

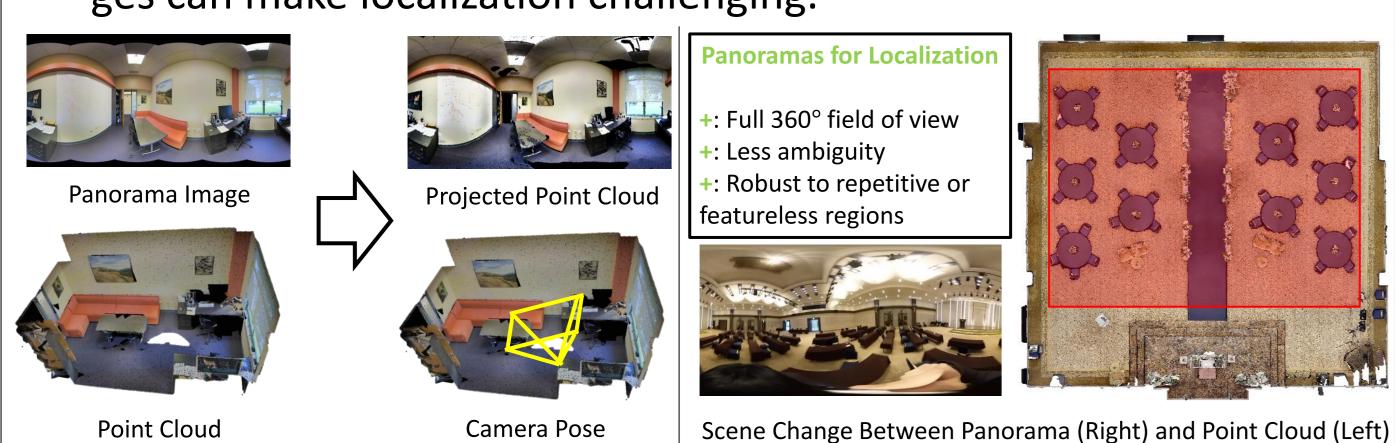
CPO: Change Robust Panorama to Point Cloud Localization

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1. Scene Changes in Visual Localization

- CPO is a localization algorithm that can robustly handle large amo unts of scene changes.
- ✓ CPO finds the camera pose from a panorama and point cloud
- CPO does not involve learning and is thus usable off-the-shelf
- While panoramas provide a large field of view, drastic scene chan ges can make localization challenging.



2. Overview of CPO Input: Query Panorama Image & Colored Point Cloud 2D, 3D Score Maps for attenuating scene changes Candidate pose selection guided by 2D score maps Pose Refinement with 3D score maps & gradient descent

✓ CPO creates 2D, 3D score maps to attenuate regions with changes.

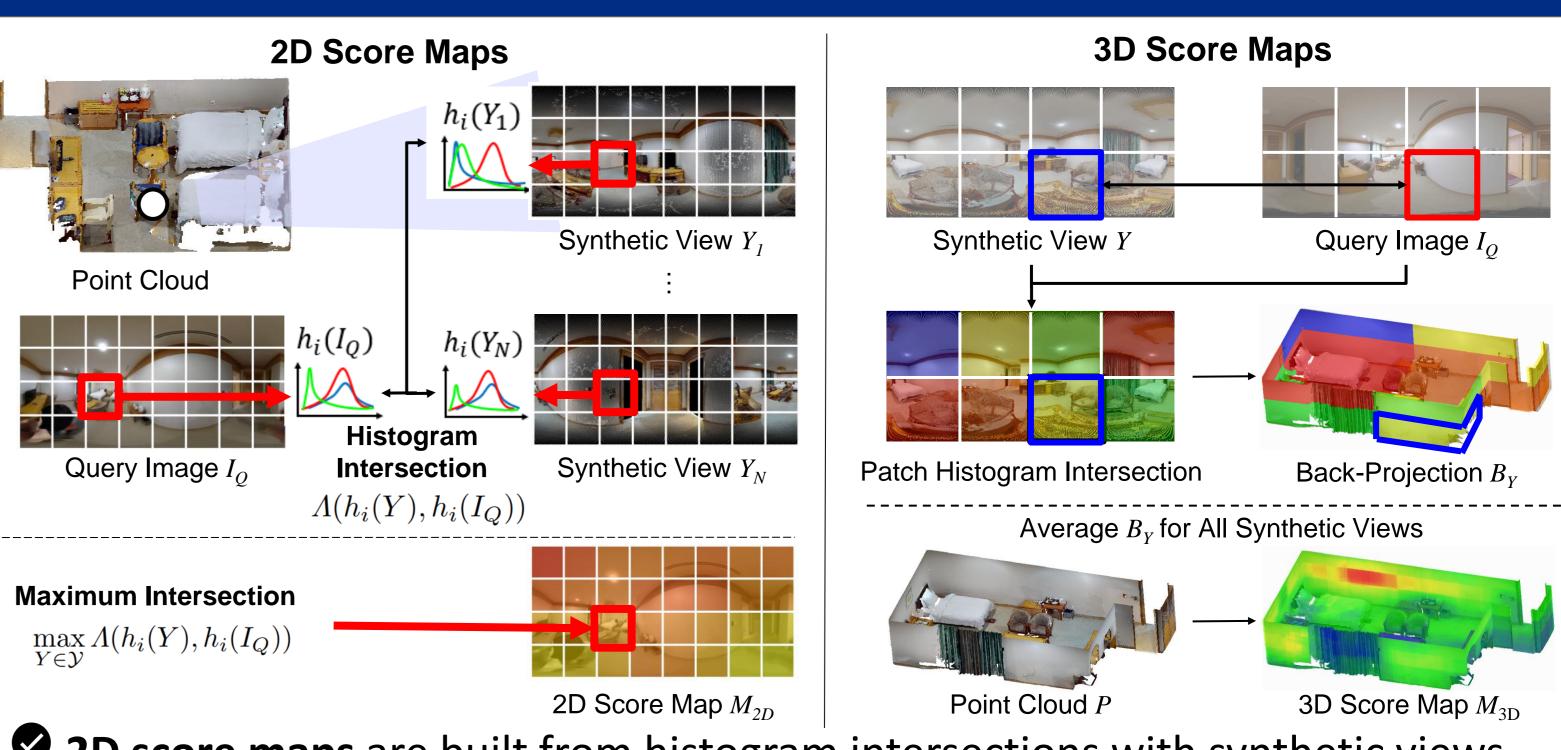
Output: 6DoF Camera Pose

Using the score maps, CPO selects candidate poses and refines the poses using gradient descent optimization.

Candidate Pose

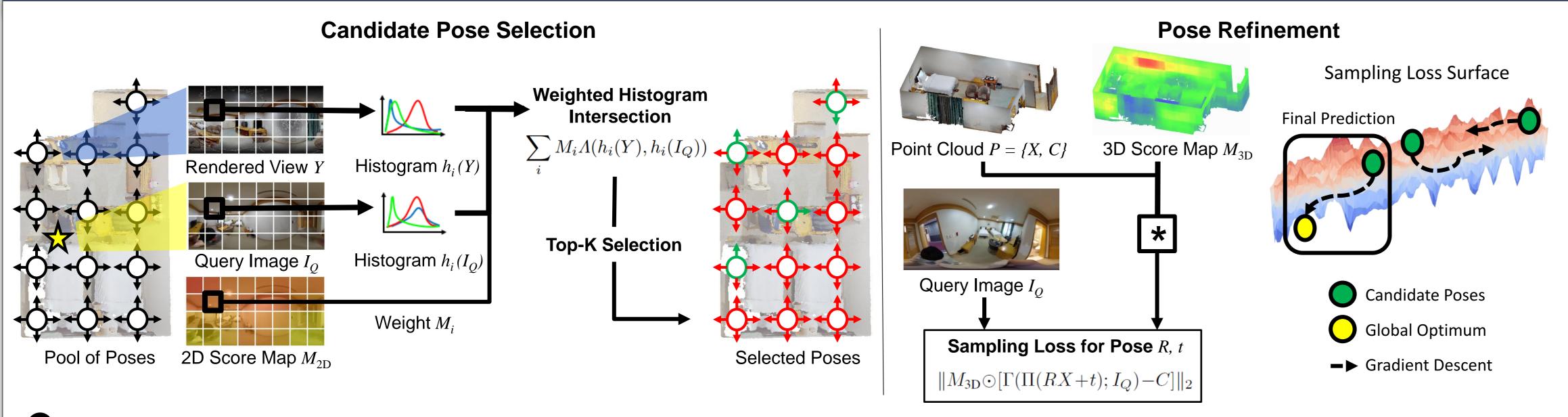
Pose Refinement

3. 2D and 3D Score Maps



- **2D score maps** are built from histogram intersections with synthetic views.
- **3D score maps** are created by back-projecting the histogram intersections. ■

4. Localization using Score Maps



- Candidate pose selection uses the 2D score map to weigh patch-wise histogram intersections during ranking.
- Pose refinement uses the 3D score map to weigh 3D points while minimizing sampling loss for each selected pose.

5. Experimental Results

