Deep Material-aware Cross-spectral Stereo Matching

Tiancheng Zhi, Bernardo R. Pires, Martial Hebert, Srinivasa G. Narasimhan
Carnegie Mellon University

Dataset Available: http://www.cs.cmu.edu/~ILIM/projects/AA/RGBNIRStereo/index.html#dataset

CVPR 2018 SALT LAKE CITY • JUNE 18-22

Motivation

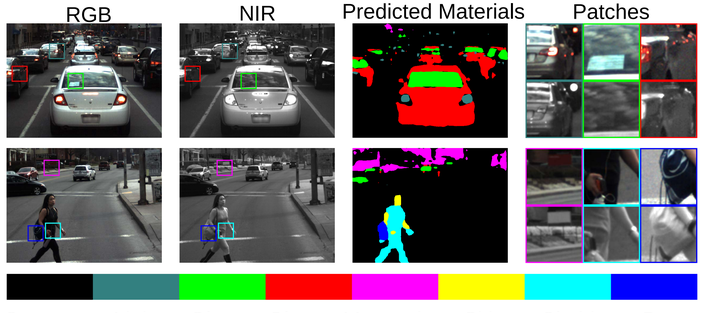
Emerging Cross-spectral Imaging Devices

iPhone X
(RGB-NIR)

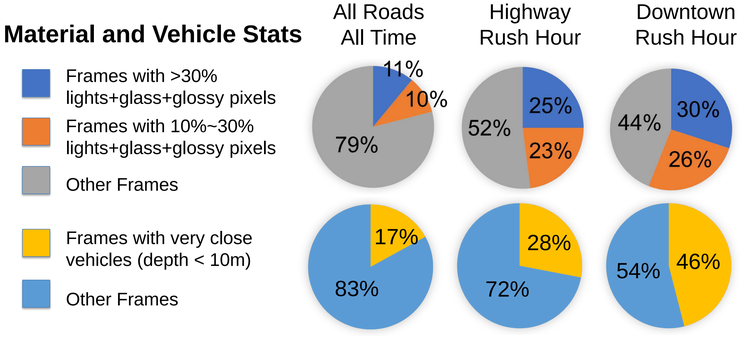
Kinect
(RGB-NIR)

1UAS VisionIR DT
(RGB-Thermal)

Materials with Large Appearance Variation

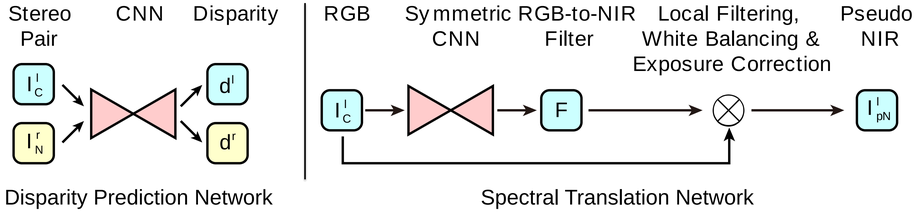


Material and Vehicle Stats

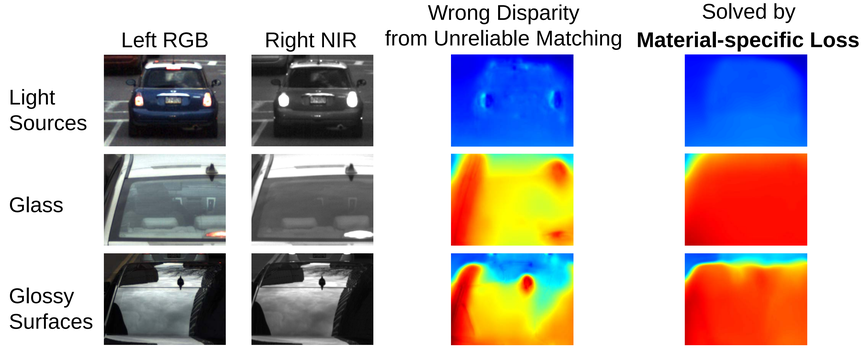


Method

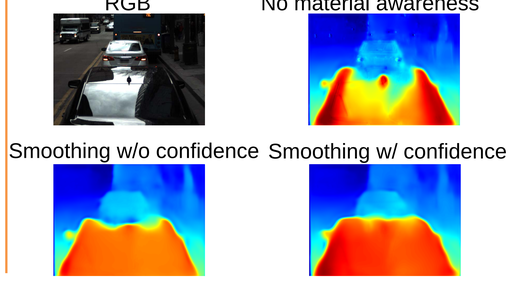
Simultaneous Disparity Prediction & Spectral Translation



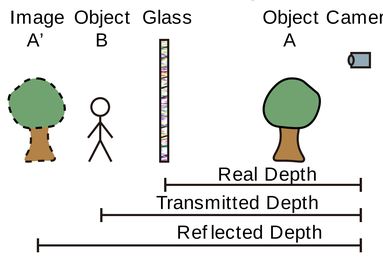
Incorporating Material Awareness into Disparity Prediction



Confidence Weighted Smoothing



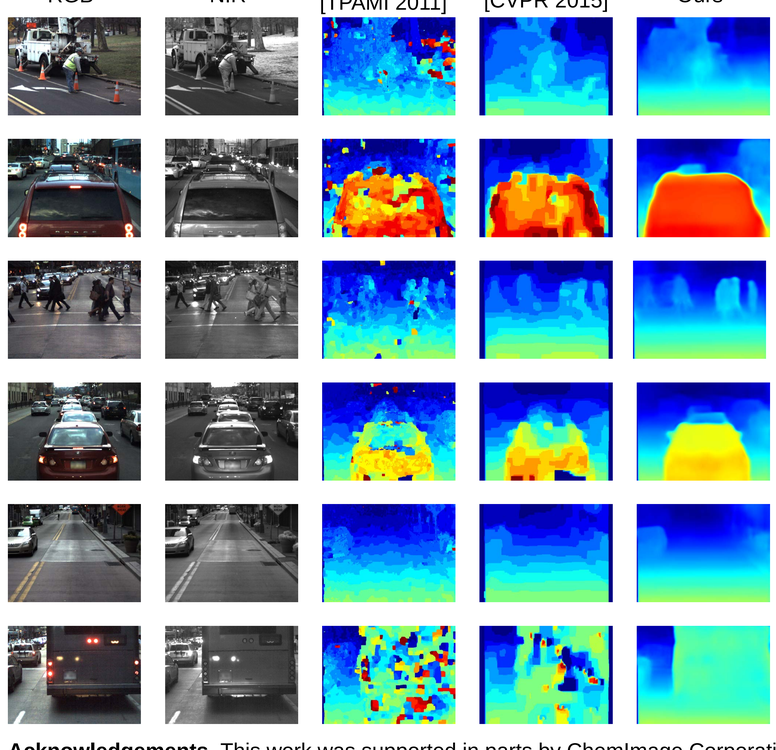
"Close Scene Prior" For Glass and Glossy Surfaces



"PittsStereo" Dataset

13.7 hours of RGB-NIR stereo pairs with challenging materials
Includes rush hour, highway, downtown, parks, residential areas
Partially labeled with material segments and sparse disparities
Reliable GPS and vehicle states are available for 70% of the data

Results



Acknowledgements. This work was supported in parts by ChemImage Corporation, an ONR award N00014-15-1-2358, an NSF award CNS-1446601, and a University Transportation Center T-SET grant.