



Less is More: Efficient Image Vectorization with Adaptive Parameterization

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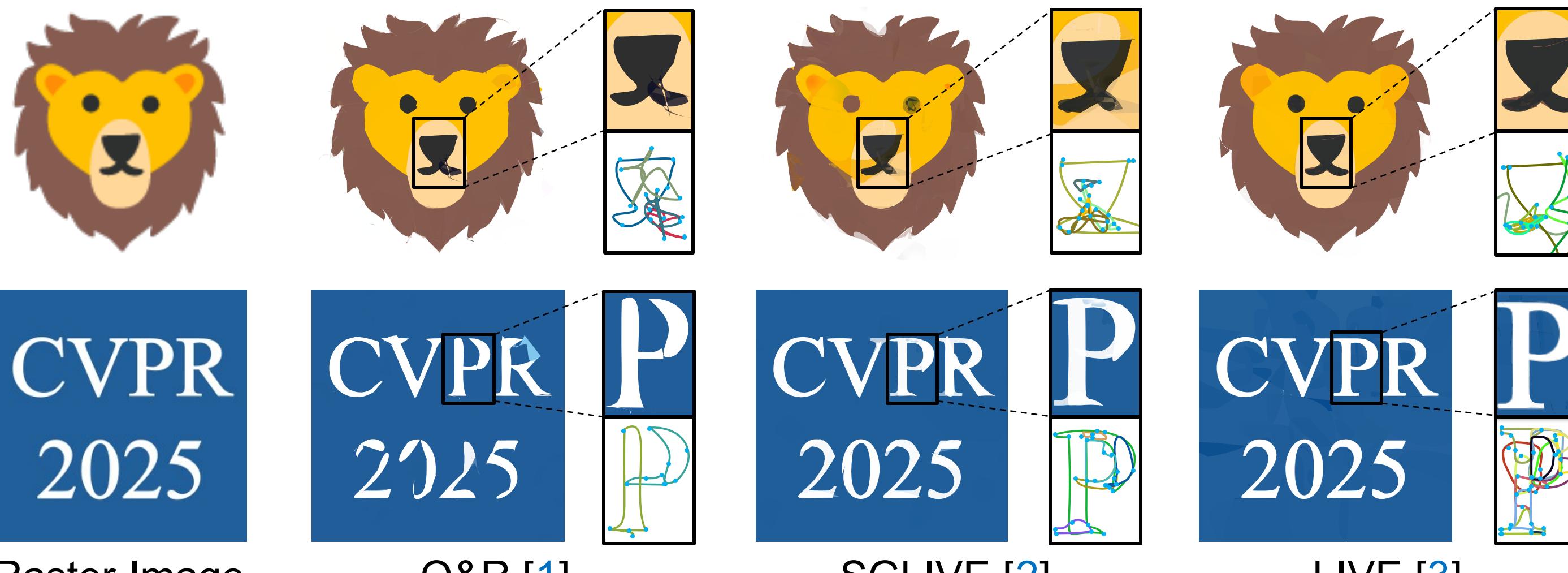
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Challenges

- The existing methods generate paths with **a fixed number of parameters**, which is not conducive to image editing and results in low generation efficiency.



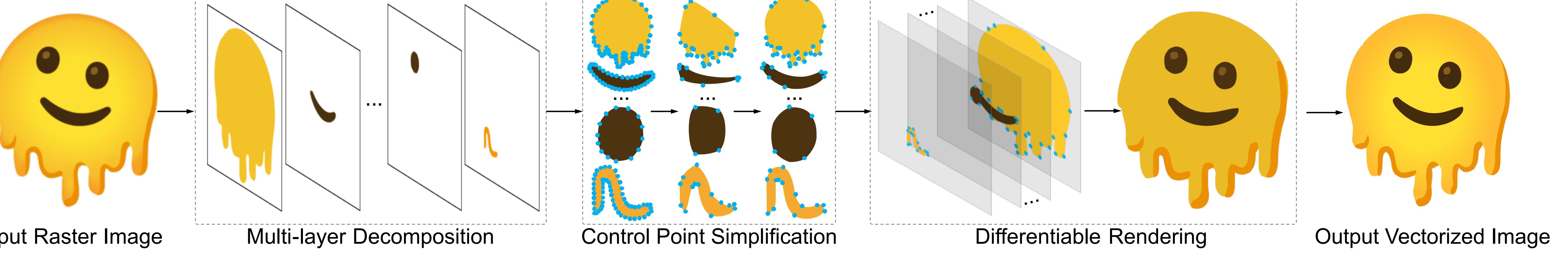
Raster Image

O&R [1]

SGLIVE [2]

LIVE [3]

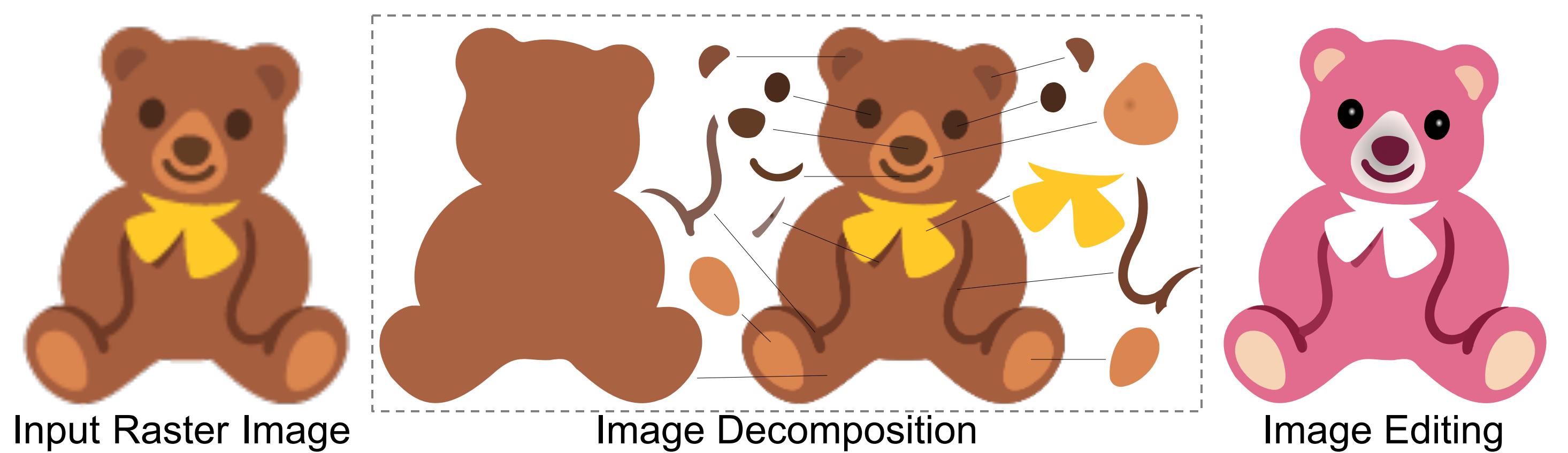
Pipeline



- We propose AdaVec, an efficient image vectorization method with adaptive parametrization, where the paths and control points can be adjusted dynamically based on the complexity of the input raster image.

Motivation

- Given the input raster image, is it possible to consider **Efficiency**, **Accuracy**, and **Editability** of image vectorization simultaneously?



Input Raster Image

Image Decomposition

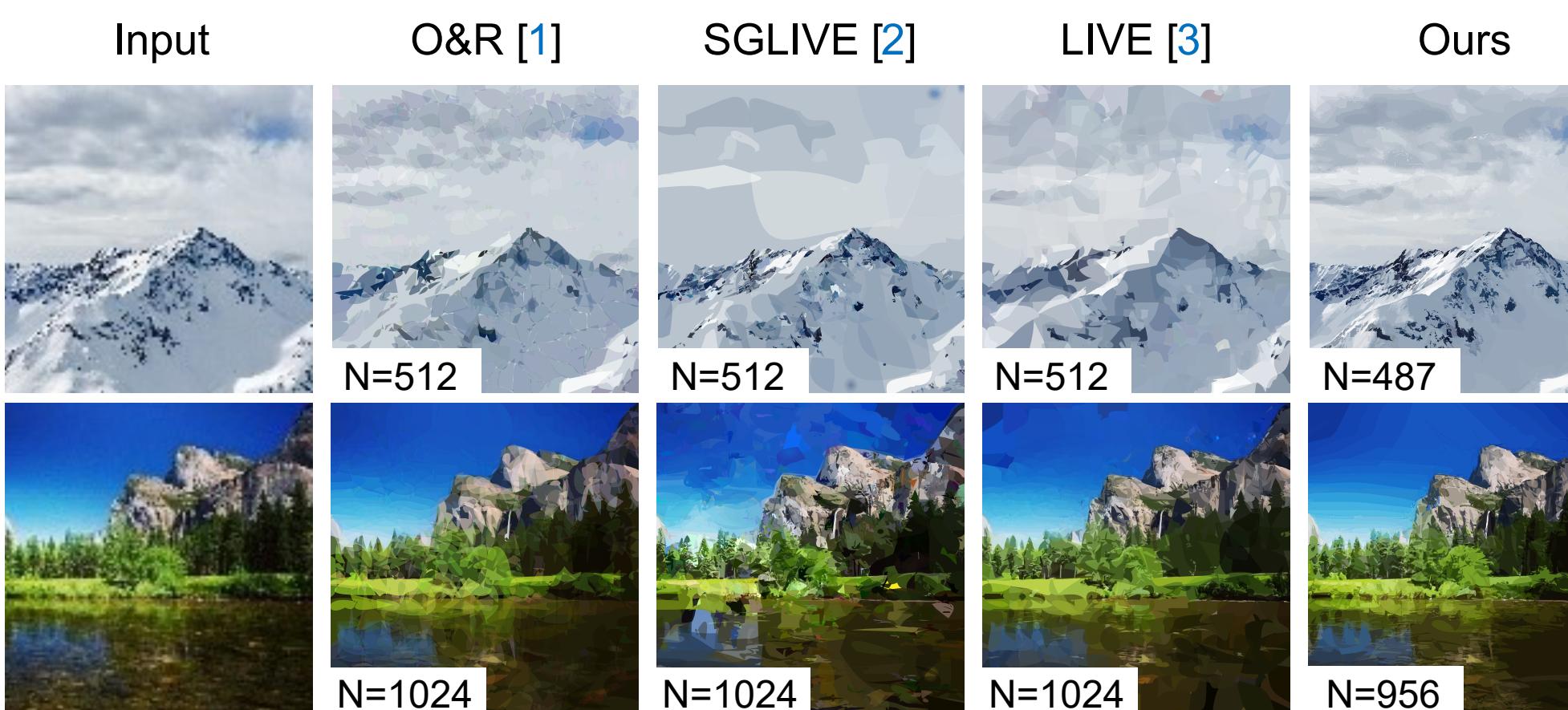
Image Editing

Contributions

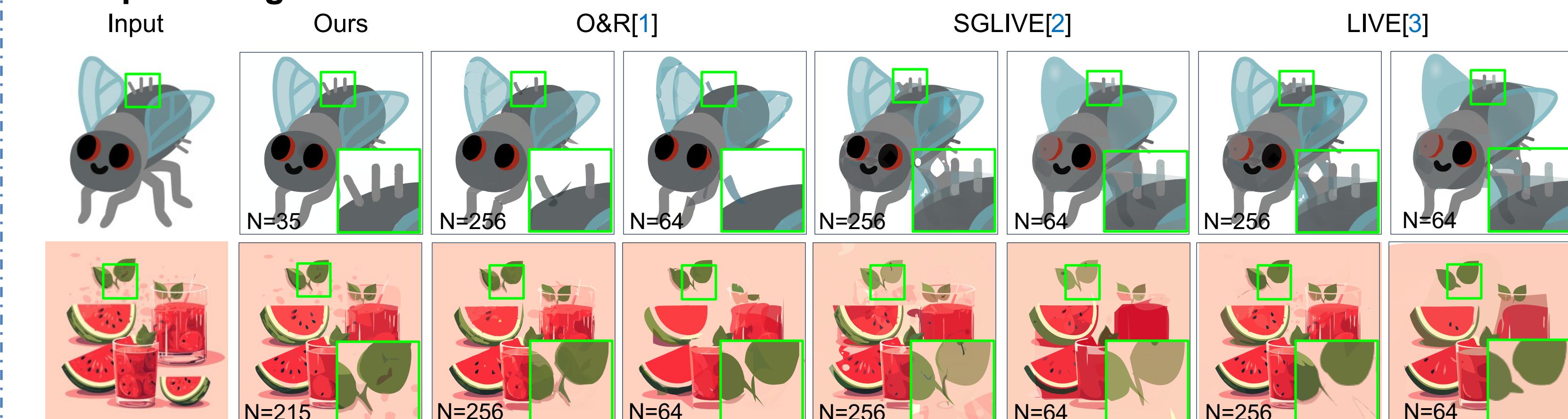
- We propose an efficient image vectorization method that allows for fast computation speed, high vectorization accuracy, and flexible editing ability.
- Our vectorization method can adjust paths and control points adaptively based on image complexity.
- Extensive evaluations confirm our method's state-of-the-art vectorization performance and benefits for image editing.

Evaluations

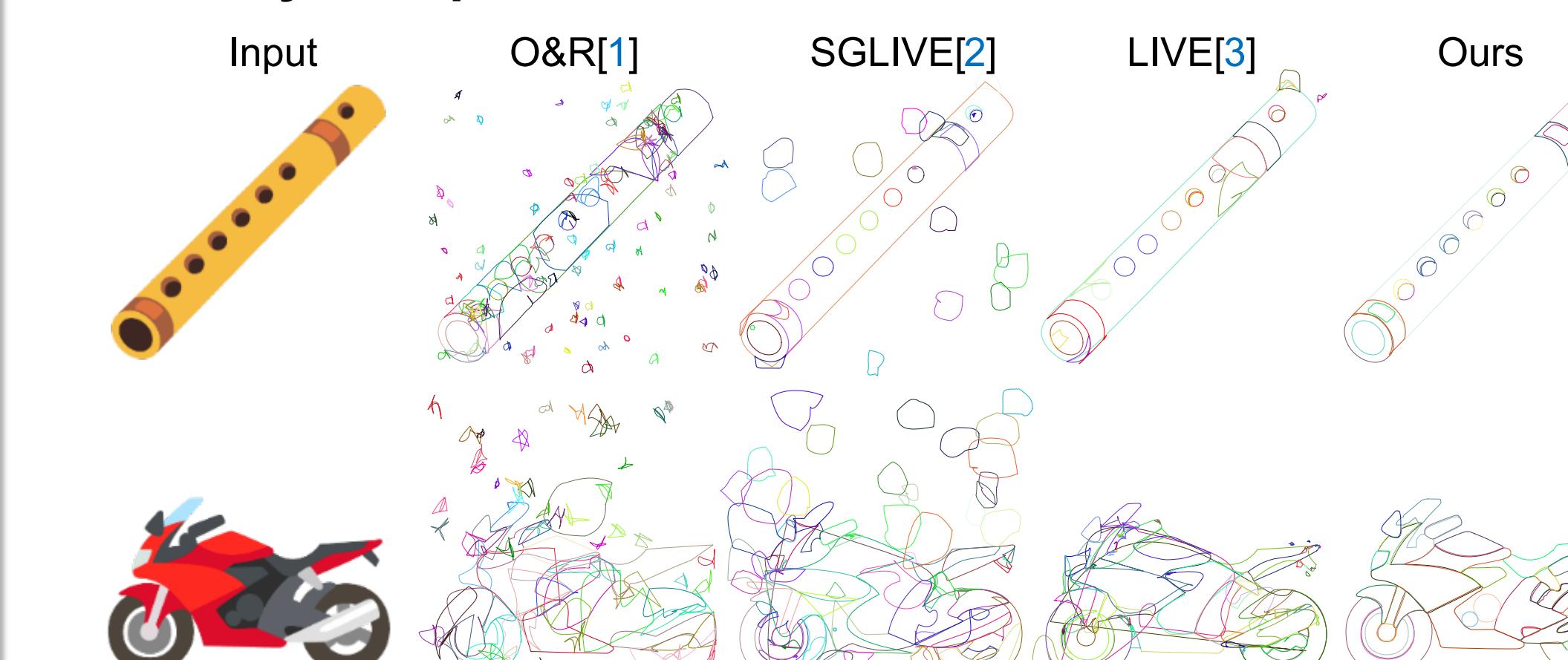
Natural Images



Graphic Images



Boundary Comparison



Quantitative Results

Metric	O&R [1] (N=64/256)	SGLIVE [2] (N=64/256)	LIVE [3] (N=64/256)	Ours (N=39)
Params ↓	1792/7168	2432/9728	1792/7168	1220
Time(s) ↓	176.3/269.7	5051.4/8721.4	4606.9/9342.2	44.9
MSE(10^{-4}) ↓	40.7/8.6	26.4/19.2	9.4/3.6	3.2

References

- [1] Or Hirschorn, et al. Optimize & reduce: A top-down approach for image vectorization. In AAAI, 2024
- [2] Hengyu Zhou et al. Segmentation-guided layer-wise image vectorization with gradient fills. arXiv preprint arXiv:2408.15741, 2024.
- [3] Xu Ma, et al. Towards layer-wise image vectorization. In CVPR, 2022.