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An information theoretic derivation of spectral graph partitioning
MANUEL MIDDENDORF, Columbia University, Department of Physics, ETAY ZIV, Columbia University, College of Physicians and Surgeons, CHRIS WIGGINS, Columbia Univeristy, Applied Math and c2b2 — At the APS meeting in 2004, we introduced an information-theoretic algorithm called the "network information bottleneck" (NIB) for clustering nodes of a network into modules (cf. arxiv.org/q-bio/0411033). Numerical experiments show that, although the modules are found by minimizing a free energy with no references to normalized edge-cuts or numbers of edges between modules, the resulting partitions are both information-modular and edge-modular (exhibiting low normalized edge-cuts). Moreover, the resulting partioning algorithm is competitive both in accuracy and efficiency with methods popular in the physics community. These numerical results along with asymptotic equivalence between the information-optimal and edge-optimal partitionings are presented.

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