

Table 1: Modularity comparison of the 90 networks. Q : $Q_d(A^{D_i}, P^i)$; Q^* : $\max_{\alpha^\ell \in [0,1]} Q_d(A^{D_i}, P^{\alpha^\ell})$

Networks	Algorithms		Louvain		Leiden	
	Q	Q^*	Q	Q^*	Q	Q^*
Zacharykarateclub	0.3951	0.4116	0.3951	0.4070		
Dolphins	0.5090	0.5232	0.5161	0.5240		
LesMiserables	0.5621	0.5621	0.5618	0.5621		
polbooks	0.5261	0.5295	0.5221	0.5263		
AmericanCollegeFootball	0.6026	0.6026	0.6026	0.6026		
JazzMusicians	0.4260	0.4476	0.4324	0.4484		
Caenorhabditiselegans	0.4398	0.4449	0.4480	0.4504		
Cora	0.8168	0.8191	0.8231	0.8232		
CiteSeer	0.8872	0.8893	0.8929	0.8933		
Powergrid	0.9360	0.9360	0.9384	0.9387		
Rhesus macaques	0,1295	0,1318	0,1318	0,1318		
Pro League (2016/2017) (1)	0,0763	0,0810	0,0763	0,0810		
Pro League (2016/2017) (2)	0,1508	0,1533	0,1503	0,1506		
Pro League (2016/2017)(3)	0,1494	0,1503	0,1494	0,1533		
Crisis in a Cloister positivo	0,2423	0,2423	0,2423	0,2423		
Crisis in a Cloister (2)	0,1118	0,1437	0,1367	0,1440		
Bundesliga (2016/2017) (1)	0,1817	0,1917	0,1917	0,1917		
Bundesliga (2016/2017) (2)	0,0740	0,0873	0,0757	0,0873		
Bundesliga (2016/2017) (3)	0,1762	0,1762	0,1767	0,1767		
Ligue 1 (2016/2017) (1)	0,1849	0,1857	0,1849	0,1857		
Ligue 1 (2016/2017) (2)	0,0748	0,0878	0,0795	0,0878		
Ligue 1 (2016/2017) (3)	0,1814	0,1814	0,1814	0,1814		
Premier League (2013/2014) (1)	0,2124	0,2150	0,2150	0,2150		
Premier League (2013/2014) (2)	0,0898	0,0898	0,0832	0,0898		
Premier League (2013/2014) (3)	0,1031	0,1216	0,1182	0,1216		
Taro exchange	0,4474	0,4474	0,4543	0,4543		
Bison	0,1470	0,1470	0,1432	0,1470		
Cattle	0,1889	0,1940	0,1889	0,1906		
Sheep	0,1640	0,1656	0,1656	0,1656		
Seventh graders	0,2483	0,2564	0,2559	0,2559		
Hens	0	0	0	0		
Dutch college	0,0904	0,0965	0,0965	0,0965		
Japanese macaques	0,2180	0,2213	0,2180	0,2213		

Table 1 – Continuación

Networks \ Algorithms	Louvain		Leiden	
	Q	Q^*	Q	Q^*
Highschool	0,6041	0,6050	0,6041	0,6050
Florida ecosystem wet	0,1925	0,1941	0,1891	0,1951
Florida ecosystem dry	0,1959	0,1962	0,1914	0,1962
Manufacturing emails	0,3951	0,4030	0,4009	0,4031
Little Rock Lake	0,3567	0,3688	0,3563	0,3689
Residence hall	0,4839	0,4907	0,4884	0,4947
Congress votes (1)	0,6511	0,6515	0,6536	0,6552
Congress votes (2)	0,7027	0,7155	0,7031	0,7163
Physicians	0,6931	0,6988	0,6969	0,7035
Caenorhabditis elegans (neural)	0,4903	0,5034	0,5069	0,5083
Wikipedia talk (ht)	0,6371	0,6393	0,6408	0,6419
FilmTrust trust	0,7499	0,7562	0,7530	0,7576
Wikipedia talk (br)	0,4663	0,4738	0,4755	0,4784
Blogs	0,4316	0,4324	0,4321	0,4324
Political blogs	0,4268	0,4271	0,4271	0,4271
Air traffic control	0,6959	0,7067	0,7145	0,7155
US airports	0,2703	0,2736	0,2740	0,2742
Human proteins (Stelzl)	0,6116	0,6124	0,6204	0,6223
UC Irvine messages	0,3604	0,3641	0,3727	0,3765
DNC emails	0,5510	0,5520	0,5550	0,5551
Wikipedia talk (cy)	0,5659	0,5682	0,5698	0,5706
Human proteins (Figeys)	0,4733	0,4819	0,5080	0,5133
Adolescent health	0,6982	0,7017	0,7076	0,7112
Wikipedia links (xal)	0,5725	0,5725	0,5725	0,5725
Wikipedia links (gag)	0,7365	0,7381	0,7382	0,7382
OpenFlights (Opsahl) (1)	0,6705	0,6746	0,6738	0,675
OpenFlights (Opsahl) (2)	0,1555	0,1600	0,1603	0,1629
OpenFlights (Opsahl) (3)	0,2556	0,2593	0,2575	0,2598
Wikipedia talk (oc)	0,4757	0,4793	0,4799	0,4817
OpenFlights (Patokallio)	0,6572	0,6585	0,6590	0,6596
Bitcoin Alpha (1)	0,5324	0,5331	0,5431	0,5465
Bitcoin Alpha (2)	0,6536	0,6545	0,6514	0,6568
Wikipedia links (lo)	0,2014	0,2021	0,2021	0,2026
Wikispeedia	0,5033	0,5037	0,5112	0,5140
Wikipedia links (dv)	0,4713	0,4713	0,4713	0,4713

Table 1 – Continuación

Networks \ Algorithms	Louvain		Leiden	
	Q	Q^*	Q	Q^*
CiaoDVD trust	0,4045	0,4260	0,4256	0,4271
Wikipedia links (lez)	0,7689	0,7698	0,7754	0,7758
Wikipedia links (csb)	0,1901	0,1902	0,1885	0,1902
Bitcoin OTC (1)	0,6235	0,6397	0,6376	0,6435
Bitcoin OTC (2)	0,5409	0,5494	0,5598	0,5609
JUNG/Javax	0,5050	0,5066	0,5070	0,5075
Wikipedia links (tk)	0,7196	0,7232	0,7233	0,7235
Gnutella (08)	0,4642	0,4698	0,4761	0,4779
Java Development Kit	0,5144	0,5151	0,5162	0,5168
Advogato (1)	0,4707	0,4736	0,4798	0,4837
Advogato (2)	0,5290	0,5363	0,5379	0,5405
Advogato (3)	0,6457	0,6495	0,6533	0,6558
Wikipedia elections (1)	0,4370	0,4430	0,4425	0,4432
Wikipedia elections (2)	0,4628	0,4684	0,4675	0,4695
Chess (1)	0,5606	0,5710	0,5751	0,5768
Chess (2)	0,5535	0,5604	0,576	0,5792
Chess (3)	0,5754	0,5888	0,6041	0,6162
Wikipedia talk (eo)	0,5559	0,5576	0,5575	0,5584
Wikipedia links (mi)	0,8125	0,8147	0,8111	0,8146
Wikipedia talk (gl)	0,4653	0,4678	0,4718	0,4718
Gnutella (09)	0,4649	0,4692	0,4801	0,4833
DBLP	0,6293	0,6392	0,6456	0,6494

Table 2: Modularity comparison of the 65 networks. Q : $Q_d(A^{D_i}, P^i)$; Q^* : $\max_{\alpha' \in [0,1]} Q_d(A^{D_i}, P^{\alpha'})$

Networks	Algorithms		Louvain		Leiden		Walktrap		Infomap		Fast Greedy	
	Q	Q^*	Q	Q^*	Q	Q^*	Q	Q^*	Q	Q^*	Q	Q^*
Zachary karate club	0.3951	0.4116	0.3951	0.4070	0.3422	0.3905	0.3872	0.3872	0.4070	0.4070		
Dolphins	0.5090	0.5232	0.5161	0.5240	0.4839	0.4849	0.5161	0.5213	0.4848	0.5227		
Les Miserables	0.5621	0.5621	0.5618	0.5621	0.5369	0.5557	0.5470	0.5583	0.5385	0.5616		
polbooks	0.5261	0.5295	0.5221	0.5263	0.5085	0.5314	0.5165	0.5262	0.4855	0.5248		
American College Football	0.6026	0.6026	0.6026	0.6026	0.6014	0.6027	0.6005	0.6030	0.5680	0.5804		
Jazz Musicians	0.4260	0.4476	0.4324	0.4484	0.4393	0.4440	0.2911	0.2932	0.4329	0.4371		
Caenorhabditis elegans	0.4398	0.4449	0.4480	0.4504	0.3207	0.3861	0.4177	0.4195	0.3998	0.4094		
Cora	0.8168	0.8191	0.8231	0.8232	0.7655	0.7775	0.7221	0.7525	0.8091	0.8093		
CiteSeer	0.8872	0.8893	0.8929	0.8933	0.8305	0.8406	0.8169	0.8405	0.8725	0.8778		
Power grid	0.9360	0.9360	0.9384	0.9387	0.8275	0.8915	0.8157	0.8682	0.9330	0.9330		
Rhesus macaques	0.1295	0.1318	0.1318	0.1318	0.1073	0.1318	0	0	0.1318	0.1318		
Pro League (2016/2017) (1)	0.0763	0.0810	0.0763	0.0810	0.0342	0.0741	0	0	0.0763	0.0763		
Pro League (2016/2017) (2)	0.1508	0.1533	0.1503	0.1506	0.0828	0.0828	0	0	0.1458	0.1528		
Pro League (2016/2017) (3)	0.1494	0.1503	0.1494	0.1533	0.0906	0.0906	0	0	0.1378	0.1378		
Crisis in a Cloister positivo	0.2423	0.2423	0.2423	0.2423	0.2037	0.2283	0	0	0.2380	0.2380		
Crisis in a Cloister (2)	0.1118	0.1437	0.1367	0.1440	0.0975	0.0975	0	0	0.1354	0.1354		
Bundesliga (2016/2017) (1)	0.1817	0.1917	0.1917	0.1917	0.1629	0.1629	0	0	0.1656	0.1824		
Bundesliga (2016/2017) (2)	0.0740	0.0873	0.0757	0.0873	0.0133	0.0452	0	0	0.0597	0.0764		
Bundesliga (2016/2017) (3)	0.1762	0.1762	0.1767	0.1767	0.1750	0.1750	0	0	0.1762	0.1762		
Ligue 1 (2016/2017) (1)	0.1849	0.1857	0.1849	0.1857	0.1344	0.1408	0	0	0.1827	0.1849		
Ligue 1 (2016/2017) (2)	0.0748	0.0878	0.0795	0.0878	0.0570	0.0645	0	0	0.0802	0.0802		
Ligue 1 (2016/2017) (3)	0.1814	0.1814	0.1814	0.1814	0.1814	0.1814	0	0	0.1735	0.1814		
Premier League (2013/2014) (1)	0.2124	0.2150	0.2150	0.2150	0.1874	0.1874	0	0	0.1976	0.2025		
Premier League (2013/2014) (2)	0.0898	0.0898	0.0832	0.0898	0.0804	0.0804	0	0	0.0776	0.0855		
Premier League (2013/2014) (3)	0.1031	0.1216	0.1182	0.1216	0.0796	0.1055	0	0	0.1105	0.1216		
Taro exchange	0.4474	0.4474	0.4543	0.4543	0.4241	0.4339	0.4533	0.4533	0.4316	0.4543		
Bison	0.1470	0.1470	0.1432	0.1470	0.1015	0.1117	0	0	0.1423	0.1470		
Cattle	0.1889	0.1940	0.1889	0.1906	0.1802	0.1802	0	0	0.1894	0.1894		
Sheep	0.1640	0.1656	0.1656	0.1656	0.0903	0.0916	0	0	0.1655	0.1655		
Seventh graders	0.2483	0.2564	0.2559	0.2559	0.2290	0.2309	0	0	0.2483	0.2483		
Hens	0	0	0	0	0	0	0	0	-0.0005	0		
Dutch college	0.0904	0.0965	0.0965	0.0965	0.0372	0.0498	0	0	0.0906	0.0906		
Japanese macaques	0.2180	0.2213	0.2180	0.2213	0.2012	0.2073	0	0	0.2164	0.2164		
Highschool	0.6041	0.6050	0.6041	0.6050	0.5776	0.5960	0.5979	0.6050	0.5955	0.6050		
Florida ecosystem wet	0.1925	0.1941	0.1891	0.1951	0.0990	0.1195	0	0	0.1767	0.1805		
Florida ecosystem dry	0.1959	0.1962	0.1914	0.1962	0.0752	0.0775	0	0	0.1819	0.1826		
Manufacturing emails	0.3951	0.4030	0.4009	0.4031	0.3368	0.3652	0.3988	0.3988	0.4026	0.4026		
Little Rock Lake	0.3567	0.3688	0.3563	0.3689	0.3444	0.3444	0.3415	0.3495	0.3359	0.3476		
Residence hall	0.4839	0.4907	0.4884	0.4947	0.4505	0.4668	0.4694	0.4748	0.4724	0.4724		
Congress votes (1)	0.6511	0.6515	0.6536	0.6552	0.6037	0.6144	0.6074	0.6424	0.6395	0.6425		
Congress votes (2)	0.7027	0.7155	0.7031	0.7163	0.6677	0.6686	0.6877	0.7025	0.7131	0.7156		
Physicians	0.6931	0.6988	0.6969	0.7035	0.6700	0.6700	0.6691	0.6774	0.6959	0.6959		
Caenorhabditis elegans (neural)	0.4903	0.5034	0.5069	0.5083	0.4728	0.4789	0.4836	0.4931	0.5070	0.5075		
Wikipedia talk (ht)	0.6371	0.6393	0.6408	0.6419	0.5656	0.5662	0.6276	0.6276	0.6407	0.6407		
FilmTrust trust	0.7499	0.7562	0.7530	0.7576	0.6950	0.6950	0.6985	0.7226	0.7467	0.7480		
Wikipedia talk (br)	0.4663	0.4738	0.4755	0.4784	0.2042	0.2077	0.2216	0.2216	0.4636	0.4704		
Blogs	0.4316	0.4324	0.4321	0.4324	0.4302	0.4311	0.4277	0.4297	0.4323	0.4324		
Political blogs	0.4268	0.4271	0.4271	0.4271	0.4247	0.4255	0.4226	0.4240	0.4269	0.4270		
Air traffic control	0.6959	0.7067	0.7145	0.7155	0.6126	0.6126	0.6110	0.6492	0.6805	0.6923		
US airports	0.2703	0.2736	0.2740	0.2742	0.2197	0.2213	0.0370	0.0370	0.2541	0.2541		
Human proteins (Stelzl)	0.6116	0.6124	0.6204	0.6223	0.5249	0.5249	0.5583	0.5652	0.5924	0.6076		
UC Irvine messages	0.3604	0.3641	0.3727	0.3765	0.2397	0.2397	0.3148	0.3258	0.3695	0.3699		
DNC emails	0.5510	0.5520	0.5550	0.5551	0.4591	0.4591	0.4826	0.4894	0.5388	0.5388		
Wikipedia talk (cy)	0.5659	0.5682	0.5698	0.5706	0.4540	0.4540	0.4637	0.4716	0.5690	0.5690		
Human proteins (Figseys)	0.4733	0.4819	0.5080	0.5133	0.4610	0.4610	0.4597	0.4661	0.4947	0.4947		
Adolescent health	0.6982	0.7017	0.7076	0.7112	0.6339	0.6339	0.6031	0.6218	0.7017	0.7024		
Wikipedia links (xal)	0.5725	0.5725	0.5725	0.5725	0.5626	0.5675	0.5686	0.5690	0.5706	0.5712		
Wikipedia links (gag)	0.7365	0.7381	0.7382	0.7382	0.7252	0.7317	0.7203	0.7290	0.7141	0.7141		
OpenFlights (Opsahl) (1)	0.6705	0.6746	0.6738	0.6750	0.6250	0.6477	0.6368	0.6560	0.6700	0.6700		
OpenFlights (Opsahl) (2)	0.1555	0.1600	0.1603	0.1629	0.0874	0.0874	0.0226	0.0226	0.1533	0.1549		
OpenFlights (Opsahl) (3)	0.2556	0.2593	0.2575	0.2598	0.1356	0.1932	0.0517	0.0517	0.2513	0.2513		
Wikipedia talk (oc)	0.4757	0.4793	0.4799	0.4817	0.2953	0.3448	0.4759	0.4759	0.4402	0.4501		
OpenFlights (Patokallio)	0.6572	0.6585	0.6590	0.6596	0.6233	0.6431	0.6090	0.6338	0.6100	0.6100		
Bitcoin Alpha (1)	0.5324	0.5331	0.5431	0.5465	0.4658	0.4658	0.4502	0.4765	0.5209	0.5209		
Bitcoin Alpha (2)	0.6536	0.6545	0.6514	0.6568	0.5601	0.5601	0.5990	0.6080	0.6357	0.6439		