

FIG. S1. **Filter performance on rewired synthetic networks.** As a test of robustness to incomplete and noisy network structure, we rewire the synthetic networks to remove real edges and add false edges. We plot the average MAE of the **A.** mean filter, **B.** median filter, and **C.** sharp filter applied to the true network and noisy networks. The shaded areas indicate 99% bootstrapped confidence intervals.

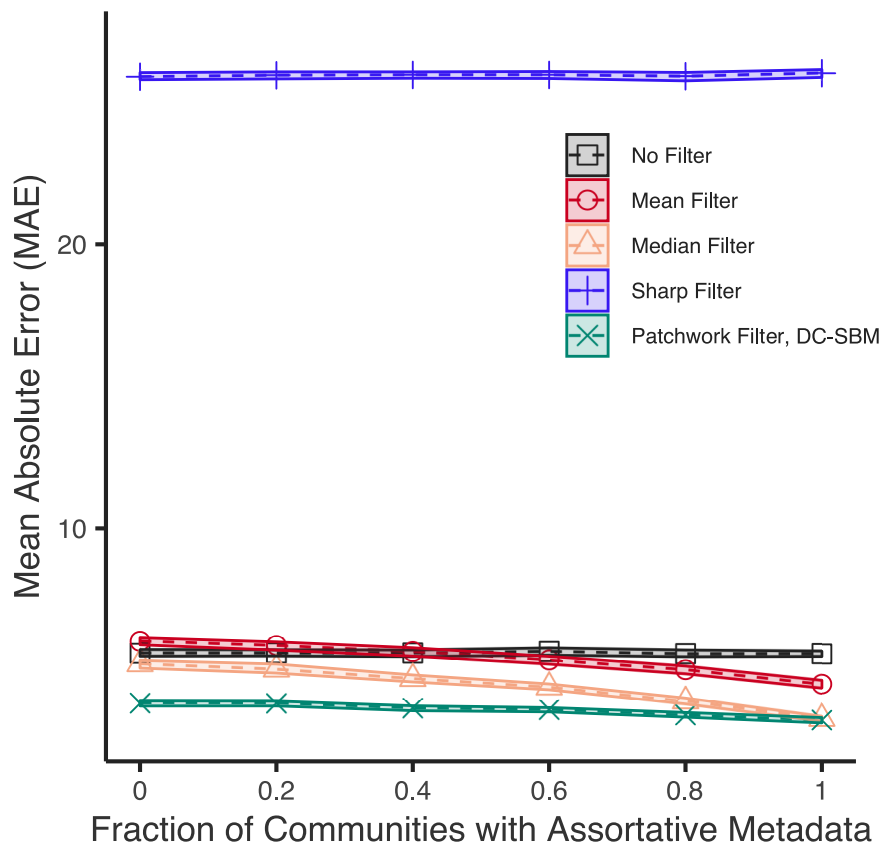


FIG. S2. **Filter performance on modular synthetic networks, including the sharp filter.** The MAE of network filters on the permuted nodes as a function of the fraction of communities with assortative data values for 100 instances of noisy modular graphs. Each network instance has 5 communities and we vary how many communities have assortative vs. disassortative data values with a moderate assortativity coefficient $|r| \in [0.4, 0.7]$. The shaded areas indicate 99% bootstrapped confidence intervals.

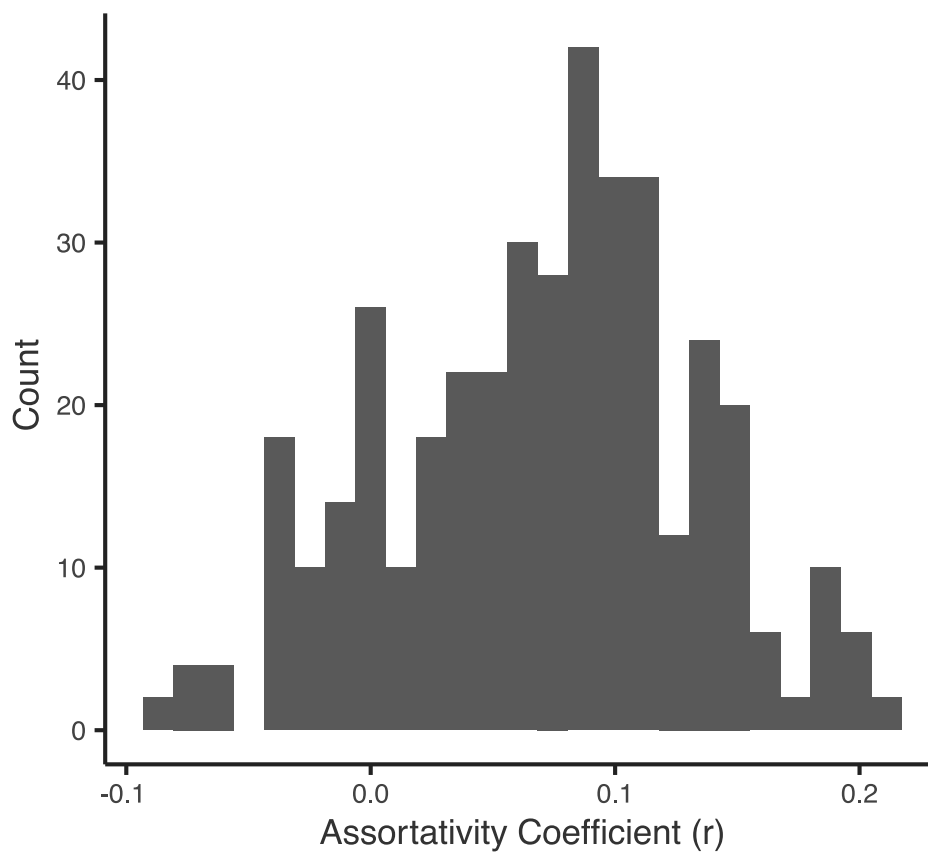


FIG. S3. **Distribution of assortativity coefficients of network modules with Human Protein Atlas Data.** We partition a protein-protein interaction network into 10 modules using the DC-SBM, and map data from the Human Protein Atlas to this network. Then we calculate the assortativity coefficient of each module with the protein expression of 40 different tissue types. Most modules are slightly assortative, while a few are very slightly disassortative.

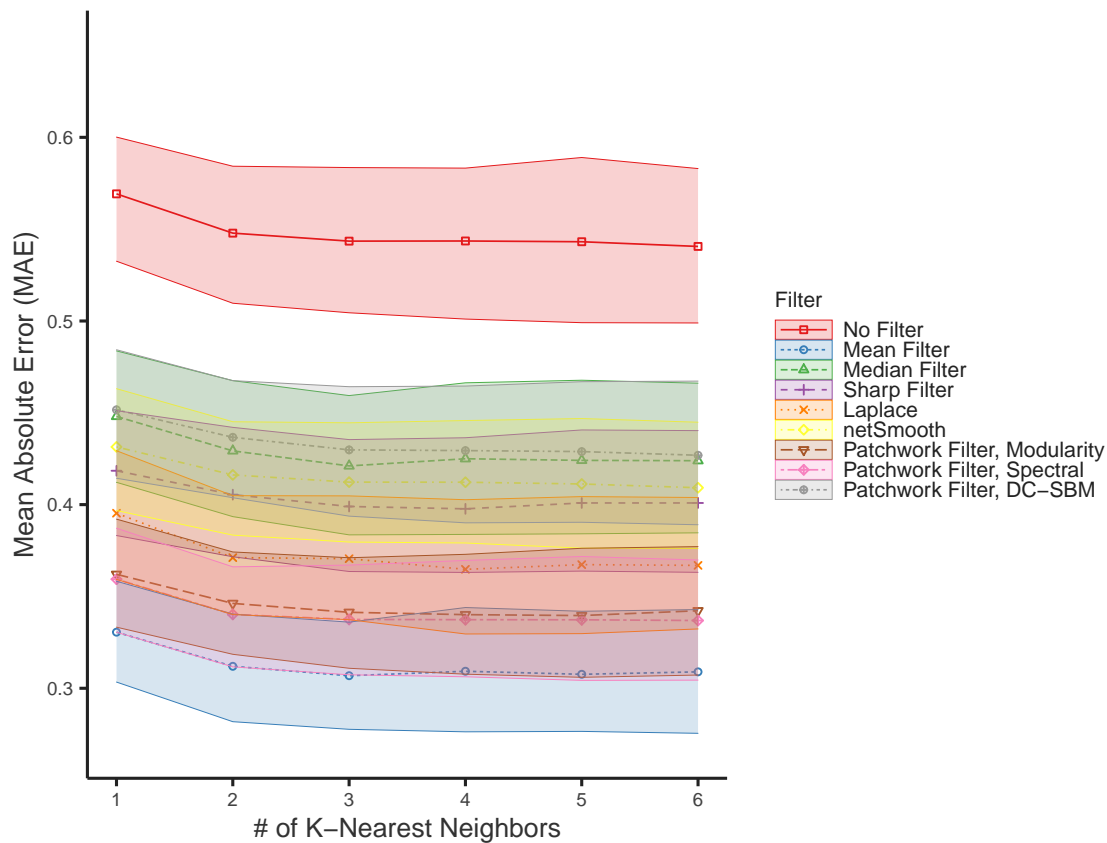


FIG. S4. **KNN regression of Human Protein Atlas data with all network filters.** We perform a K-Nearest Neighbors regression on the HPA data, with and without preprocessing with network filters. Here we show all simple global network filters, the patchwork filter with different community detection algorithms, and diffusion based comparison methods.

TABLE S1. Cell types from the Human Protein Atlas dataset averaged together to form a single healthy tissue vector

Healthy Tissue	Cell Types Averaged
Breast	Breast Adipocytes, Breast Glandular Cells
Glia	Cerebral Cortex Glial Cells, Hippocampus Glial Cells, Caudate Glial Cells
Cervix	Cervix Uterine Glandular Cells, Cervix Uterine Squamous Epithelial Cells
Colorectal	Colon Endothelial Cells, Colon Glandular Cells, Rectum Glandular Cells
Endometrium	Endometrium Cells in Endometrial Stroma, Endometrium Glandular Cells
Testes	Epididymis Glandular Cells, Seminal Vesicle Glandular Cells, Testis Cells in Seminiferous Ducts, Testis Leydig Cells
Thyroid	Thyroid Glandular Cells
Kidney	Kidney Cells in Glomeruli, Kidney Cells in Tubules
Liver	Liver Bile Duct Cells, Liver Hepatocytes
Lung	Lung Pneumocytes
Lymph	Lymph Node Germinal Center Cells, Lymph Node Non-Germinal Center Cells
Pancreas	Pancreas Exocrine Glandular Cells, Pancreas Islets of Langerhans
Prostate	Prostate Glandular Cells
Skin	Skin Fibroblasts, Skin Keratinocytes, Skin Epidermal Cells
Melanocyte	Skin Melanocytes
Stomach	Stomach Glandular Cells
Urinary	Urinary Bladder Urothelial Cells
Head and Neck	Nasopharynx Respiratory Epithelial Cells, Oral Mucosa Squamous Epithelial Cells, Salivary Gland Glandular Cells
Ovary	Ovarian Stroma Cells
Carcinoid (Healthy)	Colon Endothelial Cells, Colon Glandular Cells, Colon Peripheral Nerve Ganglion, Duodenum Glandular Cells, Pancreas Exocrine Glandular Cells, Pancreas Islets of Langerhans, Prostate Glandular Cells