation and traffic management.







# *What is a Road Network?*

A road network is a system of interconnected roads, streets, and highways. It's a complex web that facilitates movement of people and goods across a region.

## *1 Interconnected Roads*

Roads are linked to create a complex web, forming a network.

## *2 Facilitates Movement*

Road networks enable efficient transportation of people and goods.

# *Representing Road Networks as Graphs*

Graphs are powerful tools for representing road networks. They allow us to visualize connections and analyze relationships between roads.

## *Nodes*

Represent intersections, junctions, or starting/ending points.

## *Edges*

Represent roads connecting two nodes, representing distance or travel time.







# *Undirected Graphs: Modeling Bidirectional Roads*

Undirected graphs represent roads where traffic can flow in both directions. The connection between two nodes is bidirectional.

1

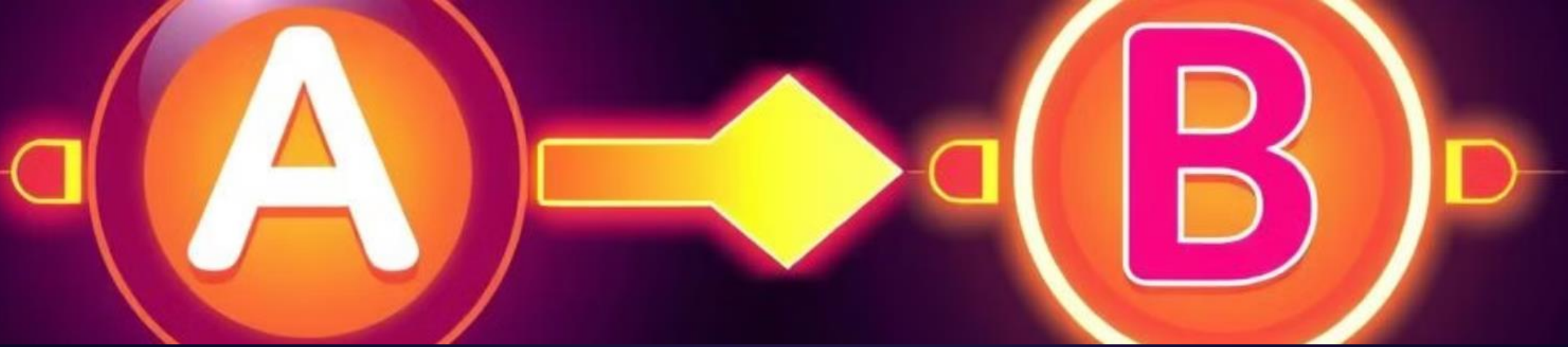
*Node A*

Represents a junction or intersection.

2

*Node B*

Represents a junction or intersection.



## *Directed Graphs: Modeling One-Way Roads*

Directed graphs represent roads where traffic can only flow in one direction. The connection between two nodes is unidirectional.

1

*Node A*

Represents a junction or intersection.

2

*Node B*

Represents a junction or intersection.

# *Real-World Applications of Road Network Graphs*

Road network graphs have practical applications in transportation planning, navigation, and traffic management.

## *Navigation Apps*

Use shortest path algorithms to find optimal routes for drivers.

## *Traffic Management*

Analyze real-time traffic flow to identify congestion and optimize traffic signals.

## *Urban Planning*

Optimize road infrastructure for better connectivity and reduced travel times.