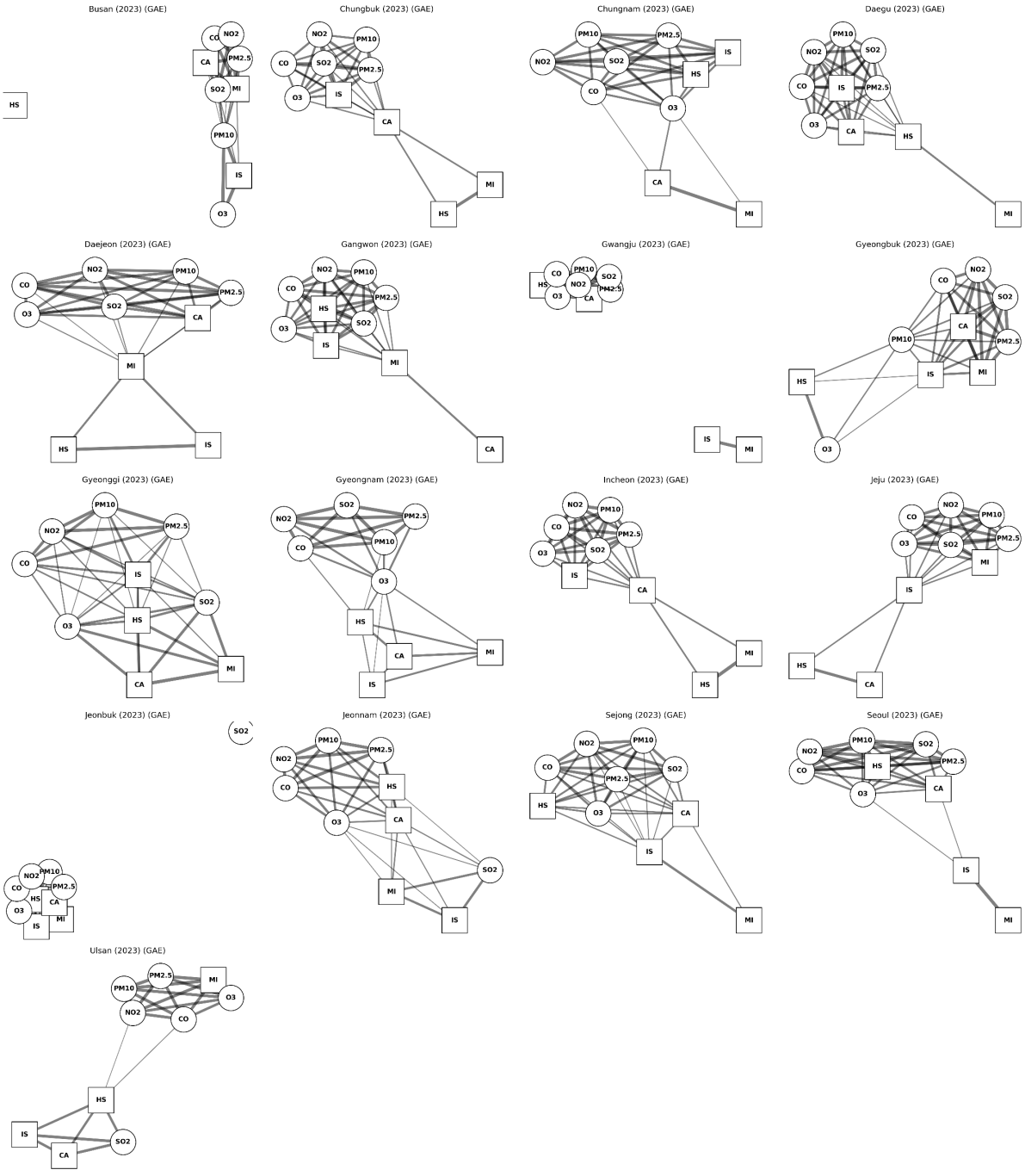
Supplement 7. Regional Graph Autoencoder (GAE) Networks Depicting Pollutant–Disease Associations in 2023



This figure shows Graph Autoencoder (GAE) network visualizations learned separately for each of the 17 administrative regions in South Korea during 2023.

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 spatial variability in pollutant–disease structural relationships across regions in 2023.

Urban regions (e.g., Seoul, Ulsan, Daegu) tend to exhibit denser, highly interconnected networks, suggesting more pronounced co-occurrence patterns between pollutants and disease nodes.

Non-metropolitan regions (e.g., Gangwon, Jeonnam) generally display sparser graphs, with fewer thick edges linking pollutants to diseases.

Overall, these regional GAE outputs complement the temporal analyses, showing how structural relationships between air pollution and cardiovascular/cerebrovascular disease varied geographically in 2023.