**Deciding what options are best for each method**

YemeniteStep with Louvain

These are the results for how the three different options effected the evaluation metrices, when using Louvain as the splitting function.

For each option (Random, Remerge, Relative) and for each graph size (1000, 10000) we calculated the affect on each metric (Modularity, Conductance, Jaccard). The *affect* is the relative change of the average value:

|  |  |  |
| --- | --- | --- |
| Adding **Random** Option | **1000** | **10000** |
| Modularity | -0.06%▼ | -0.01%▼ |
| Conductance | -0.05%▼ | -0.01%▼ |
| Jaccard | 0.04%▲ | -0.07%▼ |

|  |  |  |
| --- | --- | --- |
| Adding **Remerge** Option | **1000** | **10000** |
| Modularity | -11.12%▼ | -0.02%▼ |
| Conductance | -11.65%▼ | -0.07%▼ |
| Jaccard | -16.16%▼ | 1.41%▲ |

|  |  |  |
| --- | --- | --- |
| **Adding Relative Option** | **1000** | **10000** |
| Modularity | -0.01%▼ | 0%▼ |
| Conductance | -0.01%▼ | -0.04%▼ |
| Jaccard | -0.28%▼ | 0.59%▲ |

We conclude that when using Louvain as the splitting function, It is best to use it with all the options off.

YemeniteStep with GN Modularity

These are the results for how the three different options effected the evaluation metrices, when using GN Modularity as the splitting function.

For each option (Random, Remerge, Relative) and for each graph size (1000, 10000) we calculated the affect on each metric (Modularity, Conductance, Jaccard). The *affect* is calculated as explained in Splitting with Louvain.

|  |  |  |
| --- | --- | --- |
| **Adding Random Option** | **1000** | **10000** |
| Modularity | -0.02%▼ | 0.02%▲ |
| Conductance | 0.02%▲ | -0.03%▼ |
| Jaccard | -0.21%▼ | 1.6%▲ |

|  |  |  |
| --- | --- | --- |
| **Adding Remerge Option** | **1000** | **10000** |
| Modularity | -10.48%▼ | -0.46%▼ |
| Conductance | -59.78%▼ | -22.36%▼ |
| Jaccard | -16.73%▼ | 9.1%▲ |

|  |  |  |
| --- | --- | --- |
| **Adding Relative Option** | **1000** | **10000** |
| Modularity | 0.03%▲ | 0.5%▲ |
| Conductance | -0.17%▼ | 0.52%▲ |
| Jaccard | 1.88%▲ | 0.25%▲ |

We conclude that when using GN Modularity as the splitting function, it is best to use it with the "Relative" option on, and while results on the "Random" option aren't as clear, we might still want to use it on large graphs.

YemeniteStep with GN Conductance

These are the results for how the three different options effected the evaluation metrices, when using GN Conductance as the splitting function.

For each option (Random, Remerge) and for each graph size (1000, 10000) we calculated the affect on each metric (Modularity, Conductance, Jaccard). The *affect* is calculated as explained in Splitting with Louvain.

|  |  |  |
| --- | --- | --- |
| **Adding Random Option** | **1000** | **10000** |
| Modularity | 0.17%▲ | 0%▲ |
| Conductance | -0.08%▼ | -0.04%▼ |
| Jaccard | 3.41%▲ | 1.49%▲ |

|  |  |  |
| --- | --- | --- |
| **Adding Remerge Option** | **1000** | **10000** |
| Modularity | -6.82%▼ | -0.22%▼ |
| Conductance | -33.58%▼ | -14.78%▼ |
| Jaccard | -7.25%▼ | 4.48%▲ |

We conclude that when using GN Conductance as the splitting function, it is best to use it with the "Random" option on, and while results on the "Remerge" option have a surprising jump in Jaccard metric in large graph, we decide to not use this option.

**Comparing results between methods with chosen options**

The methods we are comparing are:

1. YemeniteStep with Louvain – with no additional options
2. YemeniteStep with GN Modularity – with "Random" and "Relative" options
3. YemniteStep with GN Conductance – with "Random" option

We are comparing all methods to the results of running the regular Louvain and Newman algorithms.

Modularity Results



Conductance Results



Jaccard Results



In the Jaccard