Fast Disparity Estimation using Dense Networks

[1]University of the Philippines

Rowel Atienza[1] (rowel@eee.upd.edu.ph)

Key Features

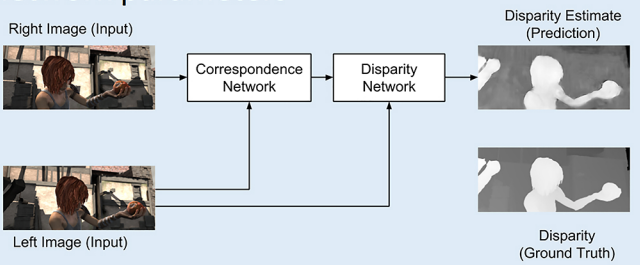
- Fast: > 30Hz Full Stereo RGB
- Compact: 290k Parameters
- Accurate: Low End-Point-Error (EPE)

Motivation

- State-of-the-art (SOTA) deep learning models are huge (>3.5M parameters) and slow
- SOTA not suitable for mobile robots
- Classical disparity estimation fails on textureless and repetitive regions

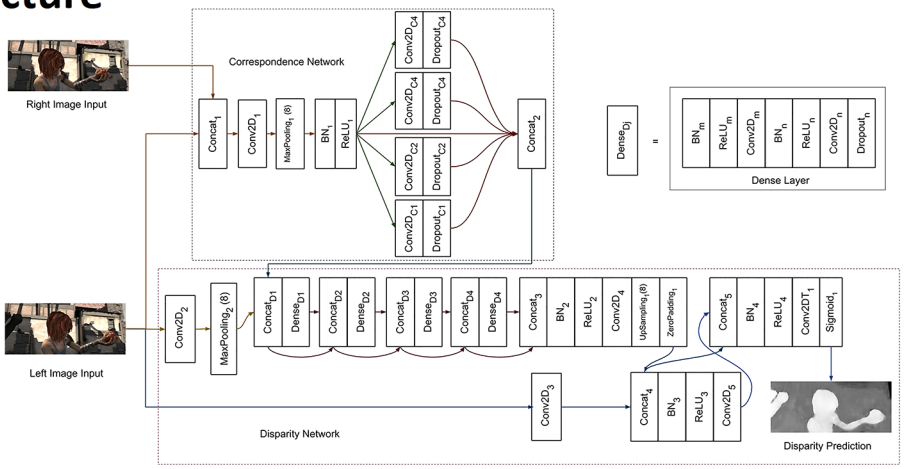
Design Principle

- Use of global reasoning in model architecture
- Use of dense interconnection to reduce network parameters



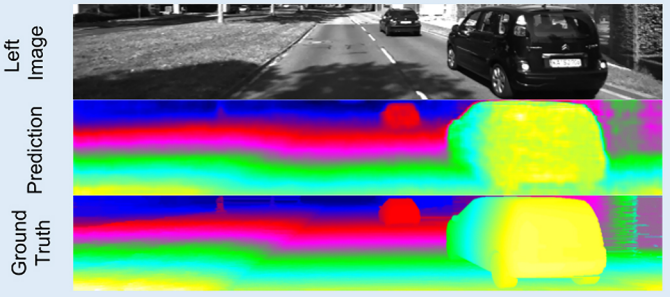
DenseMapNet is made of *Correspondence Network* that finds correspondences between stereo images and *Disparity Network* that applies the output of the *Correspondence Network* to the reference image.

Model Architecture

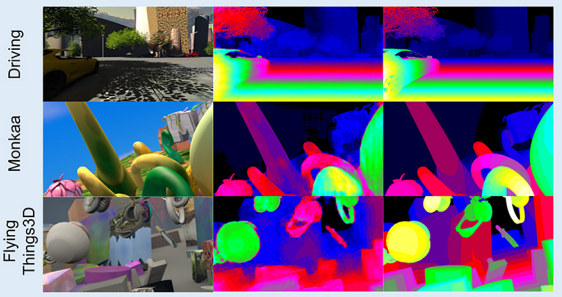


Model architecture of the proposed ***DenseMapNet***. The *Correspondence Network* is wide and densely interconnected. The *Disparity Network* is deep and densely interconnected.

Results



KITTI 2015



EPE

Method	Sintel	Driving	Flying3D	Monkaa	KITTI '15	Params	Speed	GPU
DispNet	5.38	15.62	2.02	5.99	2.19	38.4M	16.67Hz	Titan X
SGM	19.62	40.19	8.70	20.16	7.21	-	0.91Hz	Titan X
MCN	11.94	19.58	4.09	6.71	-	0.6M	1.25Hz	Titan X
Ours	4.41	6.56	5.07	4.45	2.52	0.29M	>30Hz	1080 Ti

This work was funded by CHED-PCARI Project IIID-2016-005 and DOST-ERDT