SPA++: Generalized Graph Spectral Alignment for Versatile Domain Adaptation

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Problems & Ideas

- Conventional domain alignment maximizes cross domain similarity but ignores intra domain graph structure, collapsing class separability.
- Model source and target as graphs and align their eigenspaces with a lightweight spectral regularizer to preserve global geometry.
- Apply neighbor aware propagation with simple augmentation–consistency to denoise pseudo labels and refine target predictions.

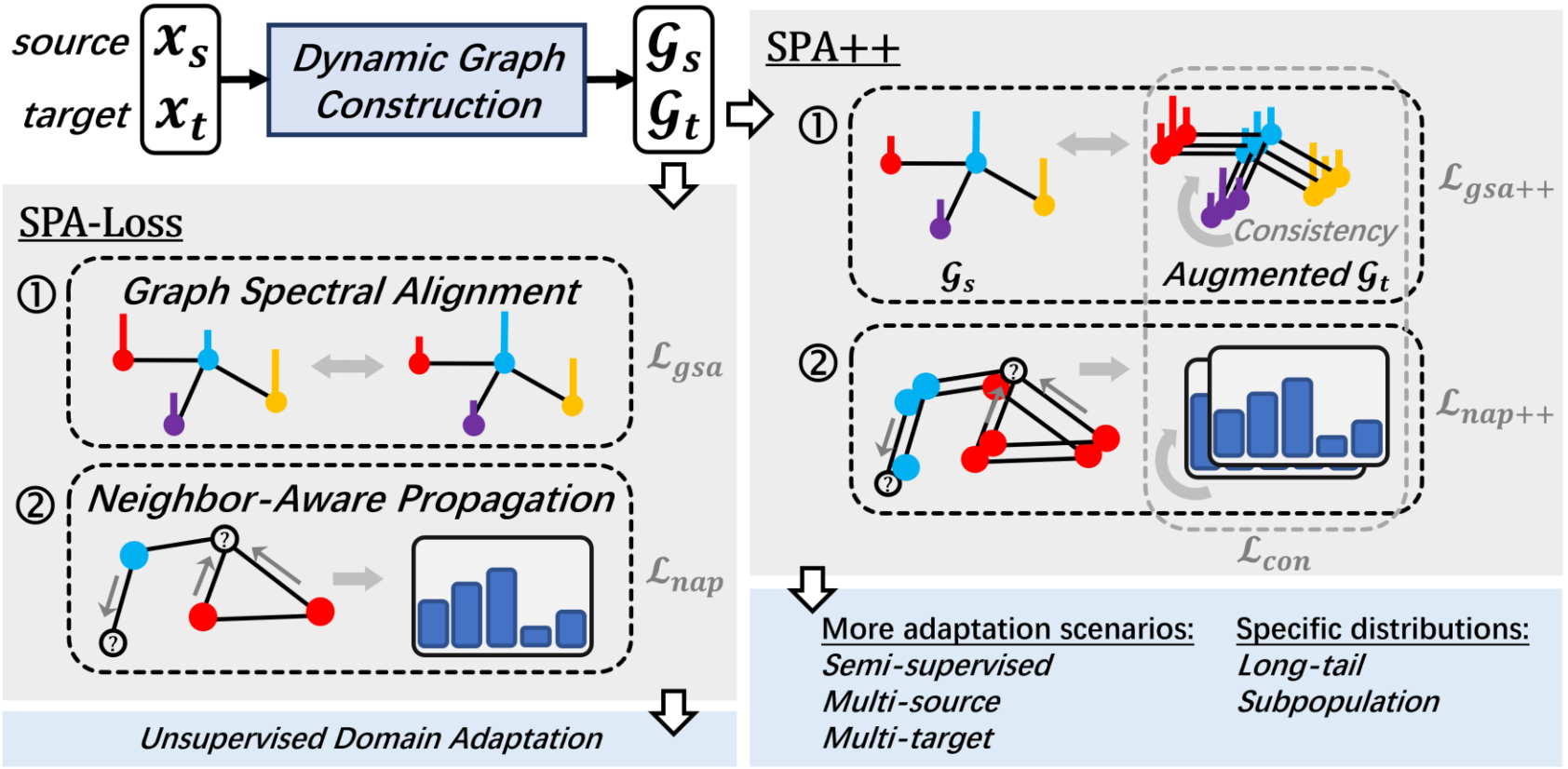

Fig. 1. SPA++ overview.

Main Contributions

- Model source/target as graphs and align their eigenspaces (spectral regularizer), then refine with neighbor aware propagation to preserve class separability.
- Add lightweight augmentation–consistency to stabilize optimization and denoise pseudo labels—no rigid node matching, easy to integrate.
- Provide generalization analysis for the design and show consistent state of the art accuracy on diverse datasets.

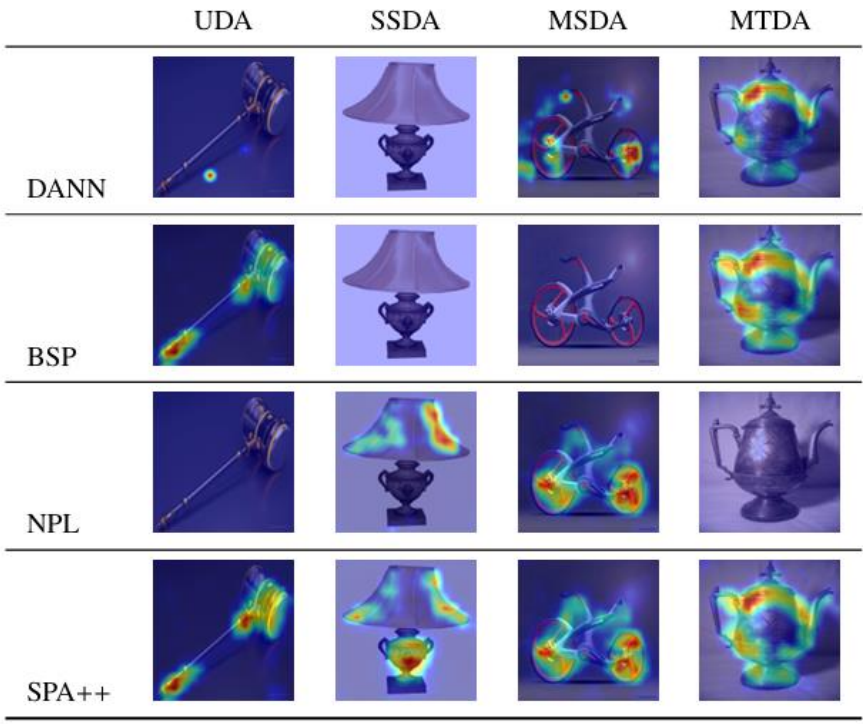

Fig. 2. Grad-CAM Visualization.

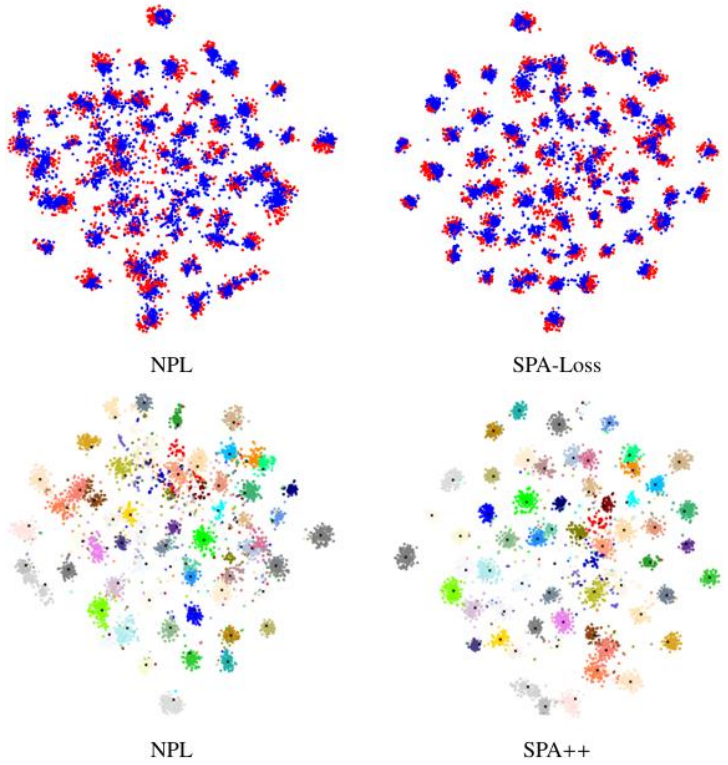

Fig. 3. Feature Visualization.