# Search Algorithms

# Centrality

After computing the centralities of cities from Romania map, we have observed that **Bucharest, Sibiu, Rimnicu Vilcea** and **Pitesti** scored the highest on all centrality measures. This was expected because they were located at the center of the map and had relatively more connections.

Cities that are located at the edge of the map, such as **Vaslui, Hirsova, Mehadia, Lugoj, Iasi, Giurgiu, Eforie** and **Neamt,** had small centrality on all measures which indicated their extreme location.

The following tables show the computed centralities for each cities of Romania.

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| |  |  | | --- | --- | | Degree Centrality | | | City | Centrality | | Sibiu | 0.211 | | Bucharest | 0.211 | | Arad | 0.158 | | Rimnicu Vilcea | 0.158 | | Pitesti | 0.158 | | Craiova | 0.158 | | Urziceni | 0.158 | | Oradea | 0.105 | | Zerind | 0.105 | | Timisoara | 0.105 | | Fagaras | 0.105 | | Lugoj | 0.105 | | Mehadia | 0.105 | | Drobeta | 0.105 | | Hirsova | 0.105 | | Vaslui | 0.105 | | Iasi | 0.105 | | Giurgiu | 0.053 | | Eforie | 0.053 | | Neamt | 0.053 | | |  |  | | --- | --- | | Closeness Centrality | | | City | Centrality | | Pitesti | 0.00343 | | Rimnicu Vilcea | 0.00329 | | Bucharest | 0.00329 | | Sibiu | 0.00302 | | Urziceni | 0.00294 | | Craiova | 0.00294 | | Fagaras | 0.00282 | | Giurgiu | 0.00257 | | Arad | 0.00255 | | Drobeta | 0.00247 | | Hirsova | 0.00237 | | Oradea | 0.00233 | | Mehadia | 0.00229 | | Vaslui | 0.00225 | | Zerind | 0.00220 | | Timisoara | 0.00217 | | Lugoj | 0.00217 | | Eforie | 0.00198 | | Iasi | 0.00192 | | Neamt | 0.00165 | |

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| |  |  | | --- | --- | | Betweenness Centrality | | | City | Centrality | | Bucharest | 1.05263 | | Pitesti | 0.93567 | | Urziceni | 0.88889 | | Rimnicu Vilcea | 0.65497 | | Sibiu | 0.63158 | | Craiova | 0.40936 | | Arad | 0.39766 | | Vaslui | 0.39766 | | Drobeta | 0.29240 | | Hirsova | 0.21053 | | Iasi | 0.21053 | | Mehadia | 0.18713 | | Timisoara | 0.11696 | | Lugoj | 0.09357 | | Zerind | 0.04678 | | Oradea | 0.00000 | | Fagaras | 0.00000 | | Giurgiu | 0.00000 | | Eforie | 0.00000 | | Neamt | 0.00000 | | |  |  | | --- | --- | | Eigenvector Centrality | | | City | Centrality | | Rimnicu Vilcea | 0.40410 | | Sibiu | 0.39756 | | Pitesti | 0.38951 | | Bucharest | 0.34233 | | Craiova | 0.33856 | | Fagaras | 0.26563 | | Arad | 0.23855 | | Oradea | 0.19913 | | Urziceni | 0.17544 | | Zerind | 0.15713 | | Drobeta | 0.14948 | | Giurgiu | 0.12291 | | Timisoara | 0.10982 | | Mehadia | 0.07784 | | Vaslui | 0.07395 | | Hirsova | 0.07233 | | Lugoj | 0.06737 | | Iasi | 0.03049 | | Eforie | 0.02597 | | Neamt | 0.01095 | |

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| |  |  | | --- | --- | | Katz Centrality | | | City | Centrality | | Sibiu | 0.26209 | | Bucharest | 0.25984 | | Rimnicu Vilcea | 0.24444 | | Pitesti | 0.24424 | | Craiova | 0.24017 | | Arad | 0.23904 | | Urziceni | 0.23852 | | Fagaras | 0.22199 | | Oradea | 0.21755 | | Zerind | 0.21545 | | Drobeta | 0.21506 | | Timisoara | 0.21495 | | Vaslui | 0.21468 | | Hirsova | 0.21275 | | Mehadia | 0.21255 | | Lugoj | 0.21254 | | Iasi | 0.21034 | | Giurgiu | 0.19578 | | Eforie | 0.19107 | | Neamt | 0.19083 | |  |