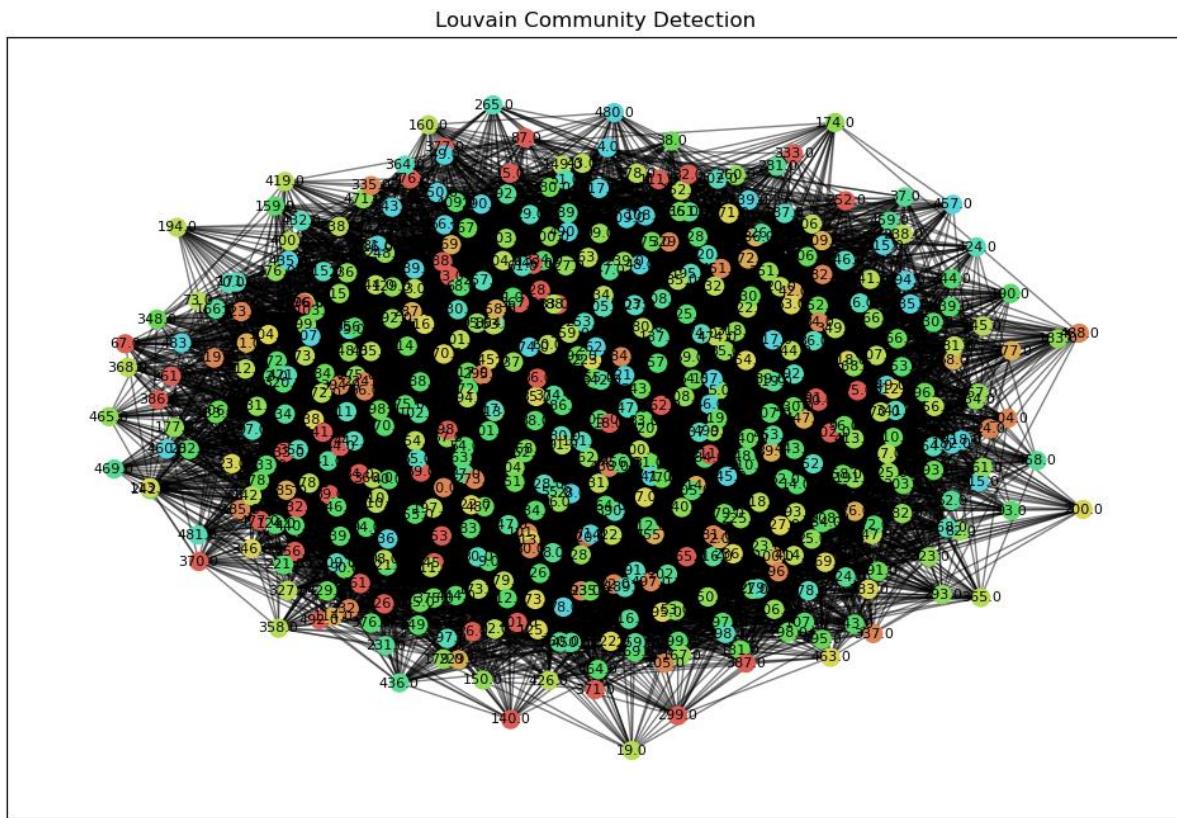


Name – Tiku Mohammd

R.No – 24CS60R81

Community used - community\_louvain.



Modularity: 0.1560

### 3. Identifying Key Businesses:

Community 0 - Key Businesses:

Top 5 by Degree Centrality: [44.0, 128.0, 36.0, 120.0, 18.0]

Top 5 by Betweenness Centrality: [44.0, 36.0, 128.0, 120.0, 32.0]

Top 5 by Closeness Centrality: [44.0, 128.0, 36.0, 120.0, 461.0]

Community 1 - Key Businesses:

Top 5 by Degree Centrality: [295.0, 205.0, 381.0, 273.0, 22.0]

Top 5 by Betweenness Centrality: [295.0, 224.0, 329.0, 22.0, 332.0]

Top 5 by Closeness Centrality: [295.0, 224.0, 329.0, 332.0, 337.0]

**Community 2 - Key Businesses:**

Top 5 by Degree Centrality: [214.0, 100.0, 285.0, 447.0, 269.0]

Top 5 by Betweenness Centrality: [100.0, 214.0, 447.0, 372.0, 285.0]

Top 5 by Closeness Centrality: [214.0, 100.0, 447.0, 285.0, 42.0]

**Community 3 - Key Businesses:**

Top 5 by Degree Centrality: [312.0, 445.0, 63.0, 369.0, 118.0]

Top 5 by Betweenness Centrality: [369.0, 35.0, 312.0, 118.0, 445.0]

Top 5 by Closeness Centrality: [312.0, 445.0, 63.0, 118.0, 369.0]

**Community 4 - Key Businesses:**

Top 5 by Degree Centrality: [378.0, 144.0, 404.0, 91.0, 3.0]

Top 5 by Betweenness Centrality: [378.0, 244.0, 3.0, 91.0, 144.0]

Top 5 by Closeness Centrality: [378.0, 144.0, 404.0, 91.0, 244.0]

**Community 5 - Key Businesses:**

Top 5 by Degree Centrality: [25.0, 59.0, 95.0, 389.0, 239.0]

Top 5 by Betweenness Centrality: [389.0, 53.0, 95.0, 127.0, 313.0]

Top 5 by Closeness Centrality: [25.0, 95.0, 389.0, 127.0, 59.0]

**Community 6 - Key Businesses:**

Top 5 by Degree Centrality: [64.0, 351.0, 352.0, 462.0, 133.0]

Top 5 by Betweenness Centrality: [64.0, 351.0, 90.0, 352.0, 158.0]

Top 5 by Closeness Centrality: [64.0, 462.0, 352.0, 196.0, 375.0]

**Community 7 - Key Businesses:**

Top 5 by Degree Centrality: [388.0, 405.0, 169.0, 228.0, 112.0]

Top 5 by Betweenness Centrality: [388.0, 405.0, 228.0, 456.0, 14.0]

Top 5 by Closeness Centrality: [405.0, 228.0, 376.0, 199.0, 456.0]

**Community 8 - Key Businesses:**

Top 5 by Degree Centrality: [453.0, 8.0, 47.0, 436.0, 308.0]

Top 5 by Betweenness Centrality: [202.0, 453.0, 41.0, 55.0, 8.0]

Top 5 by Closeness Centrality: [453.0, 436.0, 47.0, 308.0, 55.0]

**Community 9 - Key Businesses:**

Top 5 by Degree Centrality: [29.0, 328.0, 253.0, 392.0, 278.0]

Top 5 by Betweenness Centrality: [29.0, 328.0, 392.0, 247.0, 420.0]

Top 5 by Closeness Centrality: [65.0, 491.0, 29.0, 328.0, 278.0]

## Community 10 - Key Businesses:

Top 5 by Degree Centrality: [354.0, 490.0, 262.0, 108.0, 274.0]

Top 5 by Betweenness Centrality: [490.0, 262.0, 108.0, 245.0, 418.0]

Top 5 by Closeness Centrality: [108.0, 354.0, 262.0, 139.0, 435.0]

**summary of detected anomalies for each community (degree centrality) :**

**Total Anomalies Detected: 295**

**Community 0:**

44.0 with 212.0 (0.87), 422.0 (0.88), 25.0 (0.81), 237.0 (0.84), 70.0 (0.87);

128.0 with 294.0 (0.92), 234.0 (0.84), 91.0 (0.97), 232.0 (0.91), 356.0 (0.81), 170.0 (0.86), 206.0 (0.94);

36.0 with 462.0 (0.98), 71.0 (0.90), 45.0 (0.84), 316.0 (0.90), 51.0 (0.84), 416.0 (0.87), 380.0 (0.97), 317.0 (0.81);

120.0 with 296.0 (0.91), 230.0 (0.81), 121.0 (0.86), 313.0 (0.88), 71.0 (0.96), 207.0 (0.88);

18.0 with 7.0 (0.85), 352.0 (0.80), 297.0 (0.93), 325.0 (0.88), 466.0 (0.90), 388.0 (0.97), 439.0 (0.90).

**Community 1:**

295.0 with 306.0 (0.93), 254.0 (0.84), 410.0 (0.96), 390.0 (0.94), 312.0 (0.83), 113.0 (0.86), 385.0 (0.82), 258.0 (0.93);

205.0 with 299.0 (0.95), 422.0 (0.93), 345.0 (0.82), 221.0 (0.84), 6.0 (0.99);

381.0 with 102.0 (0.84), 203.0 (0.94), 122.0 (0.92), 326.0 (0.81), 154.0 (0.84), 452.0 (0.80);

273.0 with 460.0 (0.91), 93.0 (0.80), 496.0 (0.95), 89.0 (1.00), 29.0 (0.91), 232.0 (0.89), 45.0 (0.86), 47.0 (0.83), 117.0 (0.86), 349.0 (0.80), 67.0 (0.80);

22.0 with 100.0 (0.80), 427.0 (0.95), 291.0 (0.86), 21.0 (0.90), 413.0 (0.98).

**Community 2:**

214.0 with 302.0 (0.81), 43.0 (0.91), 497.0 (0.97);

100.0 with 112.0 (0.85), 115.0 (0.80), 312.0 (0.90), 369.0 (1.00), 161.0 (0.91);

285.0 with 122.0 (1.00), 412.0 (0.87), 121.0 (0.89), 422.0 (0.89);

447.0 with 330.0 (0.99), 118.0 (0.97), 241.0 (0.99), 28.0 (0.98);  
269.0 with 401.0 (0.97), 82.0 (0.90), 472.0 (0.87), 333.0 (0.89), 465.0 (0.93), 331.0 (0.97).

**Community 3:**

312.0 with 447.0 (0.89), 72.0 (0.81), 203.0 (0.94), 50.0 (0.84), 100.0 (0.90), 108.0 (0.99), 291.0 (0.81), 186.0 (0.84);  
445.0 with 469.0 (0.90), 132.0 (0.90), 229.0 (0.98), 215.0 (0.92), 152.0 (0.92);  
63.0 with 20.0 (0.88), 162.0 (0.83), 203.0 (0.88), 453.0 (0.96);  
369.0 with 485.0 (0.80), 100.0 (1.00), 126.0 (0.86), 444.0 (0.82);  
118.0 with 289.0 (0.97), 447.0 (0.97), 468.0 (0.92), 75.0 (0.98), 490.0 (0.89), 111.0 (0.98).

**Community 4:**

378.0 with 192.0 (0.93), 132.0 (0.90), 78.0 (0.91), 45.0 (0.83);  
144.0 with 204.0 (0.98), 35.0 (0.98), 468.0 (0.92), 6.0 (1.00), 478.0 (0.90), 59.0 (0.91), 130.0 (0.93), 39.0 (0.85), 47.0 (0.92), 68.0 (0.95);  
404.0 with 443.0 (0.80), 417.0 (0.84), 288.0 (0.81), 29.0 (0.96);  
91.0 with 423.0 (0.85), 209.0 (0.90), 438.0 (0.82), 128.0 (0.97);  
3.0 with 94.0 (0.97), 341.0 (0.89).

**Community 5:**

25.0 with 337.0 (0.82), 379.0 (0.97), 46.0 (1.00), 44.0 (0.81), 116.0 (0.86);  
59.0 with 103.0 (0.85), 144.0 (0.91), 439.0 (0.82), 169.0 (0.98), 216.0 (0.93), 84.0 (0.92);  
95.0 with 83.0 (0.96), 478.0 (1.00), 301.0 (0.92), 345.0 (0.82), 102.0 (0.87), 338.0 (0.95);  
389.0 with 359.0 (0.96), 457.0 (1.00);  
239.0 with 462.0 (0.93), 62.0 (0.85), 272.0 (0.83), 466.0 (0.85), 480.0 (0.93), 88.0 (0.92).

**Community 6:**

64.0 with 48.0 (0.90);  
351.0 with 34.0 (0.82), 157.0 (0.92), 334.0 (0.92), 19.0 (0.97);  
352.0 with 18.0 (0.80), 126.0 (0.86), 14.0 (0.89), 222.0 (0.96), 408.0 (0.90), 302.0 (0.84);  
462.0 with 239.0 (0.93), 36.0 (0.98), 265.0 (0.92), 368.0 (0.98), 449.0 (0.95);  
133.0 with 35.0 (0.99), 102.0 (1.00), 461.0 (0.98), 394.0 (0.82), 66.0 (0.84), 88.0 (0.85).

**Community 7:**

388.0 with 348.0 (0.97), 197.0 (0.83), 267.0 (1.00), 29.0 (0.81), 138.0 (0.89);  
405.0 with 403.0 (0.82), 275.0 (1.00), 262.0 (0.87), 394.0 (0.86), 438.0 (0.87);  
169.0 with 59.0 (0.98);  
228.0 with 329.0 (0.87), 252.0 (0.95);  
112.0 with 26.0 (0.86), 231.0 (0.85), 157.0 (0.93).

**Community 9:**

29.0 with 102.0 (0.93), 320.0 (0.93), 388.0 (0.81), 404.0 (0.96), 273.0 (0.91), 151.0 (0.92);  
328.0 with 314.0 (0.98), 494.0 (0.86), 383.0 (0.83);  
253.0 with 270.0 (0.84), 152.0 (0.96), 362.0 (0.87), 258.0 (0.82), 386.0 (0.88), 233.0 (0.94), 153.0 (0.99), 409.0 (0.95), 482.0 (0.82);  
392.0 with 379.0 (0.84), 100.0 (0.87), 434.0 (0.85), 48.0 (0.90);  
278.0 with 387.0 (0.81), 350.0 (0.94), 456.0 (0.99), 199.0 (0.81), 414.0 (0.91), 202.0 (0.99).

**Community 10:**

354.0 with 225.0 (0.87), 33.0 (0.93), 119.0 (0.92), 229.0 (0.80);  
490.0 with 51.0 (0.91), 258.0 (0.93), 282.0 (0.90), 272.0 (0.82);

262.0 with 50.0 (0.92), 320.0 (0.85), 101.0 (0.92), 405.0 (0.87), 499.0 (0.87), 309.0 (0.97);  
108.0 with 421.0 (0.93), 210.0 (0.97), 312.0 (0.99), 335.0 (0.97);  
274.0 with 344.0 (0.99), 275.0 (0.87), 101.0 (0.86).

**New Modularity Score after adjustments: 0.2018708496868685**