Supplementary Materials for Occlusion Aware Unsupervised Learning of Optical Flow

1. Implementation details on the enlarged search and bilinear sampling method.

We search among both the four nearest neighbor points (i.e., black dots in the inner circle in Fig. 4) and further points at the same time. We use the neighbor size of 3 (i.e., one more circle outside the blue points in Fig. 4).

In terms of how derivatives are calculated, the only extra step that is different from standard bilinear sampling is finding the point having the closest value to the target value. This is implemented using TensorFlow's "argmin" api, which does not back-propagate to the found index.

2. Experimental results in occluded areas.

We have conducted the evaluation on the EPE error of Sintel dataset in the occluded and non-occluded regions. We have found that the EPE of our method in occluded areas does improve more compared to non-occluded areas over the baseline method.

Methods	Sintel Clean test		Sintel Final test	
	occ	noc	occ	noc
DSTFlow-best	52.7	5.20	53.4	5.92
Ours+ft-Sintel	39.52	4.08	41.41	5.21

3. Results of supervised training on our modified FlowNetS.

To serve as a reference, we trained our modified FlownetS using ground-truth of FlyingChair. The EPE is 2.46 for FlyingChair test, 4.59 for Sintel Clean train and 5.77 for Sintel Final train.

4. Enlarged search improve large motion

We evaluated our model trained with and without the enlarged warping module by splitting the data based on flow magnitude. We found that the enlarged warping does improve large motion estimation at the expense of slightly worse small motion estimation.

Methods	Sintel Clean train			Sintel Final train		
	0-10	10-40	40+	0-10	10-40	40+
w/o warp	0.87	4.63	42.23	1.10	6.01	46.25
w/ warp	0.98	4.80	35.35	1.23	6.52	41.25

5. More data augmentation on Sintel

We have tried to fine-tune the model using Sintel with more data augmentation. It seems to prevent over-fitting and give better results on test dataset.

Methods	Sintel Clean		Sintel Final	
	train	test	train	test
w/o aug	(4.03)	7.95	(5.95)	9.15
w/ aug	(4.36)	7.42	(6.18)	8.99