Slide 1 — Title Slide

Explanation:

Today we will talk about Network Centrality, which is a set of methods used to measure how important each node is inside a network. This helps us understand influence and communication

Slide 2 — What Is Network Centrality?

Explanation:

Network centrality tells us how important or influential a node is based on its connections and position in the network.

We use centrality to find:

• Influencers

• Weak or vulnerable nodes

• Bridges between communities

• Nodes that help information spread quickly.

Slide 3 — Why Centrality Matters

Explanation:

Centrality is important because it helps us understand how strong or weak a network is.

It also explains how fast information and data move true network.

Nodes with high centrality usually control communication and stability.

Slide 4 — Types of Centrality

Explanation:

There are several centrality measures because each one looks at importance from a different angle.

These include degree, closeness, betweenness, eigenvector, PageRank, and clustering coefficient.

Slide 5 — Degree Centrality

Explanation:

Degree centrality simply counts how many connections each node has.

If a node has many neighbors, it is more popular or more connected.

This measure helps us find immediate influencers or hubs in a network.

The graph example shows the degree of each node as a bar chart.

Slide 6 — Closeness Centrality

Explanation:

Closeness centrality measures how quickly a node can reach all other nodes using the shortest paths.

Nodes with high closeness have low communication delay.

In the graph, central nodes have higher closeness scores because they can reach others faster.

Slide 7 — Betweenness Centrality

Explanation:

Betweenness centrality measures how often a node lies on the shortest path between other nodes.

Nodes with high betweenness act as bridges or control points.

If removed, they can break communication.

In the graph, the highlighted nodes are the main bridges.

Slide 8 — Eigenvector Centrality

Explanation:

Eigenvector centrality looks at not only how many connections a node has, but how important those neighbors are.

A node connected to influential neighbors gets a higher score.

In the graph, larger nodes are those connected to other important nodes.

Slide 9 — PageRank Centrality

Explanation:

This is Google's original web-page ranking algorithm.

PageRank measures the importance of a node based on the importance of the nodes linking to it.

It simulates a 'random surfer' who moves through the network.

The diagram shows how probability flows among nodes.

Slide 10 — Clustering Coefficient

Explanation:

Clustering coefficient measures how connected a node's neighbors are to each other.

High clustering means the node belongs to a tight group or community.

The graph example highlights triangles showing dense neighborhoods.

Slide 11 — Comparing All Measures

Explanation:

This table compares the main centrality measures.

Each measure answers a different question:

• Degree → Who is most connected?

• Closeness → Who can reach everyone fastest?

• Betweenness → Who controls communication?

• Eigenvector → Who is connected to important nodes?

• PageRank → Who is most likely to be visited?

• Clustering → Who belongs to tight communities?”

Slide 12 — Caveats

Explanation:

There is no single best centrality.

Different networks require different measures.

A node with high centrality is not always the most important , it depends on the purpose and context of the analysis.