Degradation-Adaptive Neural Network for Jointly Single Image Dehazing and Desnowing

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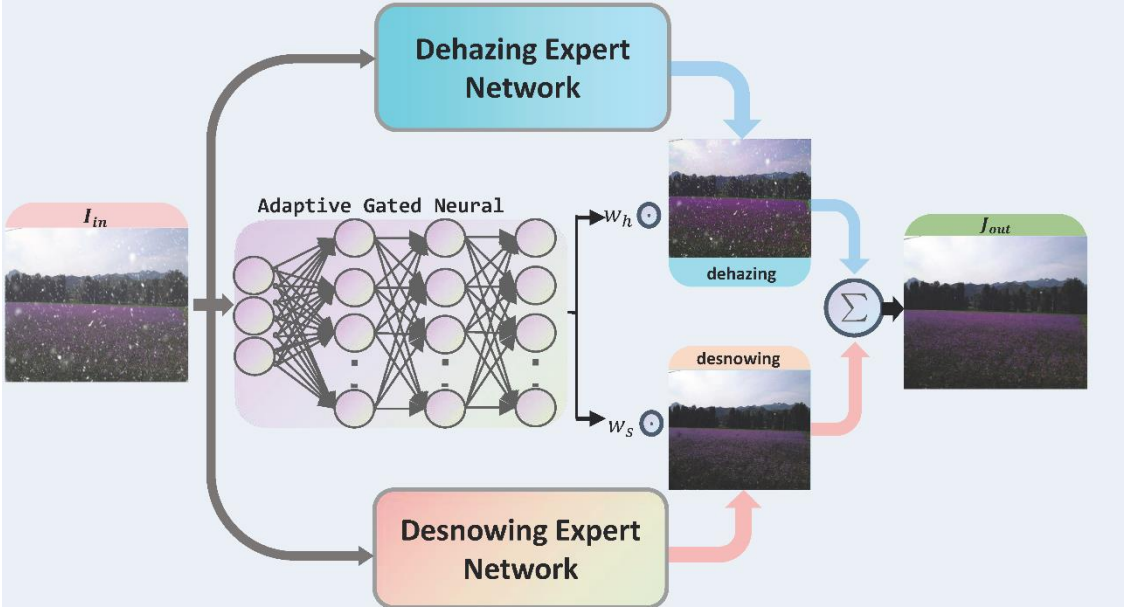
Problems & Ideas

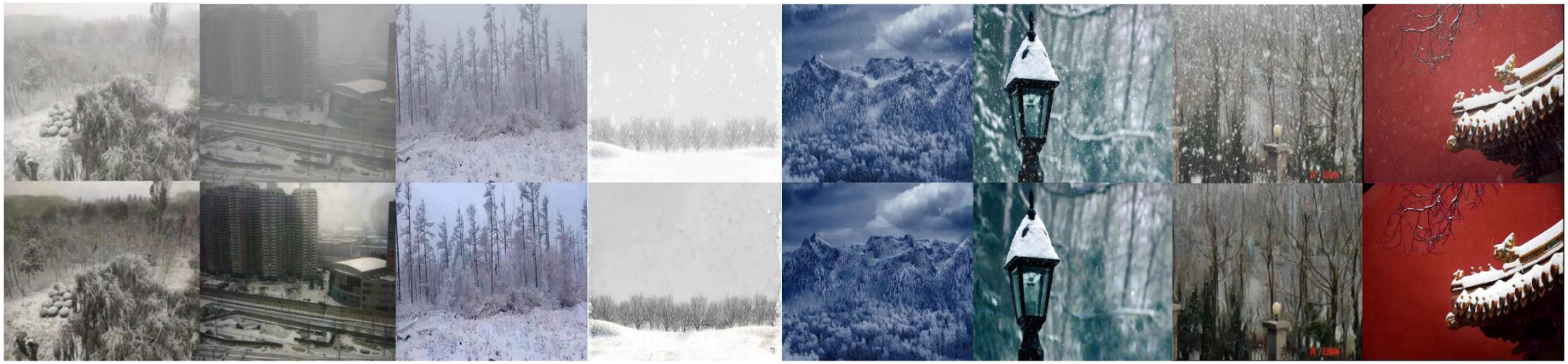
- Problems of conventional dehazing and desnowing methods:
  - Existing dehazing and desnowing methods mainly focus on one type of weather-related degradation.
  - Existing dehazing and desnowing methods struggle to handle haze and snow degradations, simultaneously.
- Ideas: A lightweight Degradation-Adaptive Neural Network (DAN-Net) that considers multiple degrdations (haze and snow).



The schematic overview of the proposed degradation-adaptive neural network.

Main Contributions

- Contributions:
  - A novel lightweight Degradation-Adaptive Neural Network (DAN-Net) that jointly achieves dehazing and desnowing;
  - Three effective modules, namely Multi-branch Spectral Transform Block (MSTB), Dual-Pool Attention Module (DPAM), and Cross-Layer Activation Gated Module (CLAGM), as the fundamental components to construct each task-specific expert network, achieving better trade-off between restoration performance and parameters for dehazing and desnowing;
  - An adaptive gated neural module as an effective degradation-adaptive guider to control the contributions of two pre-trained expert networks, contributing to the removal of multiple degradations.



Real-world winter images (top) and corresponding restoration results (bottom) using the proposed DAN-Net.