# Use Case: Social Media Influence Analysis

## Scenario

To identify who has the most following on a social media platform like Instagram with the purpose of recruiting popular influencers to promote a product or efficiently spread information across the social media app.

## Test Data

Nodes represents users (Jordan, John, Jaden, Jade, Jasmine).

Edges represents follower relationships between users.

## Network Graph

## Analysis

The graph network above illustrates which user has the most followers or influence. The two key metrics utilized in graph network analysis are degree centrality and betweenness centrality.

### Degree Centrality

Degree centrality refers to the number of connections a single node has compared to other nodes. In this context, it calculates how many followers does an Instagram user (representing a node) has. Degree centrality usually relies on the structures of two graphs, undirected graph and directed graph. In an undirected graph (relationships are mutual), the degree centrality defines as the number of edges connected to a node. In a directed graph (relationships are one-way), the degree centrality defines as the number of incoming edges from other nodes and outgoing edges to other nodes.

Based on this network graph, a directed graph can be used to perform analysis. Jordan is the most influential as he has the most incoming edges connected to him amongst them. Therefore, making his node the one with the highest degree centrality.

### Betweenness Centrality

Betweenness centrality refers to which nodes acts the most as a bridge, helping other nodes connect with each other. To further elaborate, it measures which nodes appears the most at the shortest route between every pair of nodes. This metric can be used for identifying the specific user that can efficiently spread information across the social network.

#### **Shortest Paths Available**

**John → Jordan**: 1 direct path (John → Jordan)

**John → Jaden**: 1 direct path (John → Jaden)

**John → Jade**: John → Jaden → Jade

**John → Jasmine**: John → Jaden → Jade → Jasmine

**John → Jordan**: John → Jaden → Jade → Jasmine → Jordan (a second path via Jasmine)

**Jaden → Jade**: 1 direct path (Jaden → Jade)

**Jaden → Jasmine**: Jaden → Jade → Jasmine

**Jaden → Jordan**: Jaden → Jade → Jasmine → Jordan

**Jade → Jasmine**: 1 direct path (Jade → Jasmine)

**Jade → Jordan**: Jade → Jasmine → Jordan

**Jasmine → Jordan**: 1 direct path (Jasmine → Jordan)

Above list shows all the shortest paths available in the network graph. Jaden would have the highest centrality score as he provides the connection to most routes between other nodes.

#### Routes Involving Jaden

1. **John to Jade**:
   * **Path**: John → Jaden → Jade
2. **John to Jasmine**:
   * **Path**: John → Jaden → Jade → Jasmine
3. **John to Jordan (alternate route)**:
   * **Path**: John → Jaden → Jade → Jasmine → Jordan
4. **Jaden to Jasmine**:
   * **Path**: Jaden → Jade → Jasmine
5. **Jaden to Jordan**:
   * **Path**: Jaden → Jade → Jasmine → Jordan