



ICLR

3D-Aware Hypothesis & Verification for Generalizable Relative Object Pose Estimation

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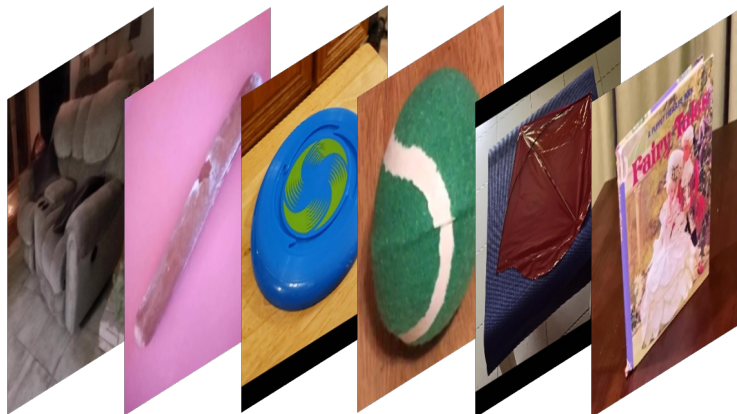
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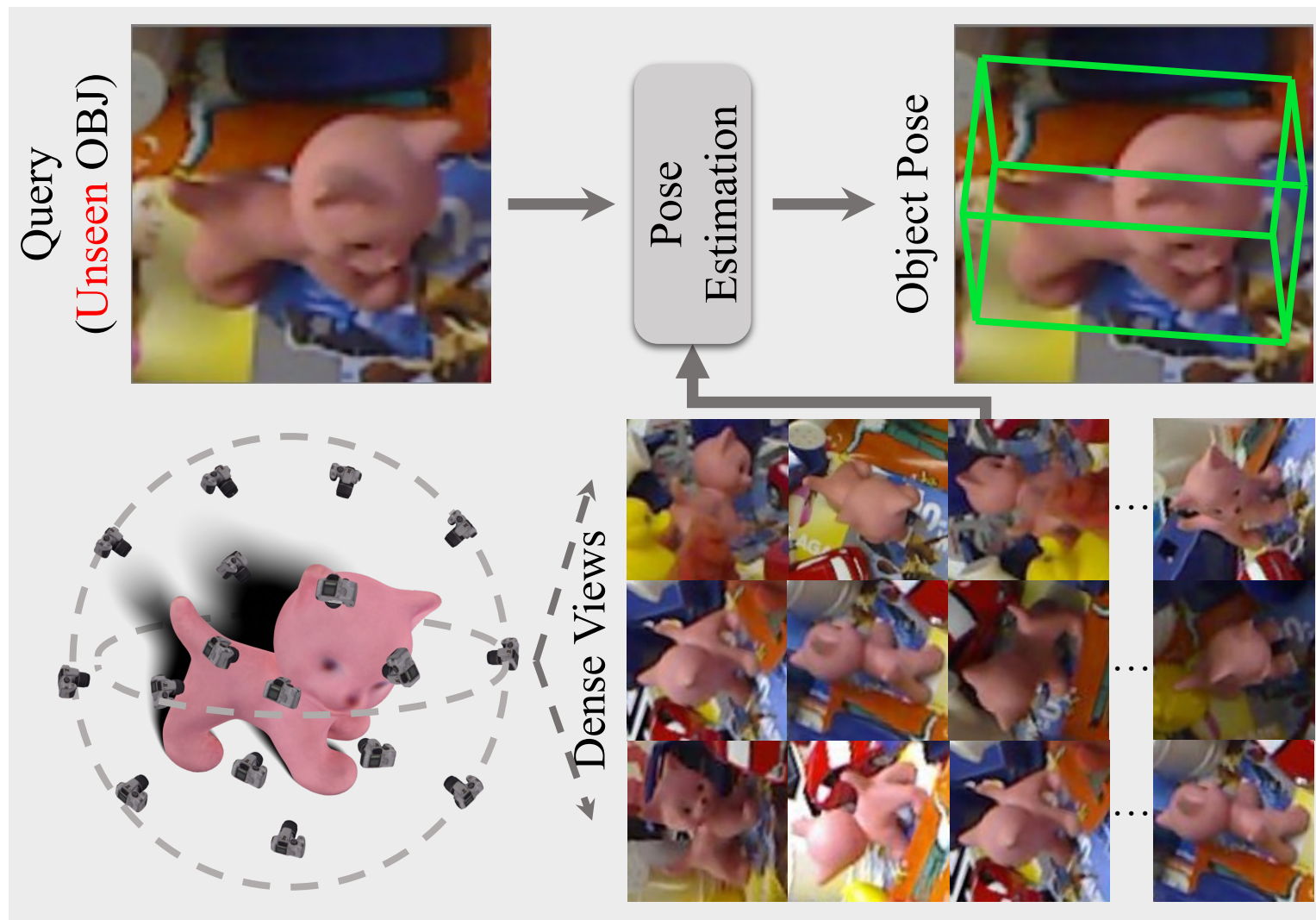
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Unseen Object Pose Estimation

Training:

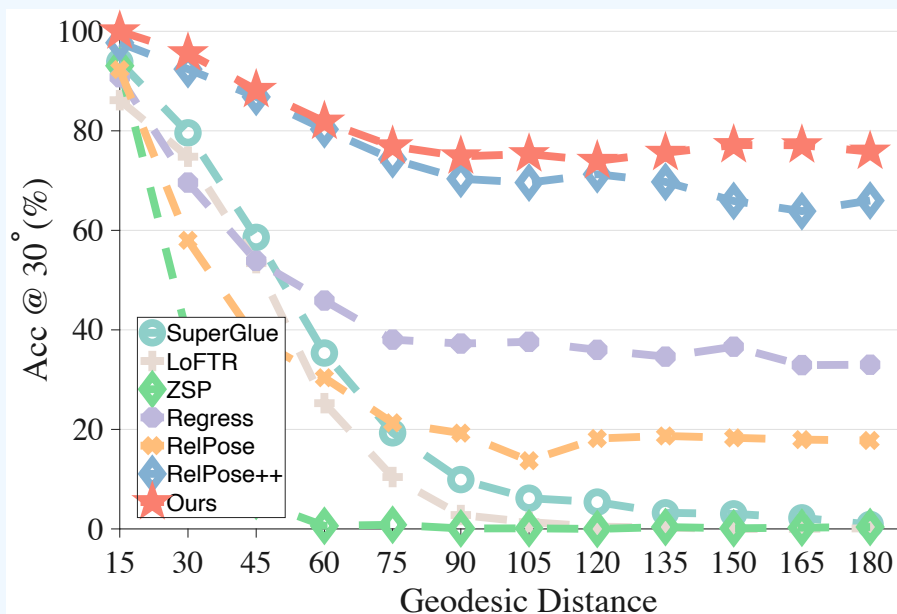
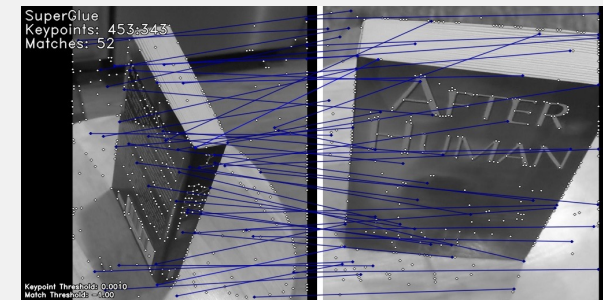
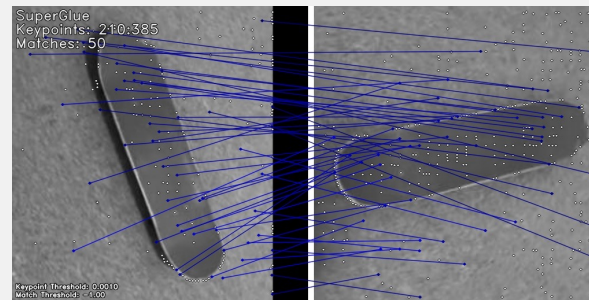
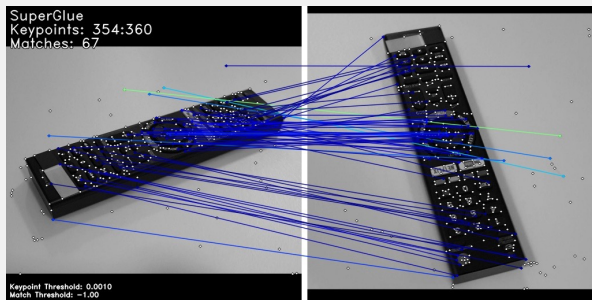
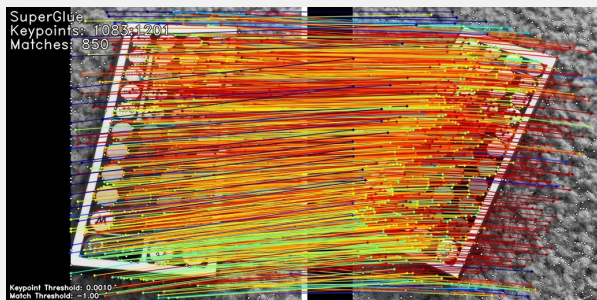


Inference:



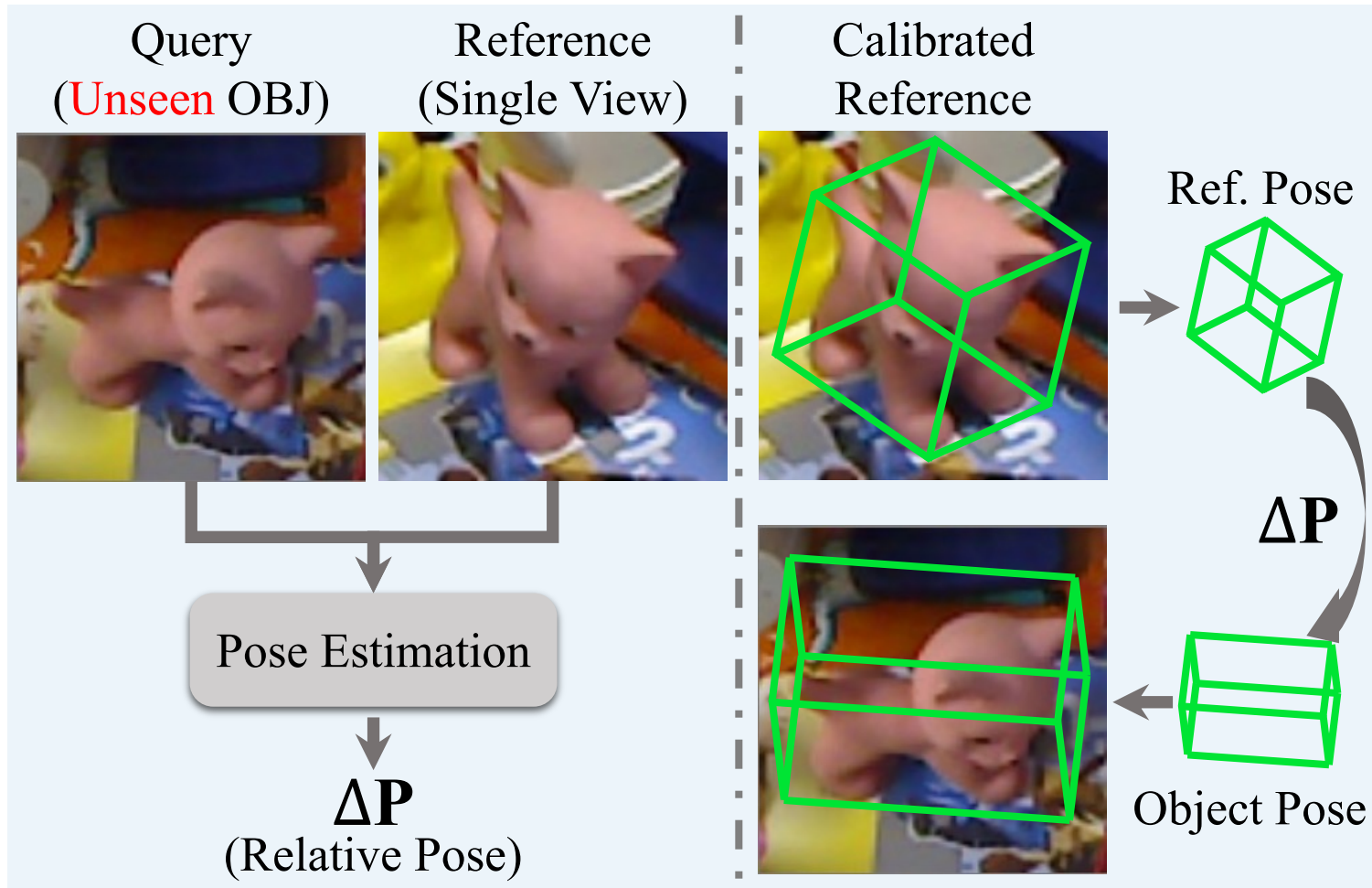
Relative Pose Estimation for Unseen Objects

Feature Matching Results:



- When only **sparse-view** references are available, the query and reference images may depict a **large-scale object pose difference**.
- The feature-matching methods cannot generate reliable correspondences in challenging scenarios.

Relative Pose Estimation for Unseen Objects

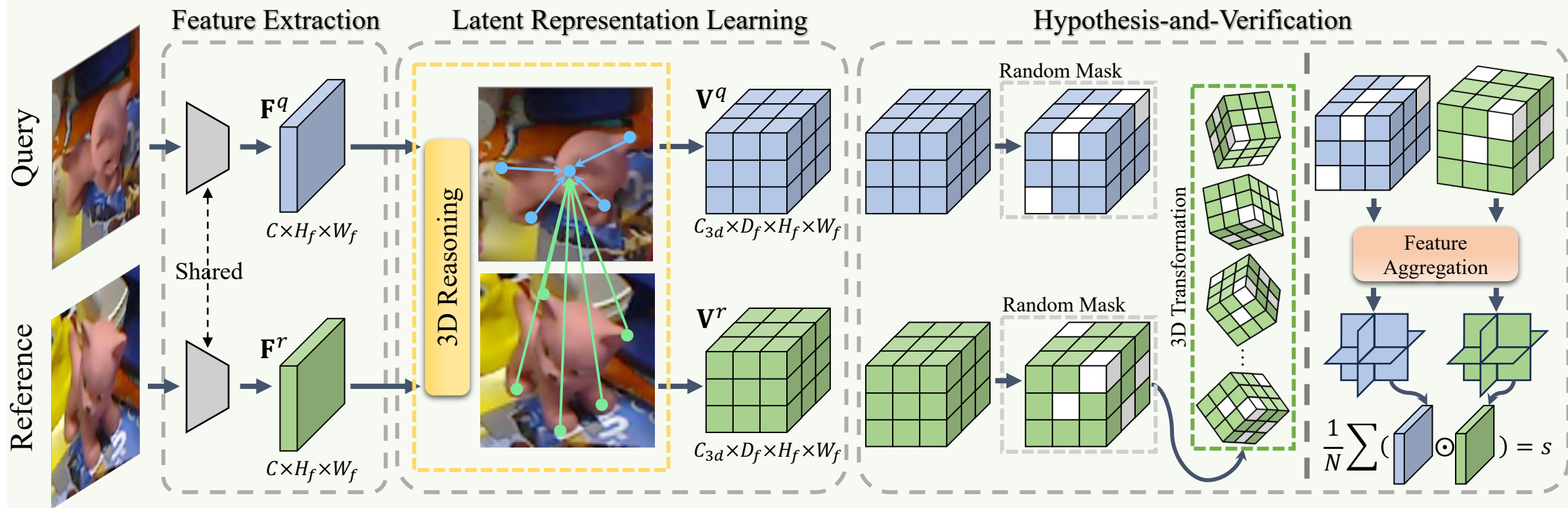


- We assume only **one reference image** is available. We predict the **relative object pose** between the reference and query.
- The object pose in the query can be derived when the pose of the reference is available.

Hypothesis-and-Verification Mechanism

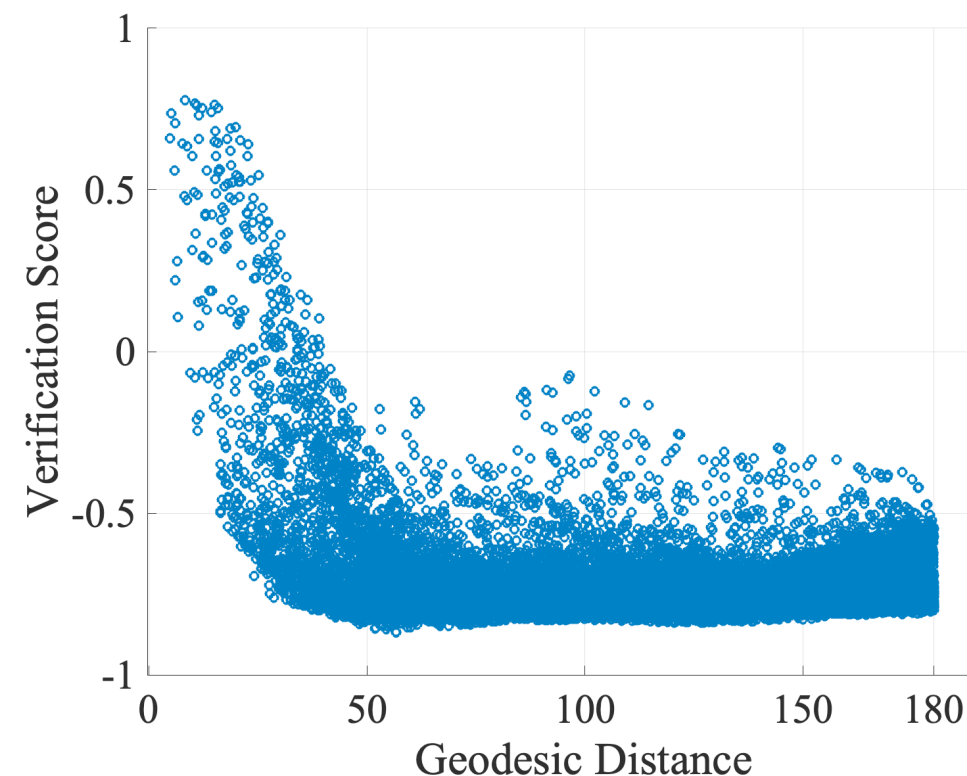
Problem Formulation:
$$\Delta \mathbf{R}^* = \arg \max_{\Delta \mathbf{R}_i \in SO(3)} f(\mathbf{I}_q, \mathbf{I}_r | \Delta \mathbf{R}_i, \Theta)$$

Framework:



Experimental Results

CO3D	Angular Error	Acc @ 30	Acc @ 15
SuperGlue	67.2	45.2	37.7
LoFTR	77.5	37.9	33.1
ZSP	87.5	25.7	14.6
Regress	46.0	60.6	42.7
RelPose	50.0	64.2	48.6
RelPose++	38.5	77.0	69.8
Ours	28.5	83.5	71.0

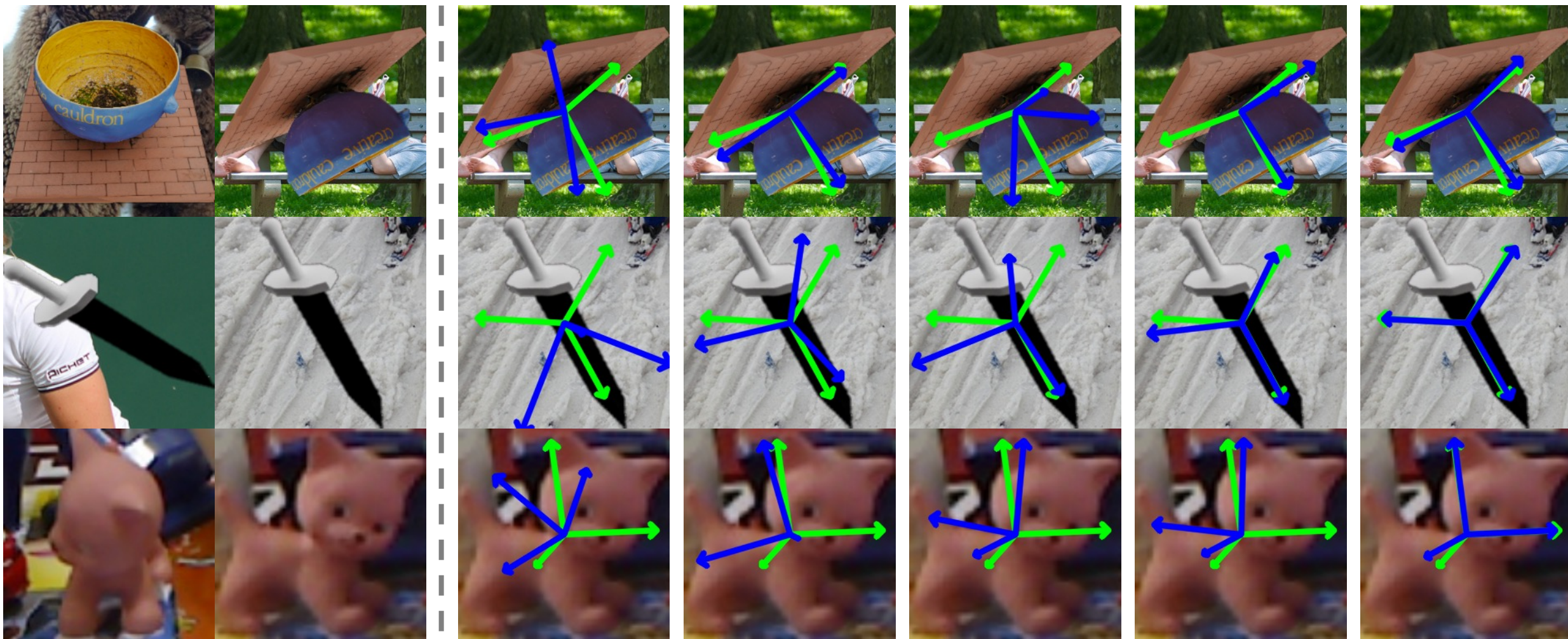


Experimental Results

LINEMOD	Angular Error	Acc @ 30	Acc @ 15
SuperGlue	64.8	26.2	14.3
LoFTR	84.5	24.2	13.5
ZSP	78.6	10.7	2.7
Regress	52.1	26.5	7.6
RelPose	58.3	26.1	7.0
RelPose++	46.6	42.5	15.8
Ours	41.7	61.5	29.9

Objaverse	Angular Error	Acc @ 30	Acc @ 15
SuperGlue	102.4	15.1	12.1
LoFTR	134.1	9.6	7.7
ZSP	107.2	4.2	1.5
Regress	55.9	39.2	15.6
RelPose	80.4	20.8	6.7
RelPose++	33.5	72.3	42.9
Ours	28.1	78.6	58.4

Experimental Results



Reference

Query

SuperGlue

Regress

RelPose

RelPose++

Ours

EPFL Ecole polytechnique fédérale de Lausanne

Thank You