ABSTRACT
Two-sample hypothesis testing for random graphs arises naturally in neuroscience, social networks, and machine learning. In this talk we consider a semiparametric two-sample hypothesis testing problem for a class of latent position random graphs. We formulate a notion of consistency in this context and propose a valid test for the hypothesis that two finite-dimensional random dot product graphs on a common vertex set have the same generating latent positions or have generating latent positions that are scaled or diagonal transformations of one another. Our test statistic is a function of a spectral decomposition of the adjacency matrix for each graph and our test procedure is consistent across a broad range of alternatives. We apply our test procedure to real biological data: in a test-retest data set of neural connectome graphs, we are able to distinguish between scans from different subjects; and in the \emph{C.elegans} connectome, we are able to distinguish between chemical and electrical networks. The latter example is a concrete demonstration that our test can have power even for small sample sizes.