

Errata to Bayesian Community Detection

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Due to bugs in the MCMC sampler for the IHM, IDM, IRM and IRMCB models the inference and predictions for these models were not correct. We have therefore revised the sampler in the toolbox accompanying the article and re-run the experiments of table 1, 2 and 3.

The new results show that the BCD outperforms the existing methods for about half of the considered networks, but not for the majority as we originally stated (see the updated Table 2). In terms of the number of components extracted by IRM and BCD, it still holds in general that the BCD extracts more clusters; however, the new results show that it is not the case for all the considered networks (see the updated Table 1).

Table 1: Network Properties and Results of Analysis.

| | NETWORK PROPERTIES | | | | CLUSTERS | | γ | AUC [%] | |
|-------------|--------------------|-------|------|------|----------|----------|----------|-----------------|-----------------|
| | N | N^+ | WGH. | DIR. | IRM | BCD | | IRM | BCD |
| USAir97 | 332 | 2126 | | | 14.4(2) | 19.0(3) | 1.00(0) | 95.2(14) | 94.5(15) |
| USPowerGrid | 4941 | 6594 | | | 16.6(5) | 37.8(32) | 0.04(0) | 81.4(10) | 77.0(16) |
| Football | 115 | 613 | | | 11.0(0) | 13.6(4) | 0.10(0) | 88.0(43) | 87.9(35) |
| Celegans | 306 | 2345 | ✓ | ✓ | 36.8(10) | 29.8(9) | 1.00(0) | 88.7(8) | 89.1(2) |
| yeast | 2361 | 6646 | | | 25.0(0) | 32.6(12) | 1.00(0) | 88.7(5) | 87.5(7) |
| lesmis | 77 | 254 | ✓ | | 12.6(4) | 12.4(4) | 0.99(1) | 93.0(39) | 94.2(27) |
| Geom | 7343 | 11898 | ✓ | | 71.2(14) | 76.8(9) | 0.98(1) | 89.4(8) | 89.4(10) |
| netscience | 1589 | 2742 | ✓ | | 8.2(2) | 8.4(2) | 0.89(4) | 59.5(21) | 65.7(24) |
| cond-mat | 16726 | 47594 | ✓ | | 53.0(7) | 53.8(41) | 0.31(11) | 71.5(4) | 75.9(8) |
| SciMet | 3084 | 10413 | | ✓ | 19.0(3) | 23.0(7) | 1.00(0) | 90.7(9) | 89.1(8) |
| smaGri | 1059 | 4919 | | ✓ | 13.8(5) | 19.0(4) | 1.00(0) | 92.4(7) | 89.2(8) |
| smallW | 396 | 994 | | ✓ | 8.8(2) | 11.4(5) | 1.00(0) | 99.1(3) | 98.3(5) |
| NIPS | 234 | 598 | | | 8.0(0) | 30.6(15) | 0.03(0) | 89.1(26) | 89.4(25) |
| NIPSCW | 2865 | 4733 | ✓ | | 32.0(4) | 85.6(23) | 0.01(0) | 90.4(12) | 89.7(5) |

Table 2: Area Under Curve (AUC) [%] Link Prediction Score.

| | IHW | IDM | IRM | IRMCB | BCD shared γ | BCD separate γ |
|-------------|----------|----------|----------------|-----------------|---------------------|-----------------------|
| USAir97 | 80.3(25) | 85.2(16) | 95.2(14) | 94.4(13) | 94.5(15) | 95.3(12) |
| USPowerGrid | 75.8(11) | 74.4(19) | 81.4(10) | 82.9(13) | 77.0(16) | 80.7(17) |
| Football | 84.4(41) | 84.7(38) | 88.0(43) | 88.2(36) | 87.9(35) | 88.6(41) |
| Celegans | 57.9(21) | 57.6(27) | 88.7(8) | 89.2(6) | 89.1(2) | 88.9(5) |
| yeast | 71.7(27) | 83.8(4) | 88.7(5) | 88.6(7) | 87.5(7) | 87.4(7) |
| lesmis | 60.0(25) | 79.7(62) | 93.0(39) | 97.1(29) | 94.2(27) | 96.1(23) |
| Geom | 70.8(20) | 73.4(5) | 89.4(8) | 88.8(4) | 89.4(10) | 90.1(7) |
| netscience | 67.0(21) | 53.8(19) | 59.5(21) | 58.4(23) | 65.7(24) | 68.2(17) |
| cond-mat | 65.4(8) | 64.1(5) | 71.5(4) | 68.5(3) | 75.9(8) | 74.5(16) |
| SciMet | 74.0(6) | 80.9(5) | 90.7(9) | 90.5(6) | 89.1(8) | 89.6(6) |
| smaGri | 71.4(9) | 82.8(10) | 92.4(7) | 92.4(5) | 89.2(8) | 89.3(5) |
| smallW | 84.0(16) | 90.8(10) | 99.1(3) | 99.0(3) | 98.3(5) | 97.7(6) |
| NIPS | 89.7(25) | 92.5(28) | 89.1(26) | 87.4(45) | 89.4(25) | 94.5(17) |
| NIPSCW | 68.5(37) | 83.7(14) | 90.4(12) | 89.9(5) | 89.7(5) | 91.5(6) |

Table 3: Average per Iteration CPU-Time.

| | IHW | IDM | IRM | IRMCB | BCD shared γ | BCD separate γ |
|-------------|-------------|-------------|-------------|------------|---------------------|-----------------------|
| USAir97 | 0.23(4) | 0.29(0) | 0.29(2) | 0.40(6) | 2.68(21) | 3.09(25) |
| USPowerGrid | 1.83(3) | 2.42(3) | 3.96(38) | 5.34(38) | 64.13(376) | 69.01(479) |
| Football | 0.04(0) | 0.06(0) | 0.07(0) | 0.08(0) | 0.74(4) | 1.11(6) |
| Celegans | 0.23(4) | 0.18(1) | 0.37(4) | 0.55(7) | 4.63(44) | 5.32(43) |
| yeast | 1.92(29) | 2.60(18) | 2.92(21) | 5.48(22) | 30.81(180) | 40.74(269) |
| lesmis | 0.06(1) | 0.04(0) | 0.06(0) | 0.08(1) | 0.50(3) | 0.64(3) |
| Geom | 9.73(120) | 9.44(141) | 16.92(383) | 31.09(742) | 188.23(1146) | 320.29(705) |
| netscience | 0.62(5) | 1.25(5) | 2.09(9) | 2.54(15) | 15.92(93) | 17.72(99) |
| cond-mat | 45.89(1566) | 46.60(1797) | 50.21(2068) | 72.85(187) | 245.70(2914) | 739.99(7486) |
| SciMet | 2.30(32) | 2.58(4) | 3.82(5) | 6.87(42) | 57.39(399) | 63.27(367) |
| smaGri | 0.86(16) | 1.07(3) | 1.15(2) | 2.01(23) | 14.83(76) | 14.47(37) |
| smallW | 0.35(5) | 0.37(0) | 0.51(3) | 0.83(15) | 3.93(10) | 4.40(20) |
| NIPS | 0.10(1) | 0.11(1) | 0.21(1) | 0.30(5) | 1.74(12) | 2.29(13) |
| NIPSCW | 2.33(31) | 1.43(4) | 2.28(19) | 3.69(35) | 32.13(350) | 39.62(371) |