

Supplementary Materials: Representative Graph Neural Network

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S1. Visualization of representative nodes.

The proposed Representative Graph (RepGraph) layer can sample a few representative nodes to dramatically reduce the computational complexity of non-local operation [1–3]. This layer applies the learned offset matrix to the original feature to dynamically sample the representative positions for each node. The representative features enable a compact and effective representation, which improves the performance in semantic segmentation and object detection. Here, for better understanding, we visualize the learned representative positions in Figure 1. The RepGraph layer is applied on the ADE20K dataset of the semantic segmentation task.

As shown in Figure 1, the proposed RepGraph layer can capture representative features for different positions. In the first row, the representative positions can focus on the *car*, while the *current* position is on the *car*. When the *current* position is on the *road*, the receptive field of the representative positions becomes larger to capture the *large* stuff. In the second row, while the *current* position is on a *small Seagull*, the RepGraph layer can also capture the representative features. For the *slender rod* in the third row, the RepGraph layer can model the representative positions on it. Meanwhile, for the *hollow* things, e.g., the *bridge* in the fifth row, the learned representative positions can be on the hollow bridge. When on the boundary of some things, e.g., the boundary of the *bridge* in the last row, the RepGraph layer can model the representative features of the *bridge* to recognize it.

These visualizations can improve the understanding of the RepGraph layer and validate the effectiveness of the RepGraph layer. We believe the proposed RepGraph layer can be helpful to the visual understanding community.

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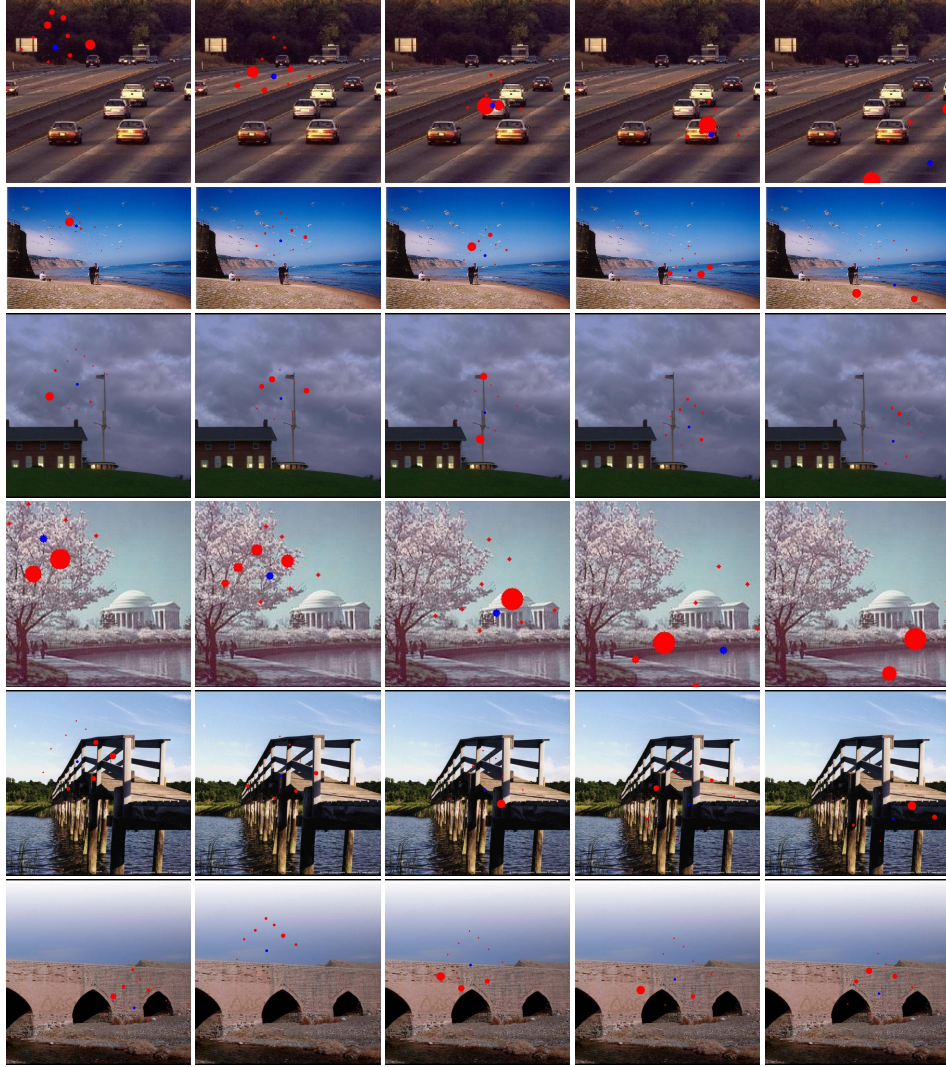


Fig. 1. Visualization of representative nodes for different positions. The blue point indicates the current position, while the red points denotes the sampled positions. The sizes of the red points represents the weight of this sampled point. For better view, we adjust the size of points which has very small weights.

References

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