Gradient Domain Discovery Pipeline

Mixed Training Environments

$\{e_1, e_2, \ldots, e_n\}$

→

Gradient Collection

$g_i = \nabla_\theta \mathcal{L}(e_i)$

→

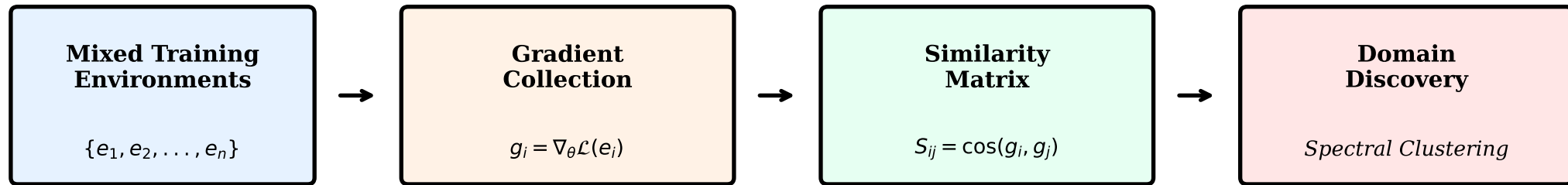**Similarity Matrix**

$S_{ij} = \cos(g_i, g_j)$

→

Domain Discovery

Spectral Clustering

Key Insight: Environments with similar optimal policies produce aligned gradients; conflicting objectives produce opposing gradients