

```
In[1]:= AppendTo[$Path, FileNameJoin[{DirectoryName, "network-similarity"}]];
g = Import["test_int_id.gml"];
```

The network we want to use for centrality calculation and community detection is that of just the vertices with indegree greater than 1. This makes the size more manageable, and ignores the large majority of papers that are irrelevant to graph similarity.

```
outdegrees = VertexOutDegree[g];
indegrees = VertexInDegree[g];
parents = Position[outdegrees, _? (# > 0 &)] // Flatten;
popular = Position[indegrees, _? (# > 1 &)] // Flatten;
g1 = Subgraph[g, Union[parents, popular], ImageSize -> Full, VertexSize -> Large]
```



We check some of the same statistics for this subgraph as we did for the original.

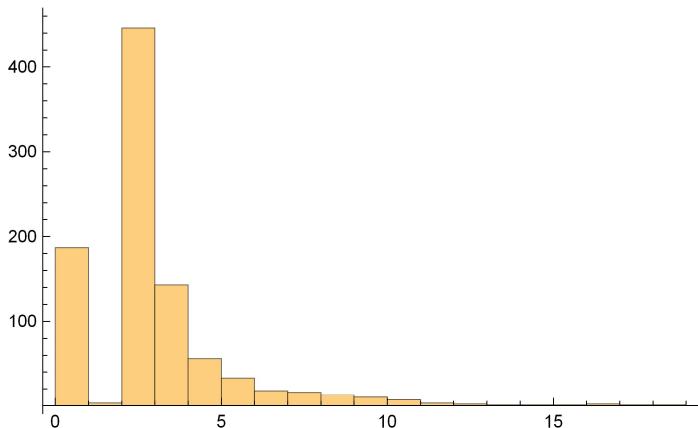
```

Length[popular]
gUndirected = UndirectedGraph[g1, Options[g]];
GraphAssortativity[gUndirected] // N
GraphAssortativity[gUndirected, "year"] // N
GraphAssortativity[gUndirected, "referenceCount"] // N
-0.267363

VertexCount[g1]
EdgeCount[g1]
944
2363

HistogramList[VertexInDegree[g1]][[2]]
Histogram[VertexInDegree[g1]]
HistogramList[VertexOutDegree[g1]][[2 ;;]][[1]]
Histogram[VertexOutDegree[g], ScalingFunctions → "Log"]
{187, 3, 446, 143, 56, 33, 18, 16, 13, 10, 7, 3, 2, 1, 1, 1, 2, 1, 1}

```

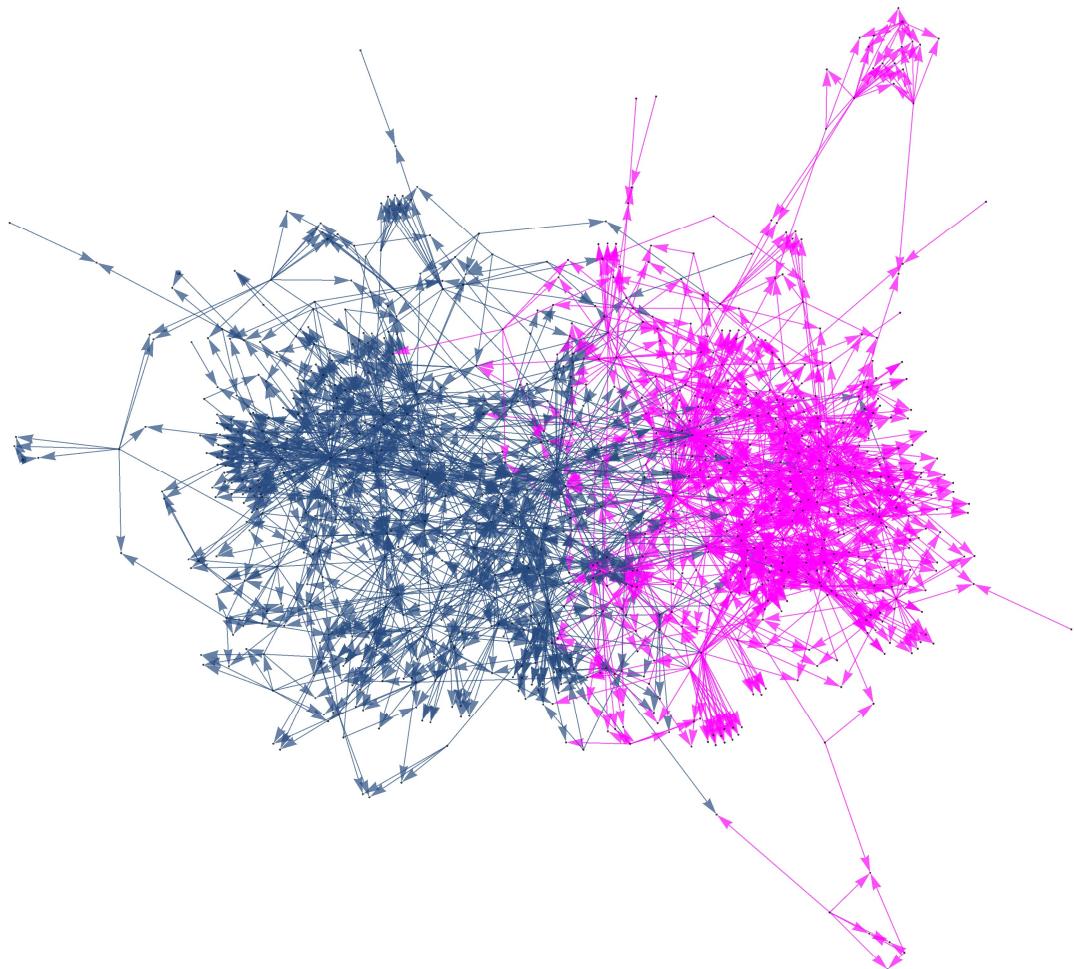


```

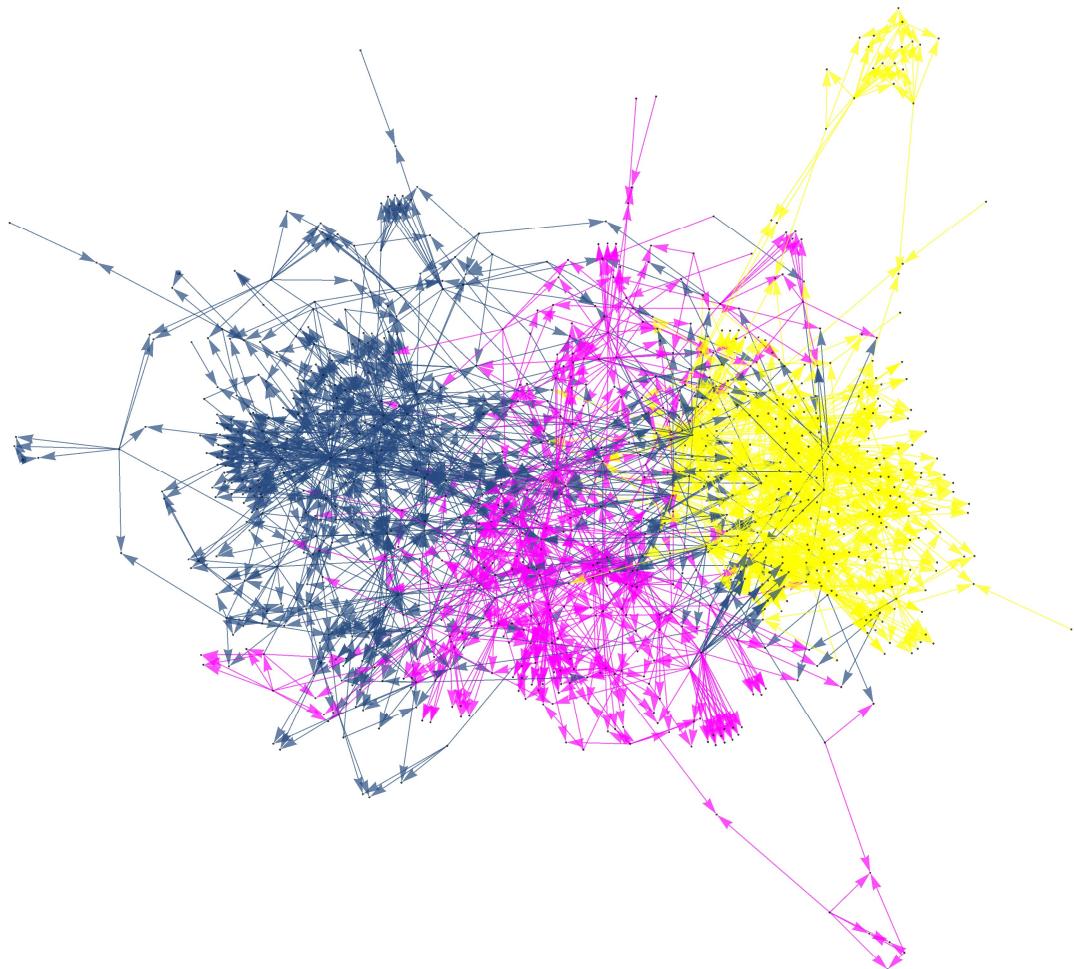
{760, 11, 8, 12, 9, 11, 16, 9, 8, 7, 8, 12, 5, 6, 6, 6, 7, 4, 3, 4, 2, 5, 1, 2, 3,
2, 0, 1, 1, 3, 2, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 2, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0,
1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1}

```

```
alternatepartition = FindGraphPartition[g1, 2][[1]];
HighlightGraph[g1, Style[Subgraph[g1, alternatepartition], RGBColor["Fuchsia"]],
  GraphHighlightStyle -> "Thick", ImageSize -> Large]
```



```
parts = FindGraphPartition[g1, 3];
HighlightGraph[g1, {Style[Subgraph[g1, parts[[1]]], RGBColor["Fuchsia"]],
Style[Subgraph[g1, parts[[2]]], RGBColor["Yellow"]]}, ImageSize → Large]
```



```
parts = FindGraphPartition[g1, 4];
HighlightGraph[g1, {Style[Subgraph[gCC, parts[[1]]], RGBColor["Fuchsia"]],
Style[Subgraph[g1, parts[[2]]], RGBColor["Green"]],
Style[Subgraph[g1, parts[[3]]], RGBColor["Yellow"]]}, ImageSize → Large]
```

