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MEGVII

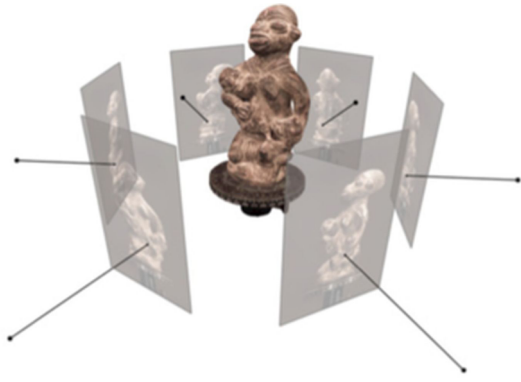
M³VSNet: Unsupervised Multi-metric Multi-view Stereo Network

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Introduction



Multi-view stereo(MVS)



Applications

Images



Feature

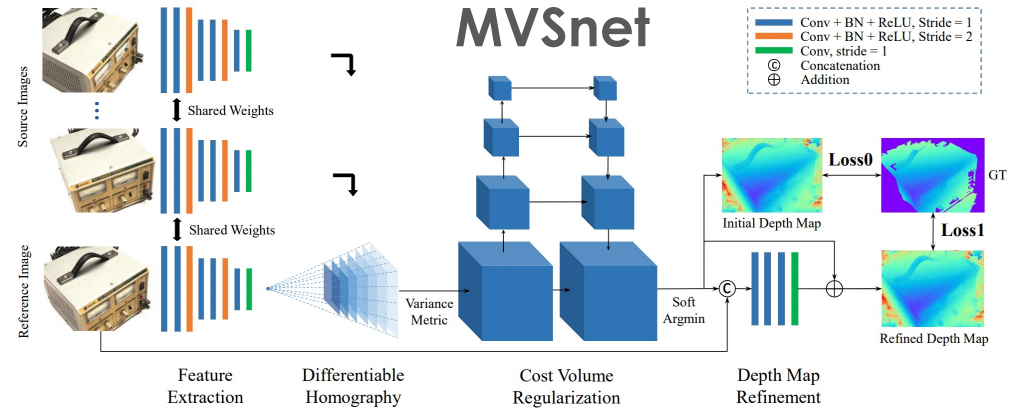


Sparse
SFM



Dense
MVS

Traditional
method



Supervised learning
method

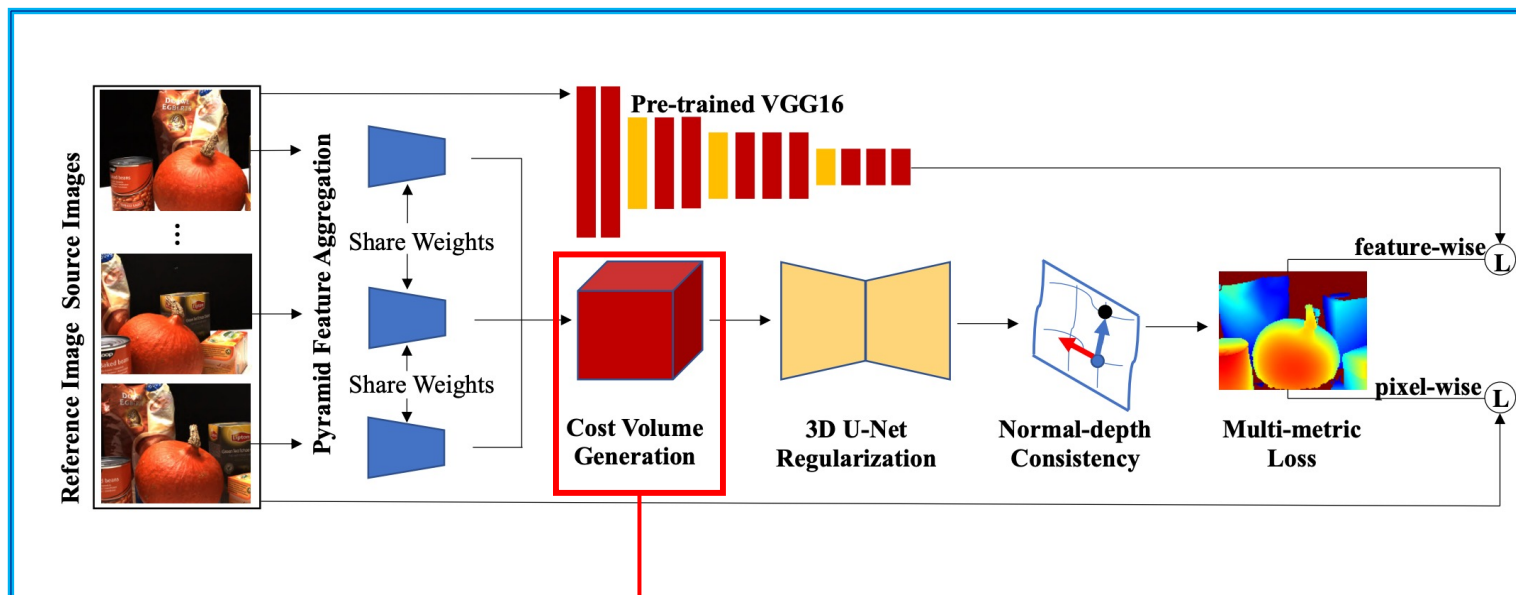


Heavy workload
on 3D training
ground-truth data

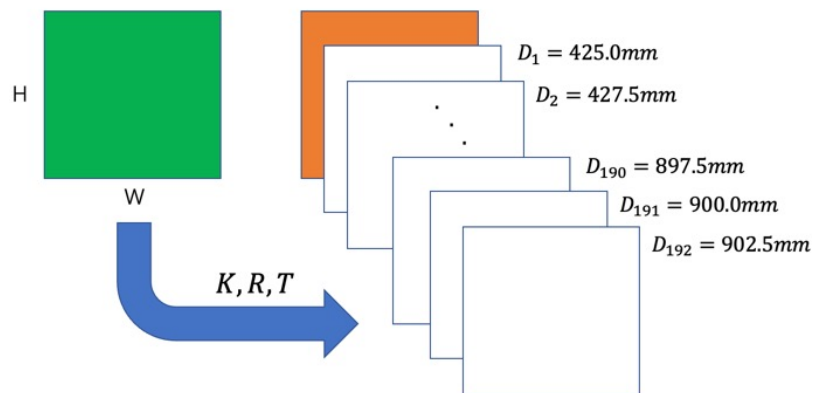
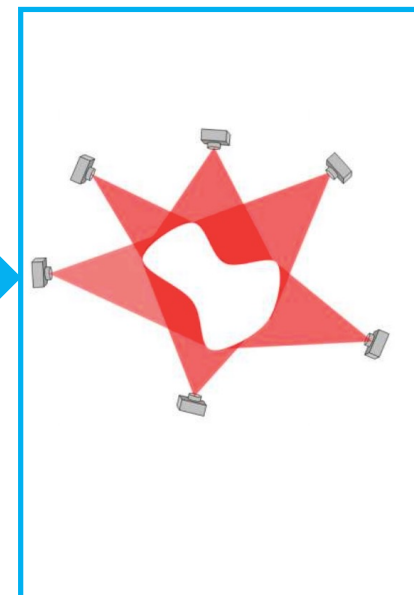


Unsupervised
method

Depth estimation

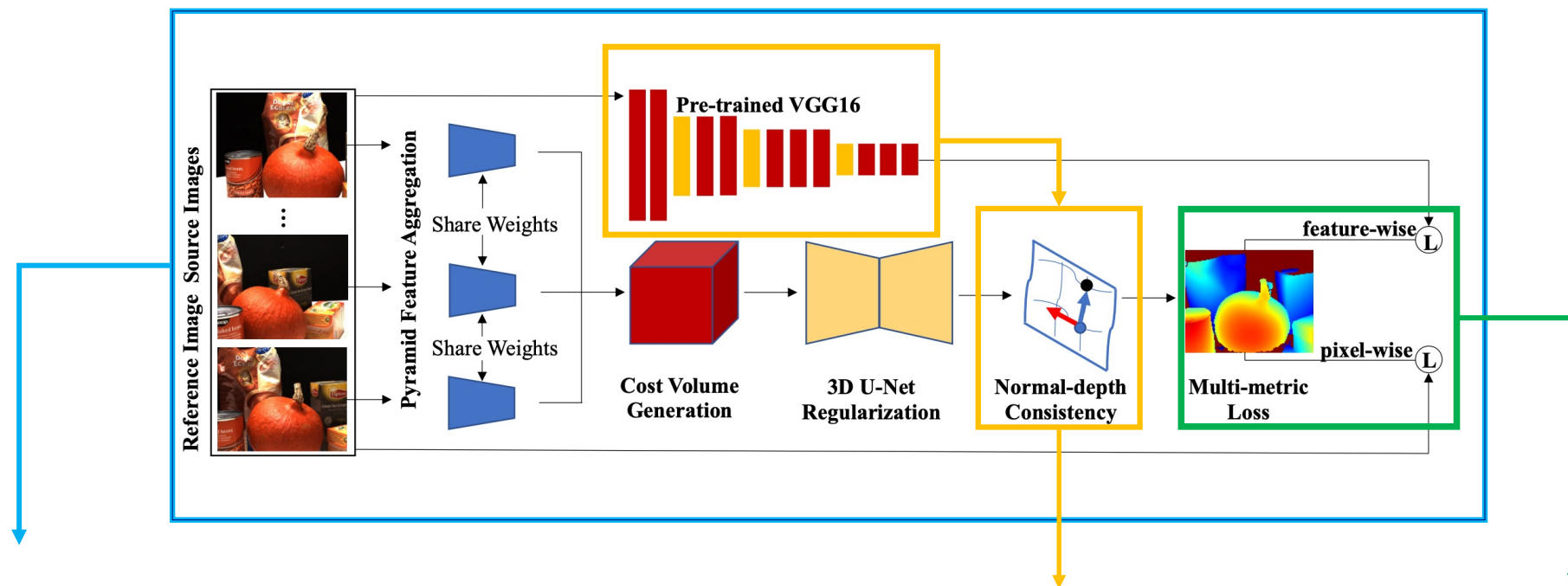


Depth fusion



1. Determine the final depth map based on the constraints of photometric consistency.
2. Use geometric consistency to measure whether the depth between multiple views is consistent or not.

Innovation



A novel unsupervised multi-metric MVS network for dense point cloud reconstruction without any supervision.

In non-ideal environments, the same color can't be guaranteed in multi-view images. We extract semantic feature from VGG network.

We combine the pixel-level and feature level unsupervised loss function.

Code is available: <https://github.com/whubaichuan/M3VSNet>

Result

Method	Mean Distance(mm)		
	Acc.	Comp.	overall
Furu	0.612	0.939	0.775
Tola	0.343	1.190	0.766
Colmap	0.400	0.664	0.532
SurfaceNet	0.450	1.043	0.746
MVSNet(D=192)	0.444	0.741	0.592
Unsup_MVS	0.881	1.073	0.977
MVS2	0.760	0.515	0.637
M3VSNet(D=192)	0.636	0.531	0.583

lower is better

DTU dataset



Tanks & Temples dataset

Method	Mean	Family	Francis	Horse	Light house	M60	Panther	Play-ground	Train
M3VSNet	37.67	47.74	24.38	18.74	44.42	43.45	44.95	47.39	30.31
MVS2	37.21	47.74	21.55	19.50	44.54	44.86	46.32	43.48	29.72
SurfaceNet	26.30	36.97	11.01	7.25	37.55	26.94	26.18	42.98	21.53



more efficient



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Thanks for your attention!

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