

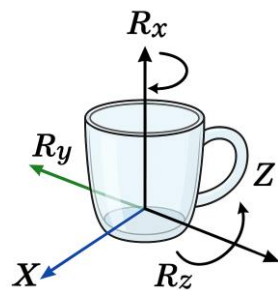
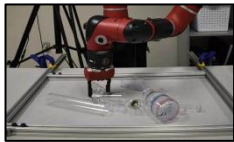
Geometry-Aware Dual-Score Fusion and Modeling with Mask Completion for Transparent Objects Pose Estimation

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Background

Application

- Robot Assistant
- Medical Waste
- Lab Automation
-



Challenges

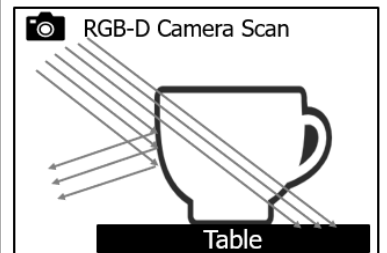
① Hard to use texture information



Reflection & Refraction

Background & light influence the appearance

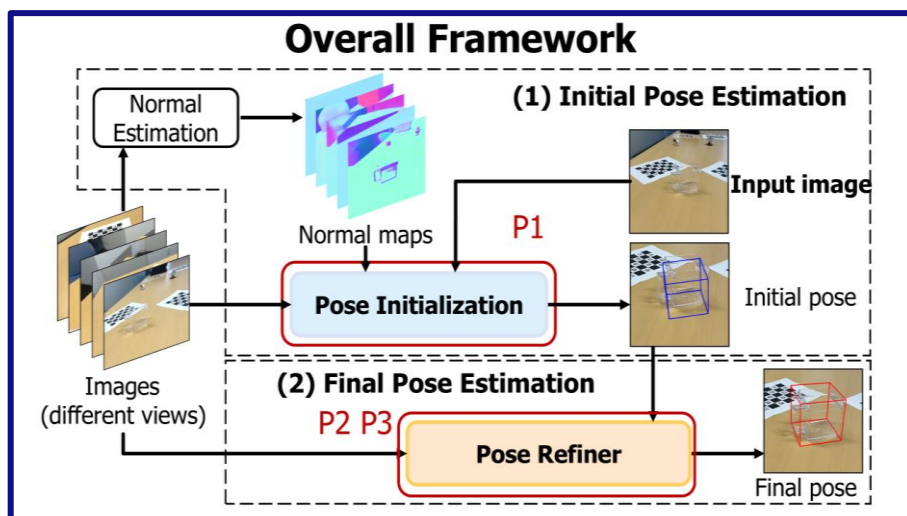
② Hard to get 3D object model



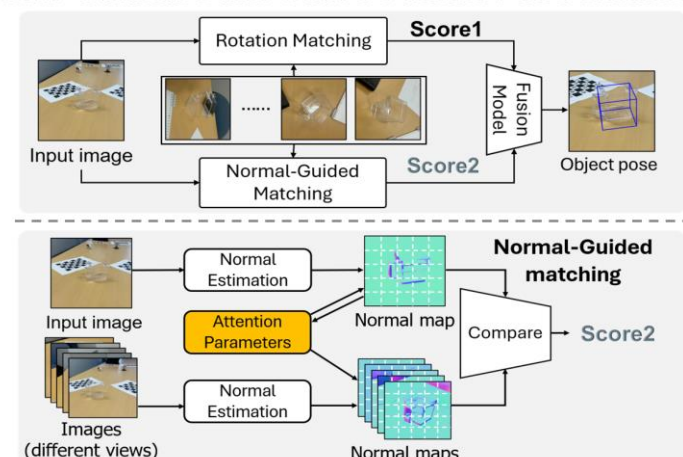
Losing depth information

◆ **Target** Achieve a success rate of 84% for transparent object pose estimation.

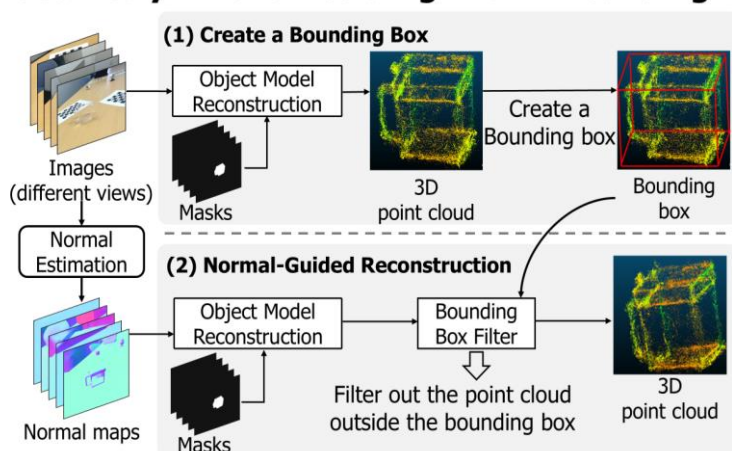
Proposals



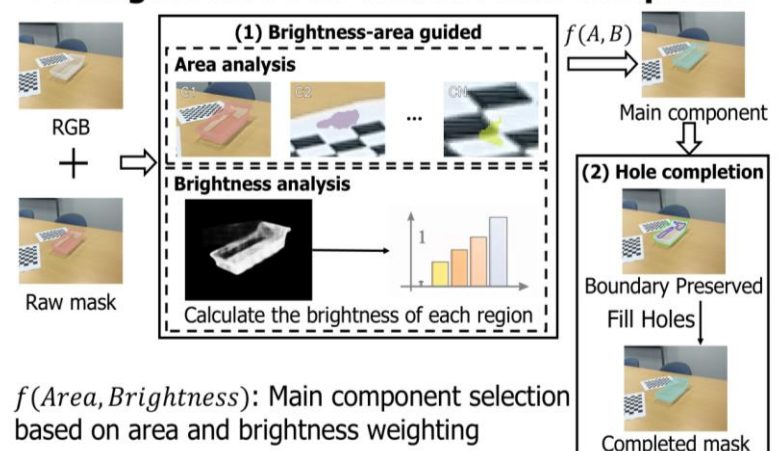
P1 Normal-Guided Dual-Score Fusion Pose Initialization



P2 Geometry-Aware Modeling within Bounding Box



P3 Brightness-Area Guided Mask Completion



Experiment Results

Metric	Method	Object ID									
		T1	T2	L1	L2	G1	G2	C1	C2	O1	Avg.
3 cm-3 deg	Baseline	87.26	78.38	60.05	65.99	85.03	73.12	73.22	82.36	46.24	72.41
	My work	95.81	92.96	98.89	99.37	99.50	96.52	89.32	91.96	98.96	95.92
1 cm-1 deg	Baseline	16.15	35.67	46.60	53.19	84.64	65.63	67.45	49.55	23.12	49.11
	My work	83.26	78.90	96.11	90.95	99.83	94.69	71.86	53.57	87.48	84.07

Conclusion

- The improved algorithm achieves an accuracy of 84.07% under the 1 cm-1° criterion, representing a 34.96-percentage-point increase over the baseline accuracy of 49.11% and demonstrating its effectiveness and robustness in addressing the challenges of transparent-object pose estimation.

