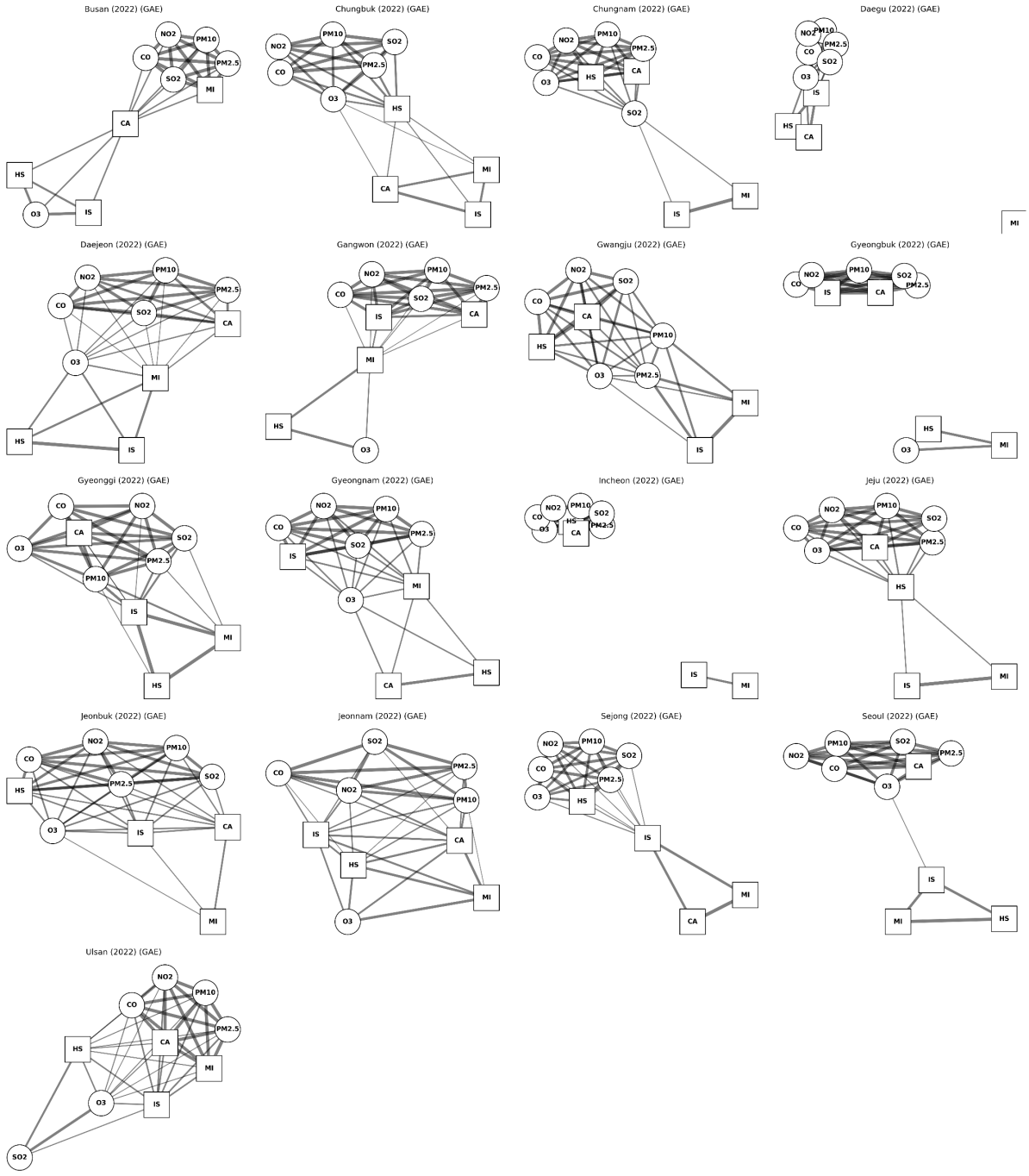
Supplement 6. Regional Graph Autoencoder (GAE) Networks Depicting Pollutant–Disease Associations in 2022



This figure displays Graph Autoencoder (GAE) network visualizations learned separately for each of the 17 administrative regions in South Korea during 2022.

Graph Elements:

Nodes: Circles represent air pollutants (SO_2, NO_2, O_3, CO, PM_{10}, $PM_{2.5}$), and squares represent disease categories: cardiac arrest (CA), myocardial infarction (MI), ischemic stroke (IS), and hemorrhagic stroke (HS).

Edges: Black lines indicate predicted structural similarity (adj_pred) between nodes. Thicker edges represent stronger connections as inferred by the model.

Interpretation:

The networks illustrate how pollutant–disease structural relationships vary by region.

Urban areas (e.g., Busan, Incheon, Ulsan) tend to show denser and more interconnected graphs, suggesting higher levels of concurrent pollutant–disease associations.

Non-metropolitan regions (e.g., Gangwon, Chungbuk) often display sparser networks, with fewer strong edges connecting pollutants to disease nodes.

Overall, these regional GAE networks highlight spatial heterogeneity in the structural relationships between air pollution and cardiovascular/cerebrovascular disease burden in 2022.