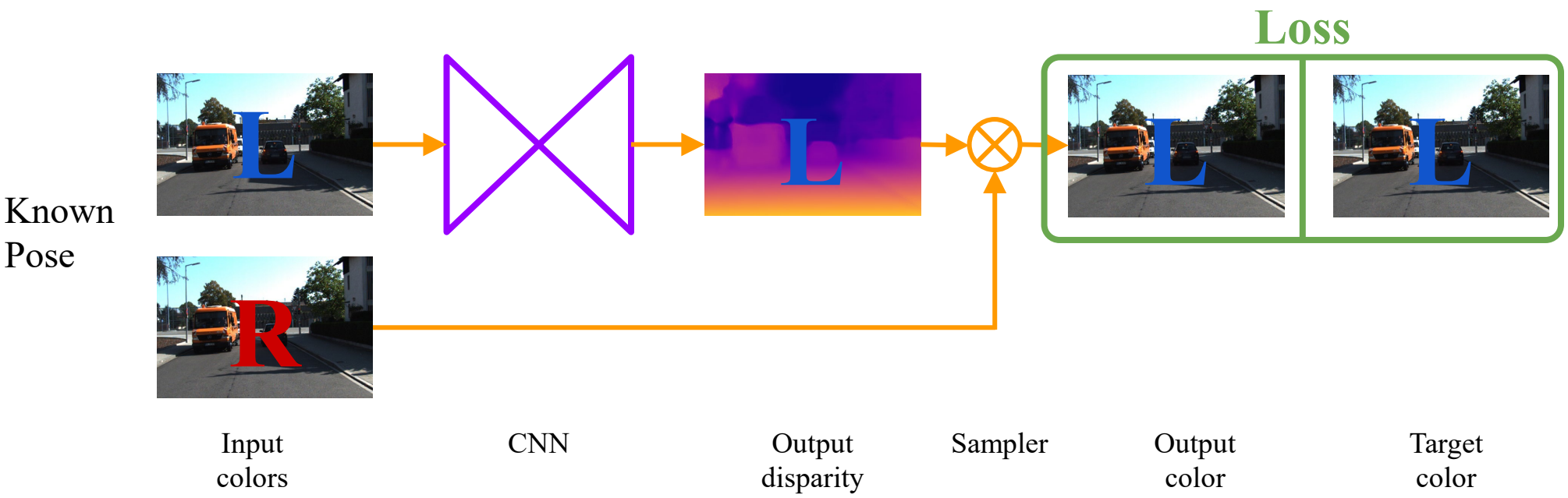
Improve Self-supervised Depth Estimation

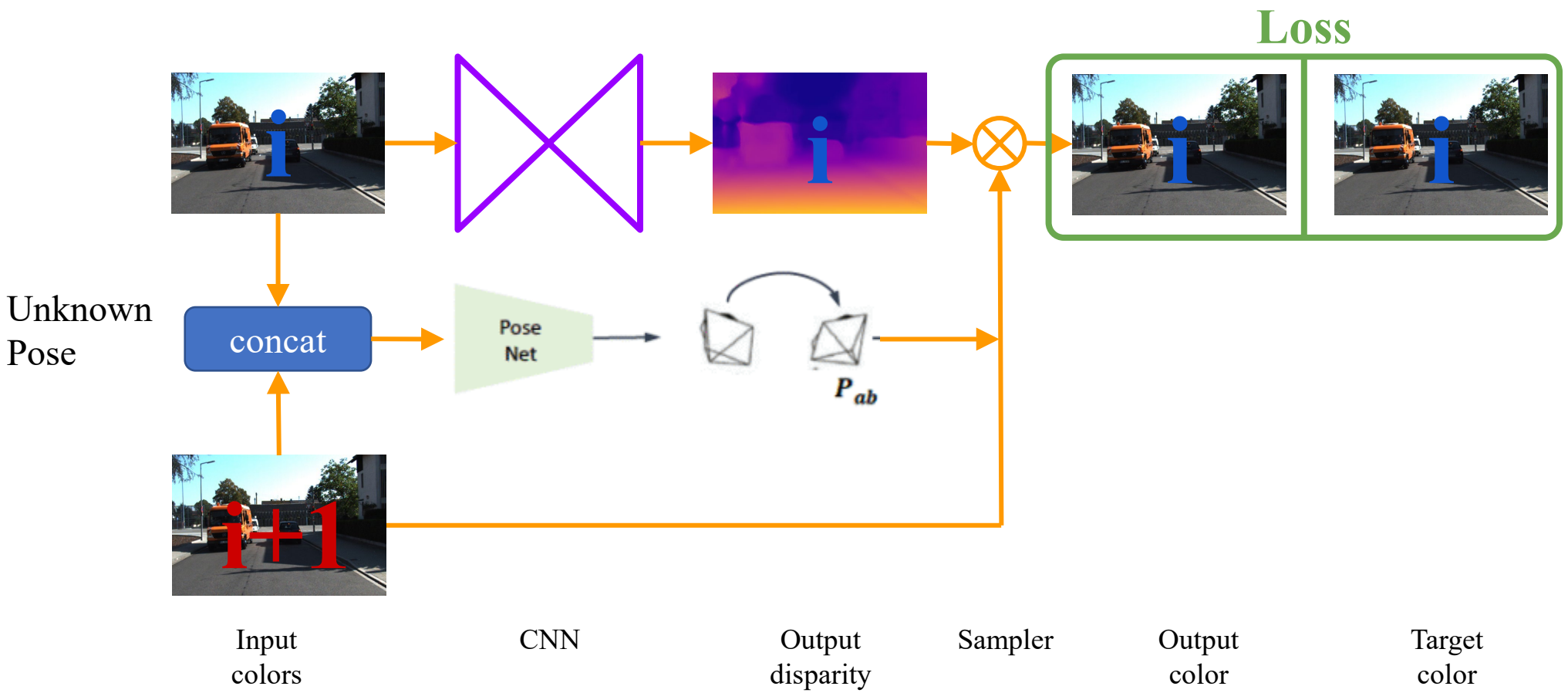
Preliminaries

- Stereo Training



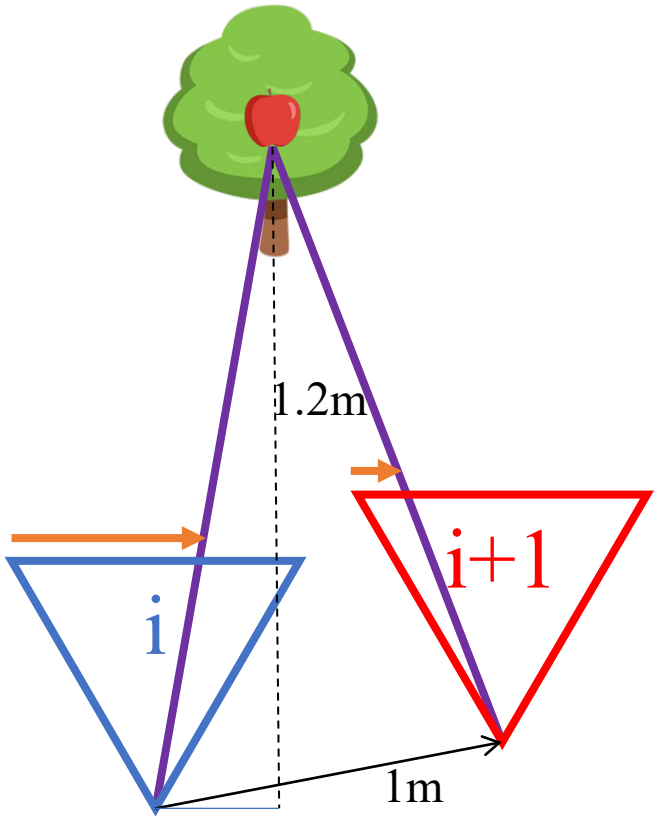
Preliminaries

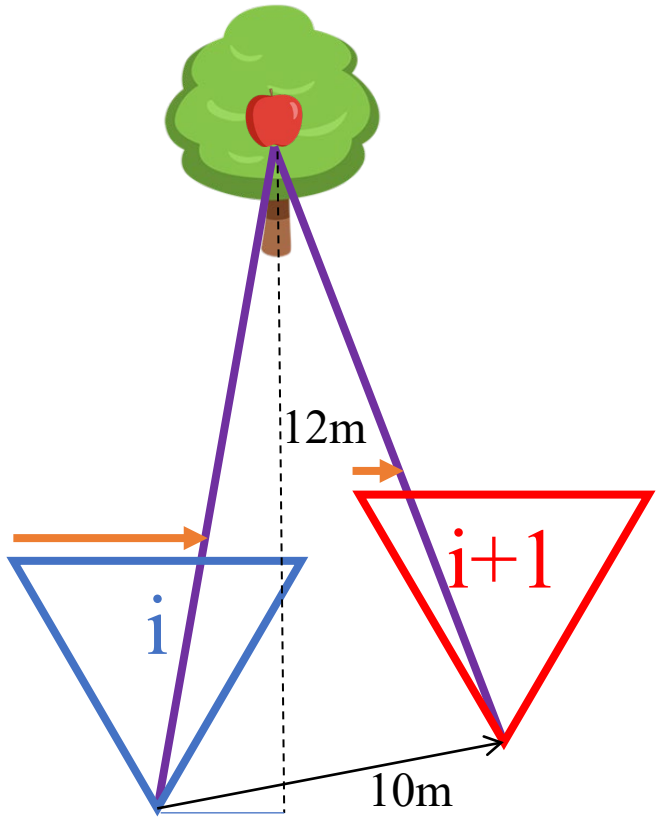
- Monocular Training



Problems

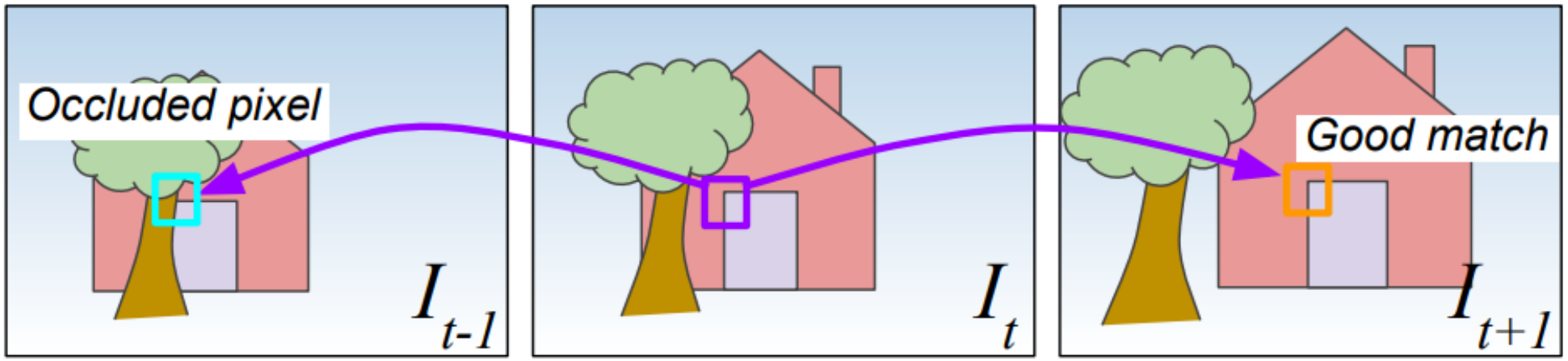
- Unknown Scale





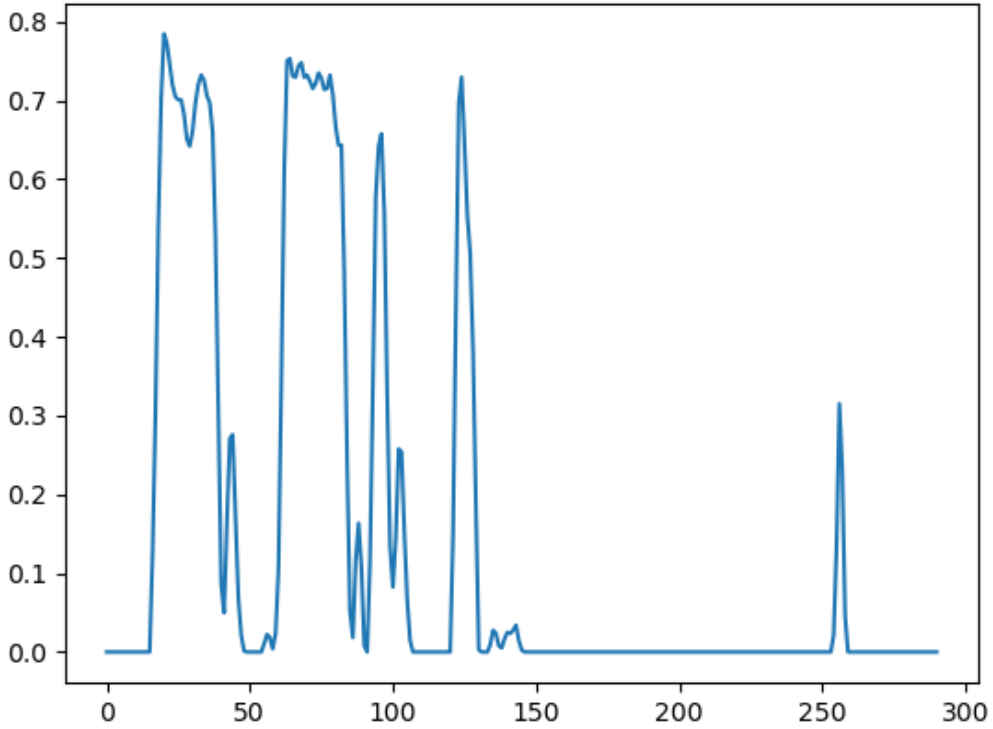
Problems

- Occlusion



Problems

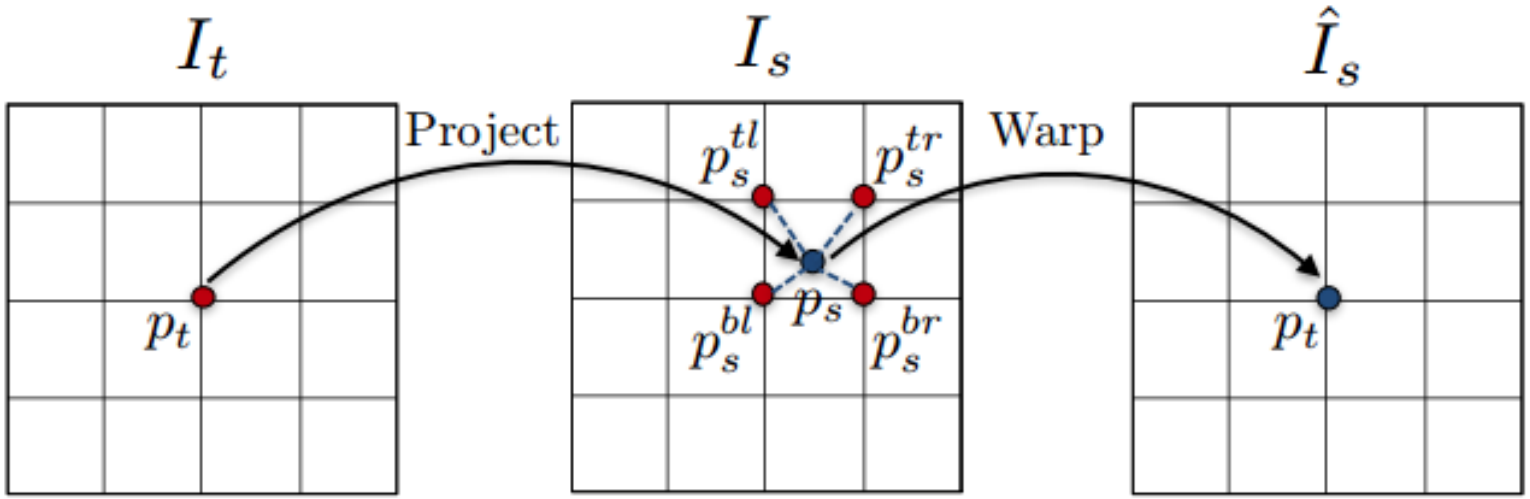
- Textureless



Problems

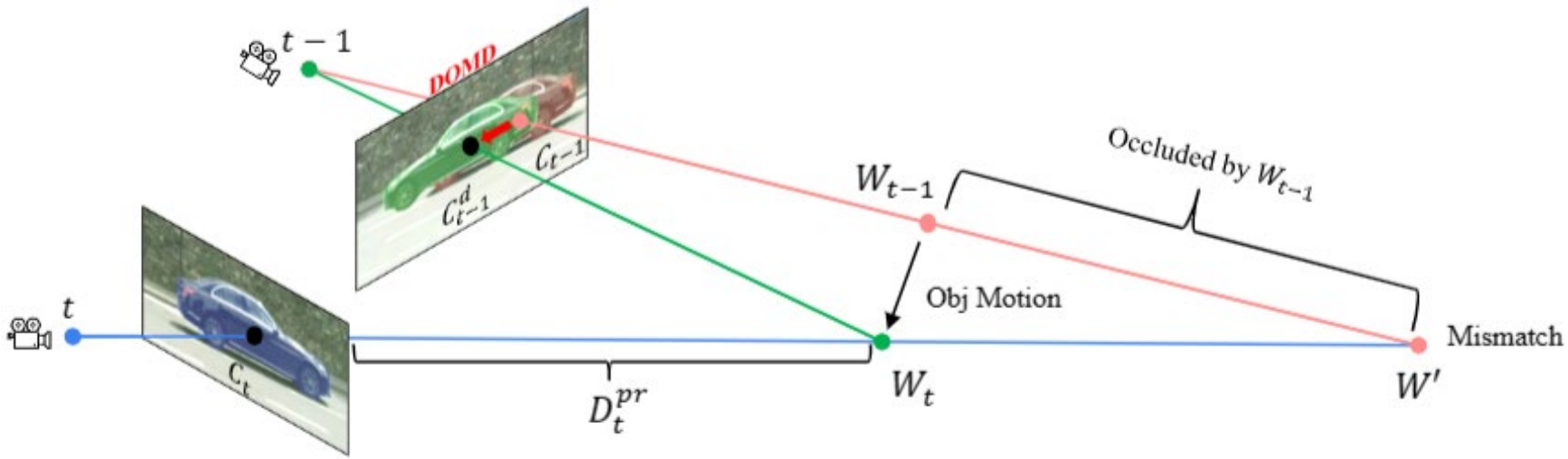
- Local Minimum

grid_sample



Problems

- Dynamic Objects

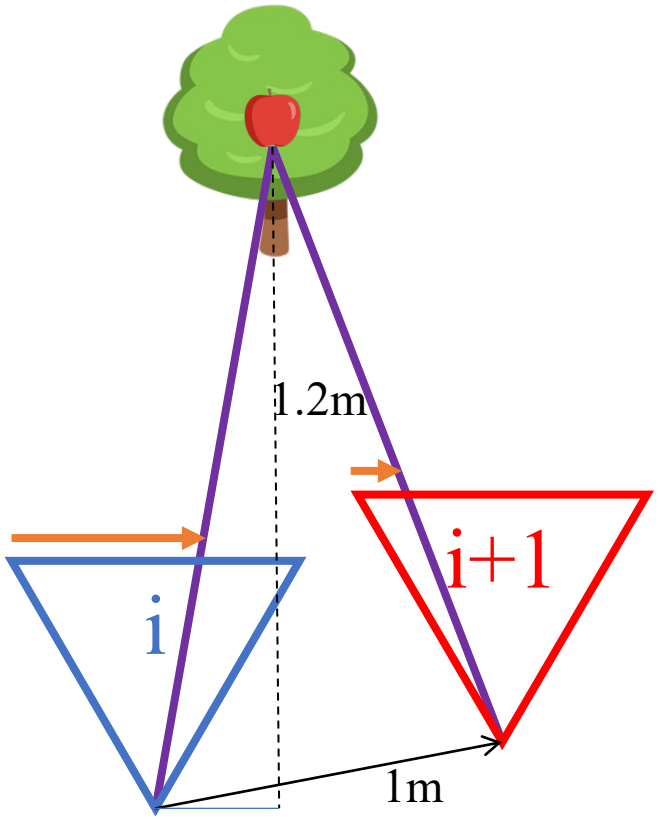


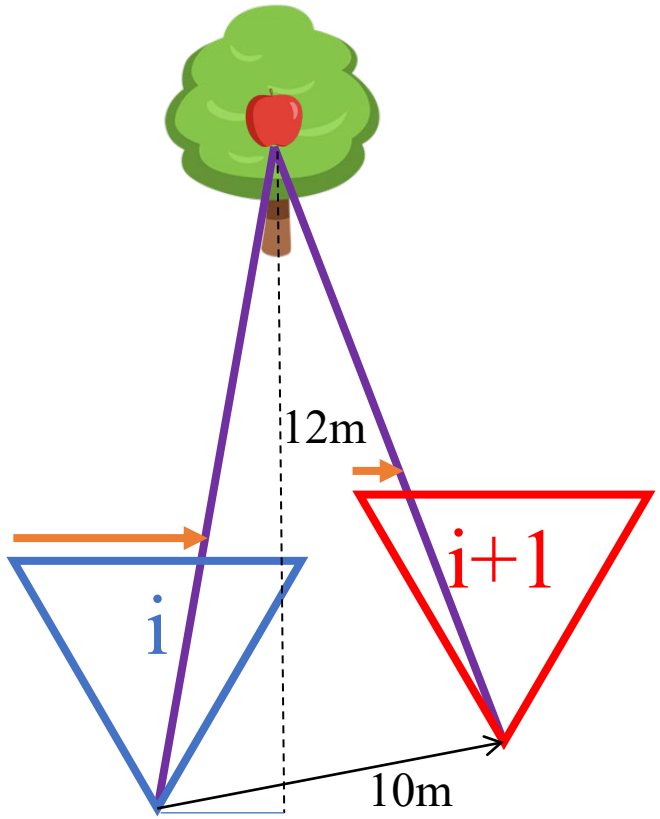
Problems

- ill-posed Problem

Solutions

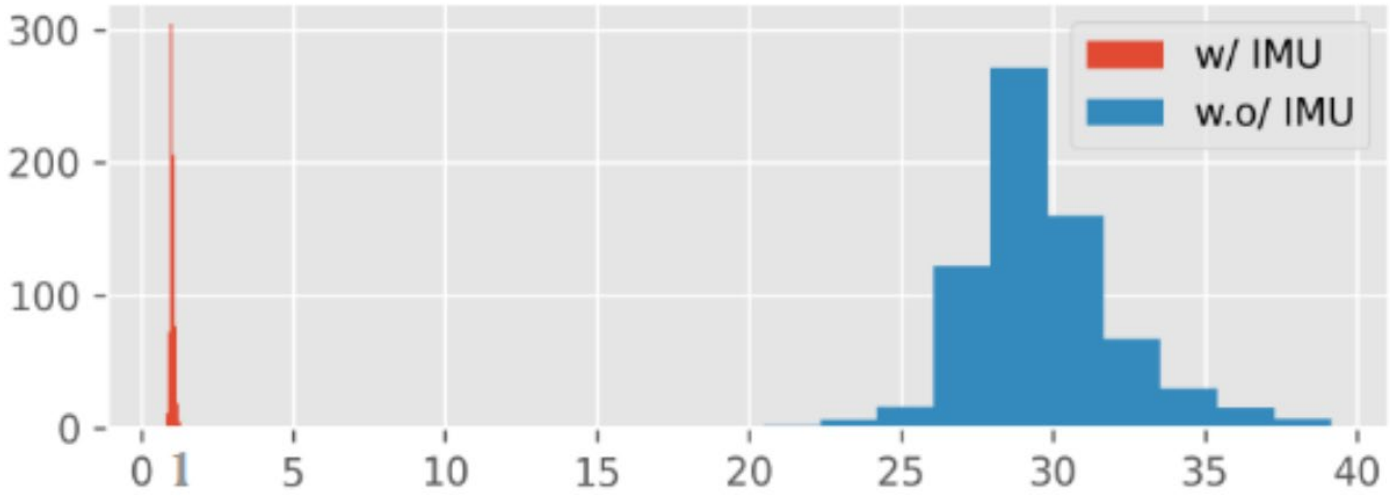
- Unknown Scale





Solutions

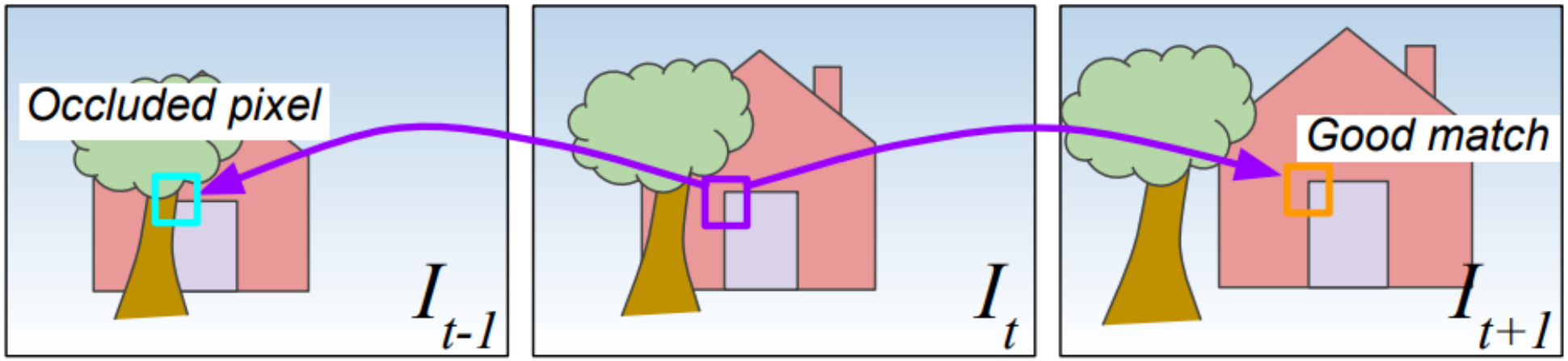
- Unknown Scale
  - Use IMU as supervision.



Towards Scale-Aware, Robust, and Generalizable Unsupervised Monocular Depth Estimation by Integrating IMU Motion Dynamics

Solutions

- Occlusion



Solutions

- Occlusion
  - MPI (Multi-Plane Image) or LDI (Layered Depth Image)

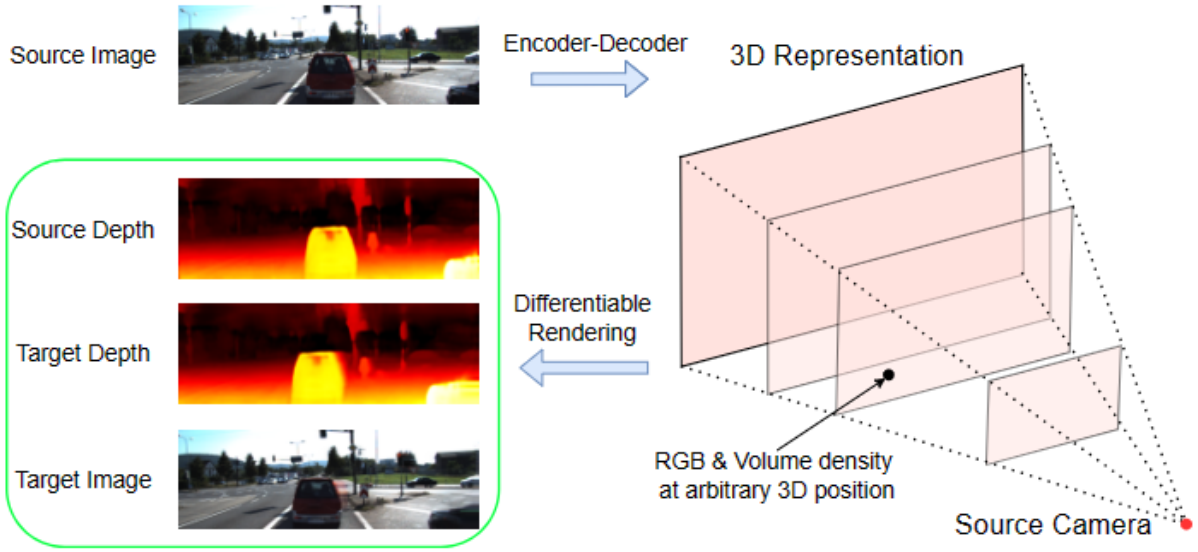
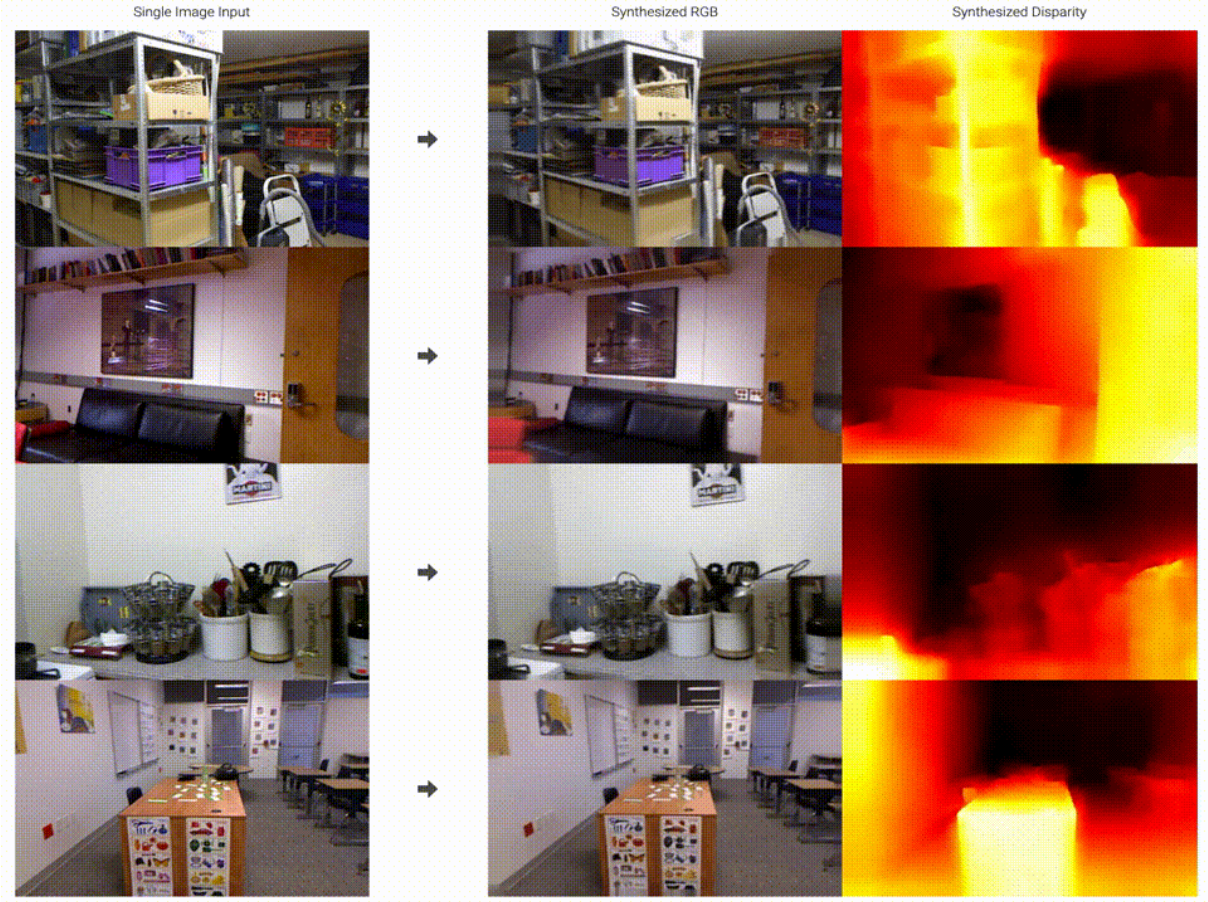


Figure 1. Overview of our proposed method.



MINE: Towards Continuous Depth MPI with NeRF for Novel View Synthesis

Solutions

- Occlusion
  - Self-distillation

Self-distillation

- Self-distillation [Gonzalez et al. 2020]:
  - Solve occlusion effect

L

R

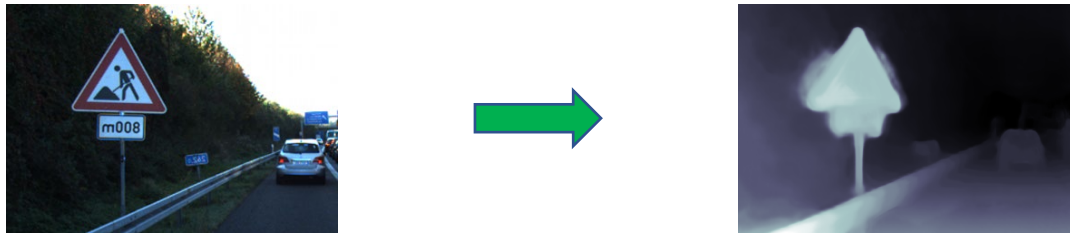
Occlusion only occurs on the left side of objects in the left view.

Self-distillation

- Self-distillation [Gonzalez et al. 2020]:
  - Solve occlusion effect

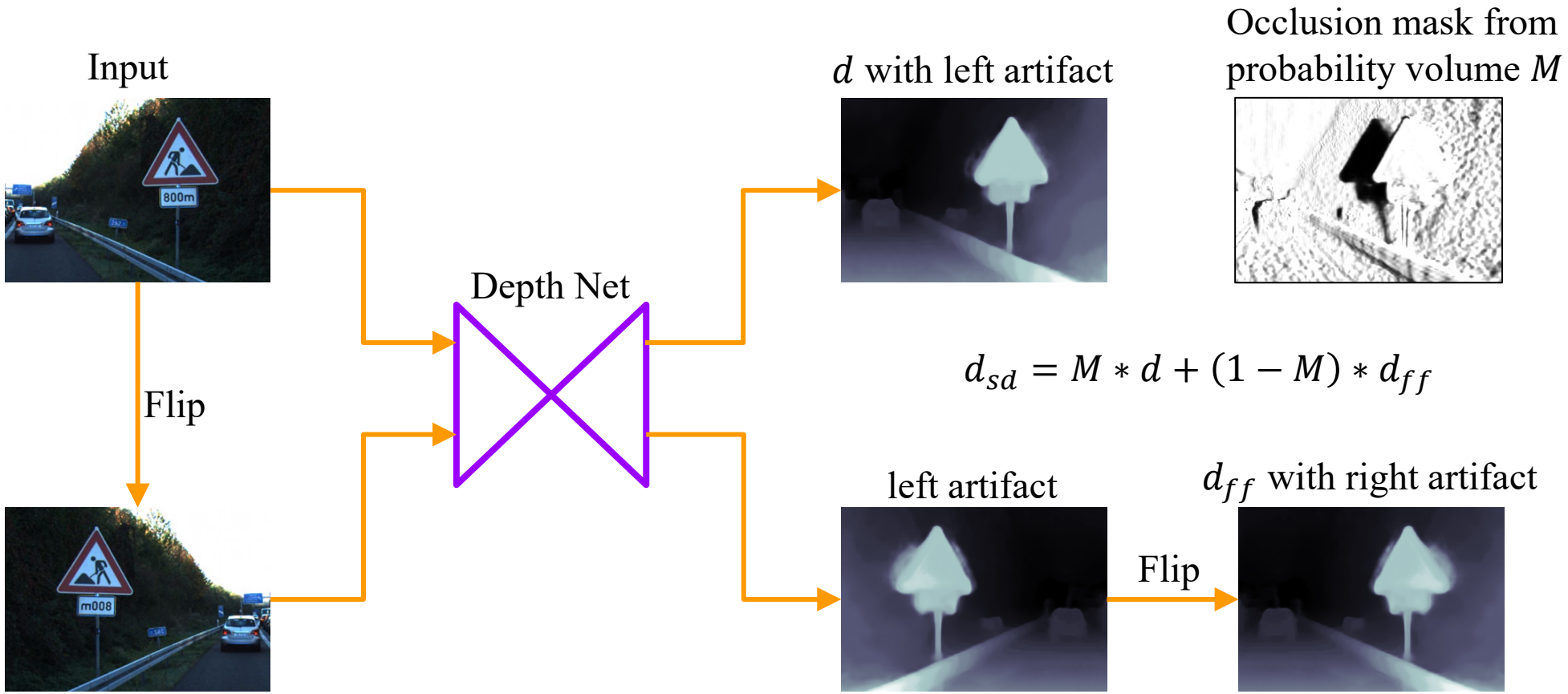
Self-distillation [Gonzalez et al. 2020]

- If we only input left views and find matchings in the right view, all artifacts caused by occlusion will appear at left of objects.



Self-distillation [Gonzalez et al. 2020]

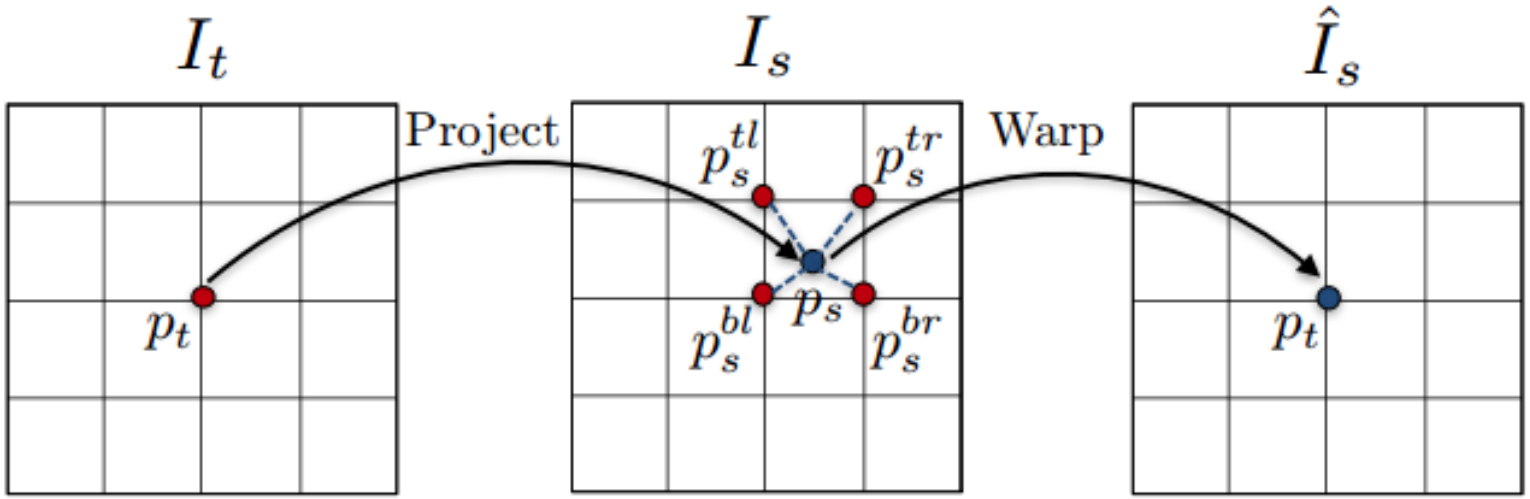
- If we only input left views and find matchings in the right view, all artifacts caused by occlusion will appear at left of objects.



Solutions

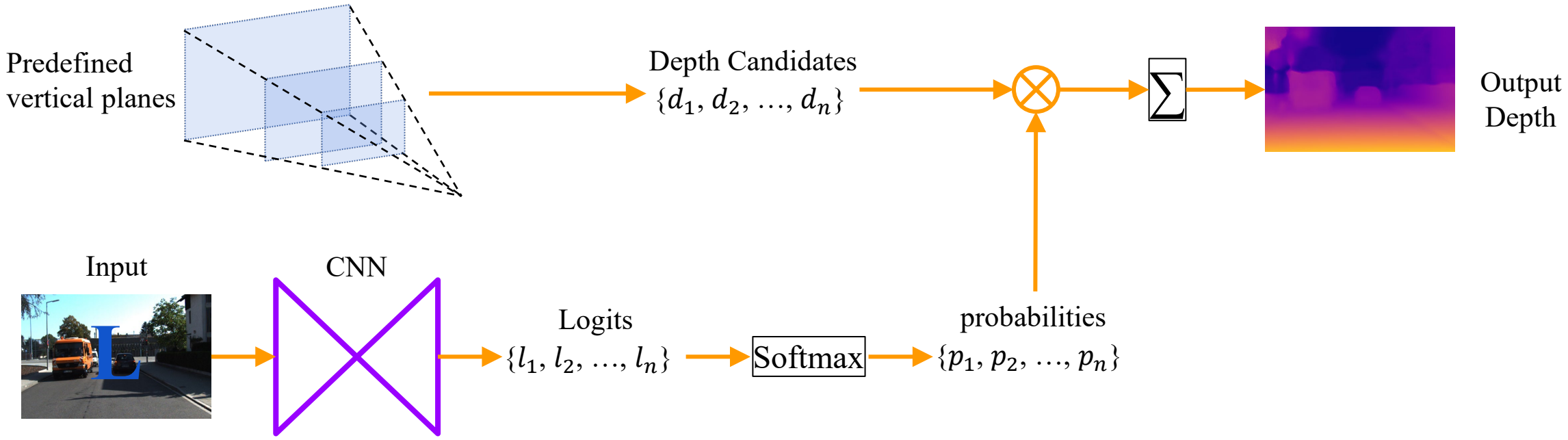
- Local Minimum

grid_sample



Solutions

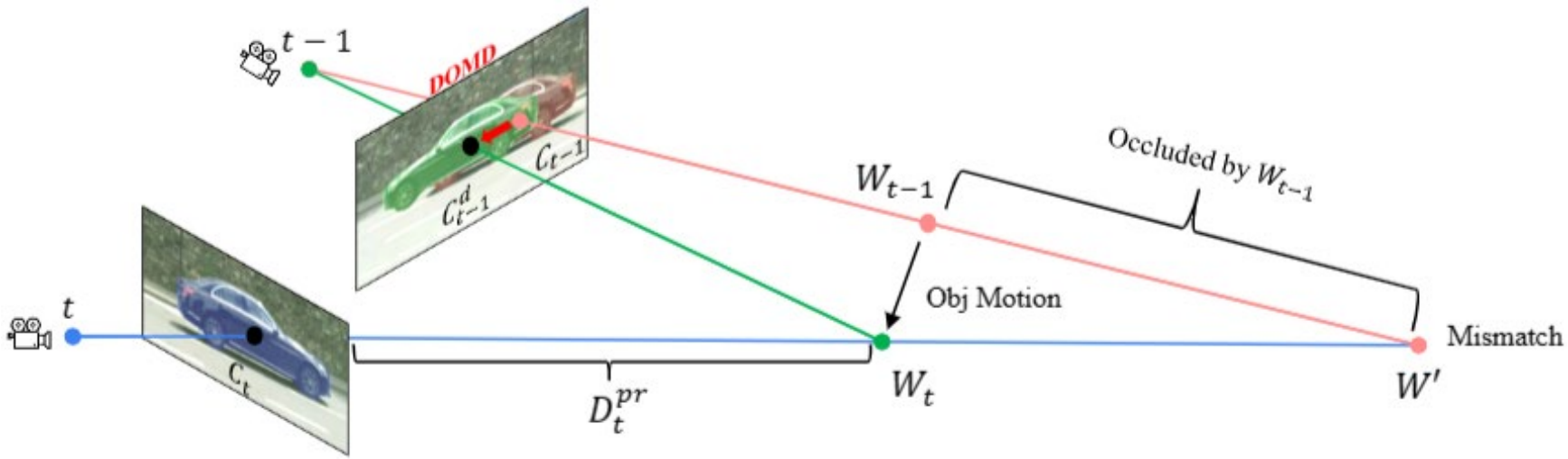
- Local Minimum
  - Depth Bins



Forget About the LiDAR: Self-Supervised Depth Estimators with MED Probability Volumes

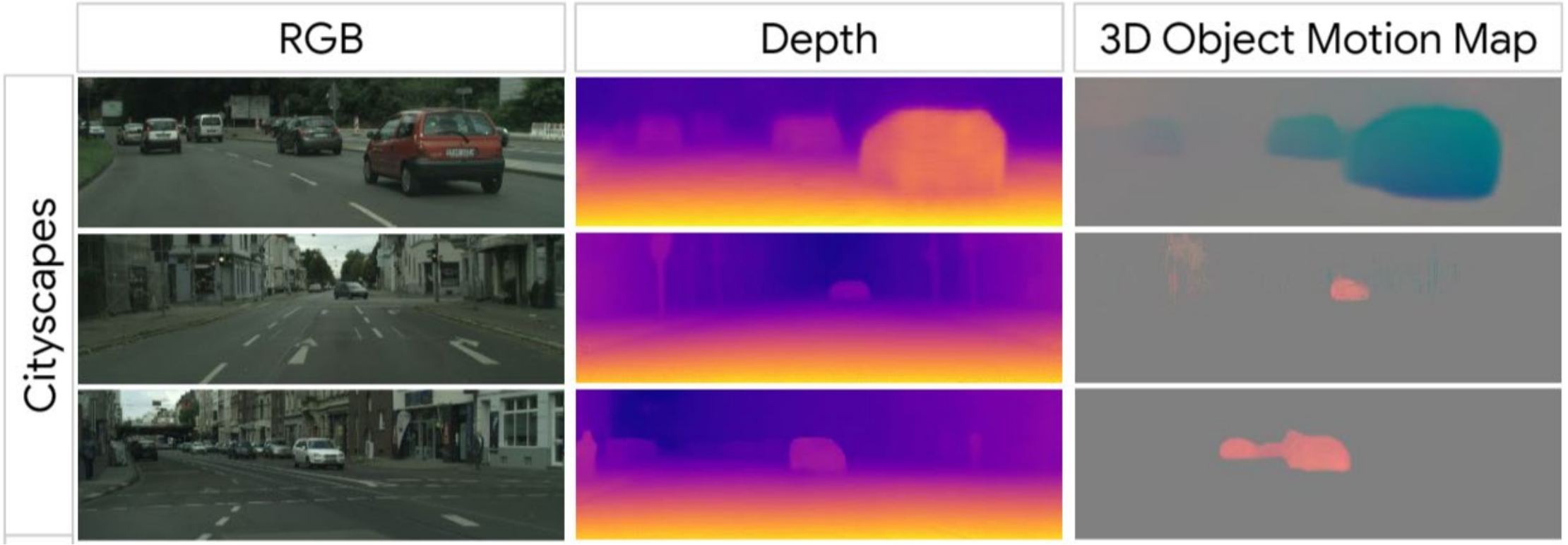
Problems

- Dynamic Objects



Problems

- Dynamic Objects
  - Scene Flow



Unsupervised Monocular Depth Learning in Dynamic Scenes

Problems

- ill-posed Problem