Week8 Report

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In this week, we further study the ranking node effect on short average path. We focus on the extreme cases. In the first step, we check the feasibility of the new degree sequence model. Then we study the effect on average short path in graph.

1 Average short path

For this part, we study the marginal node effect upon average short path based upon page rank, betweenness centrality, total degree, in degree and out degree ranking. We test for the small graph (expected mean equals to 3), and medium graph (10).

1.1 Small graph

We first test the graph where in-degree and out-degree are correlated, perfectly correlated and independent.

1.1.1 General case

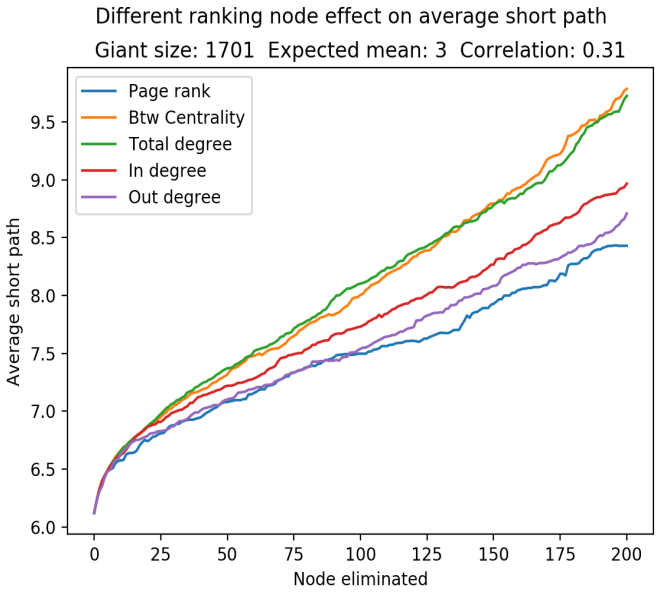

Figure 1.1: Node effect on average shortest path

1.1.2 Perfectly correlated

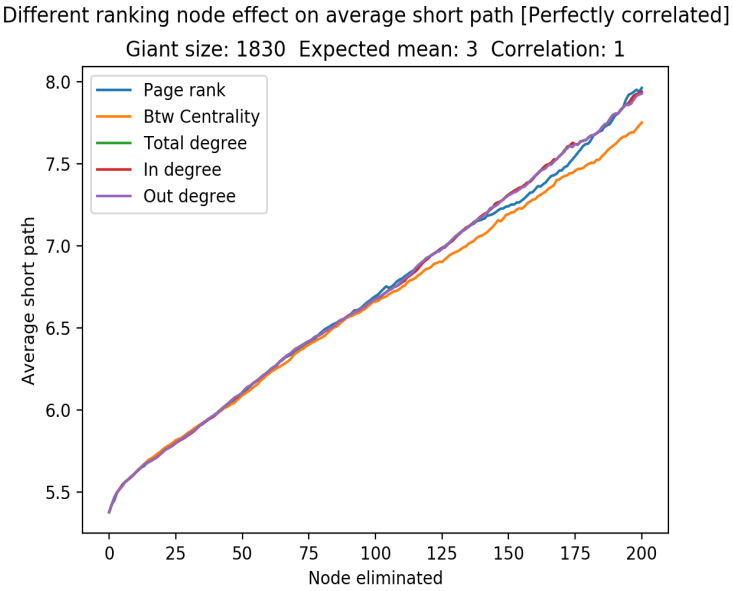

Figure 1.2: Perfectly correlated node effect on average shortest path

1.1.3 Independent

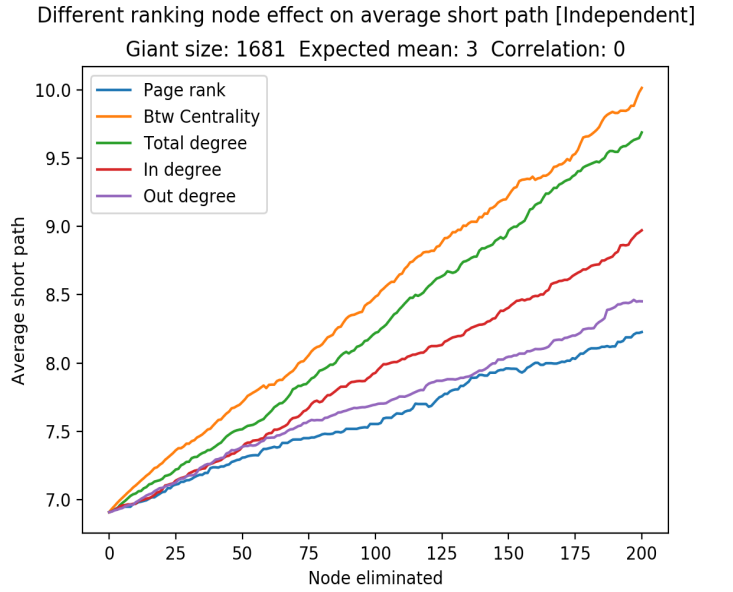

Figure 1.3: Independent degree sequence node effect on average shortest path

1.2 Mediuml graph

We test the graph where expected degree is 10.

1.2.1 General case

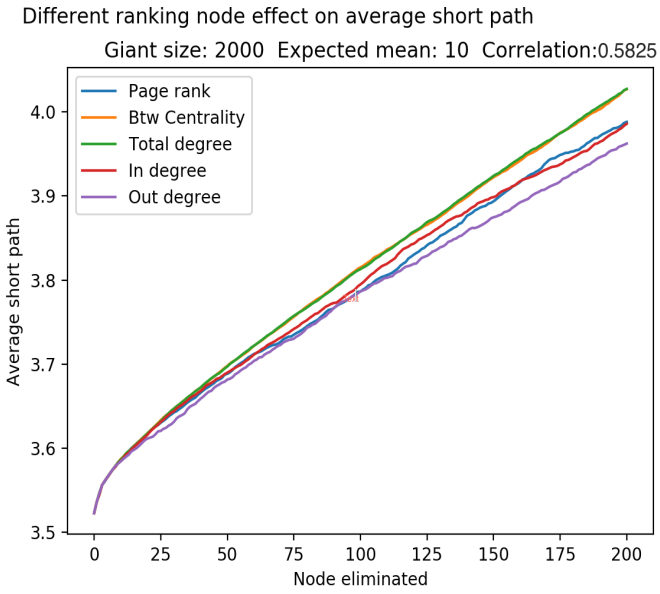

Figure 1.4: Node effect on average shortest path

1.2.2 Perfectly correlated

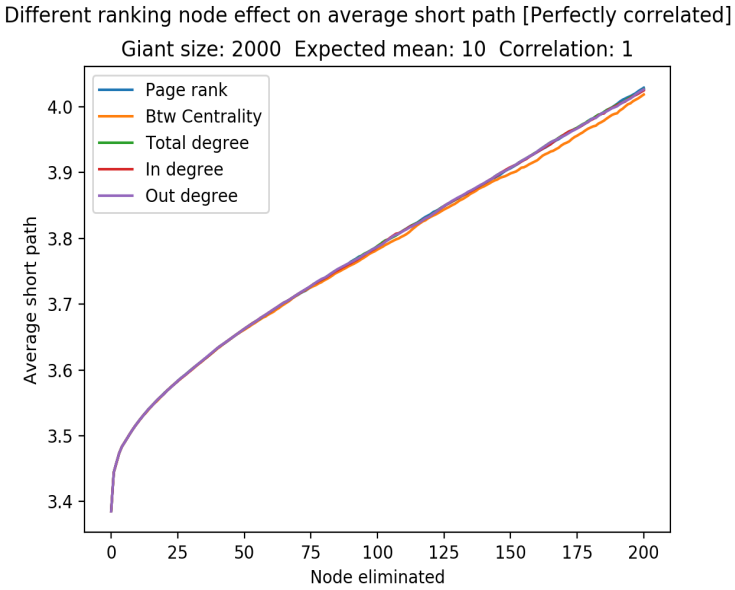

Figure 1.5: Perfectly correlated node effect on average shortest path

1.2.3 Independent

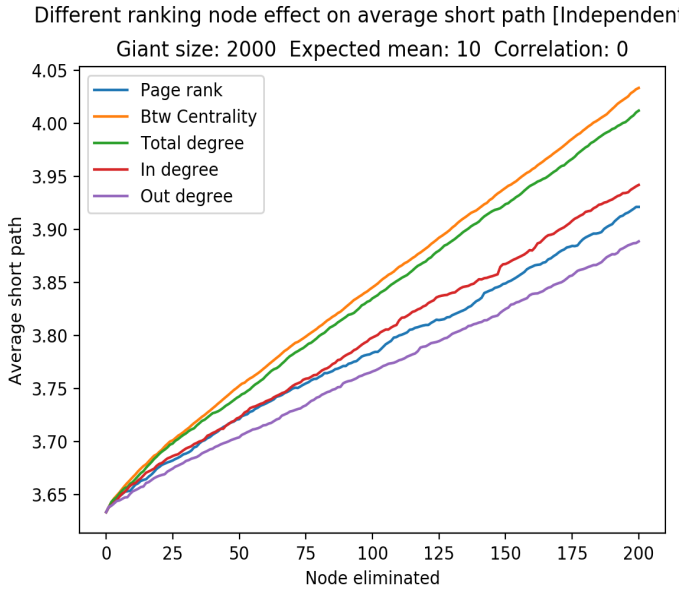

Figure 1.6: Independent degree sequence node effect on average shortest path

1.3 Large graph

We test the graph where expected degree is 20.

1.3.1 General case

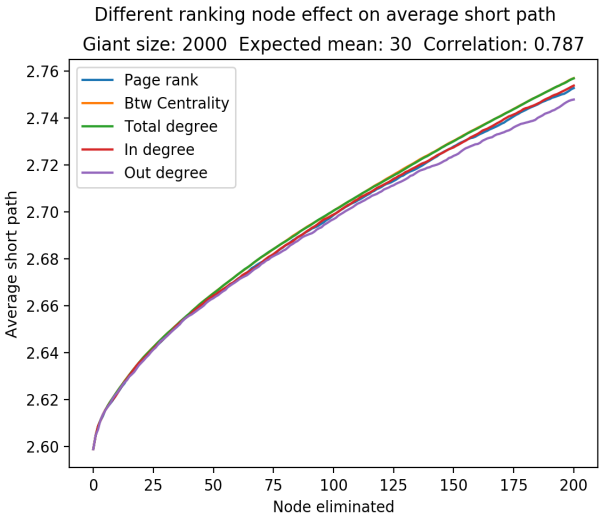

Figure 1.7: Node effect on average shortest path

1.3.2 Perfectly correlated

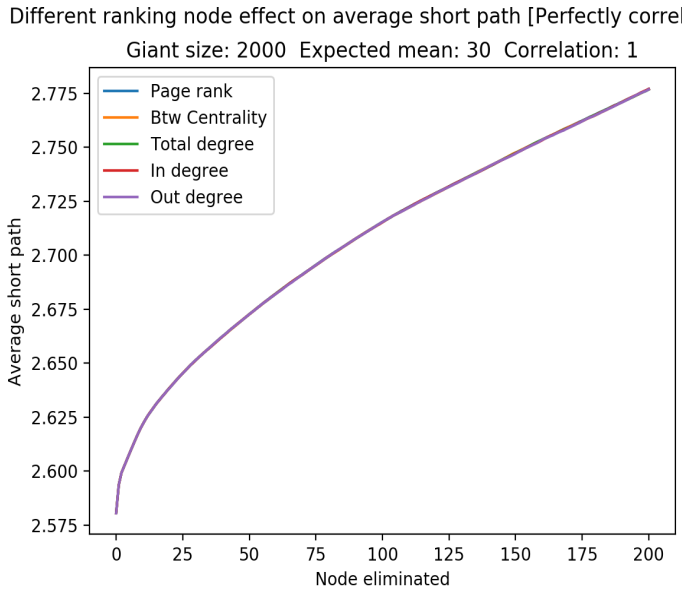

Figure 1.8: Perfectly correlated node effect on average shortest path

1.3.3 Independent

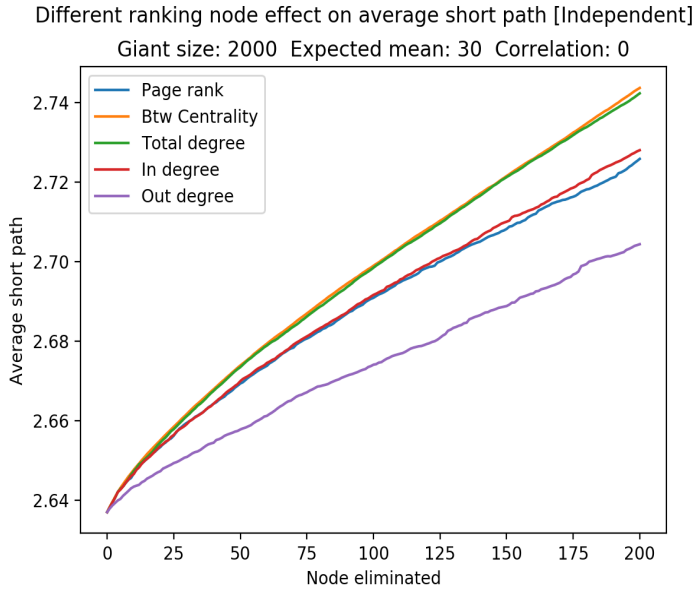

Figure 1.9: Independent degree sequence node effect on average shortest path

1.3.4 Conclusion

From the empirical result, the performance of page rank and betweenness centrality ranking on average short path depends on the correlation between in-degree and out-degree sequence. With highly correlated degree, the generated directed configuration graph's page rank and betweenness centrality's effect on average short path are much similar, whereas in independent case, the page rank is less effective as betweenness. The total degree always keep highly similar effect with betweenness centrality.