P2D: a self-supervised method for depth estimation from polarimetry
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Objective - P2D (Polarimetry to Depth)

Input Polarimetric Image ➡️ Output Depth Image

The three polarization representative images

A three term minimizable error evaluation

Reprojection Term [1]
Smoothness Term [2]
Polarimetric Term

\[ \Lambda = \mu L_r + \lambda L_s + \tau L_p \]

Model

Comparative Results

✅ Extracting usable characteristics from polarimetry and infuse them in a model
✅ Create a network able to infer depth from monocular polarimetry
✅ A better case-specific depth estimation and sky reconstruction
❌ Very few datasets and not enough groundtruth
❌ Some inconsistencies on the surfaces close to the sensor

Why Polarization?

✅ Sensitive to specularity
✅ Particular link between acquired polarization parameters and normal
❌ No colorimetric (strong differentiable features) space
❌ No generic approach leveraging the polarization to normal relationship

Contextualization

Colorimetric approaches are limited when addressing specular/transparent surfaces [1]

Failure Cases

Why Polarization?

Contextualization

References
