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Master in Computer Vision Barcelona

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Module 6

Deep Learning for Video: Motion Estimation

22nd March 2018

Deep Learning online courses by UPC:

- [MSc course](#) (2017)
- [BSc course](#) (2018)

Next edition Autumn 2018

- [1st edition](#) (2016)
- [2nd edition](#) (2017)
- [3rd edition](#) (2018)

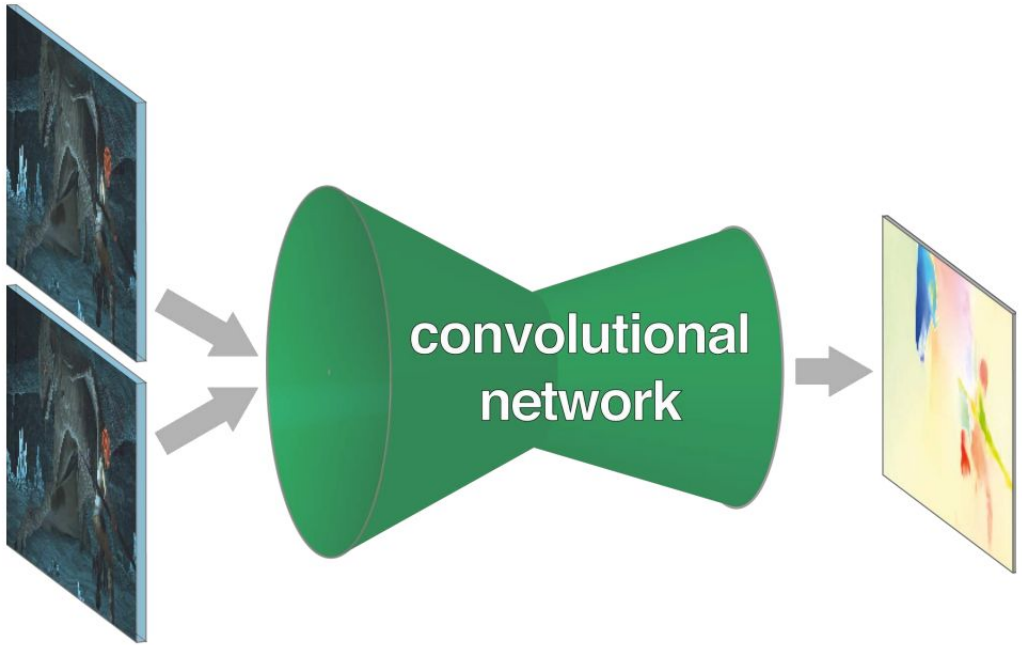
Summer School (late June 2018)

- [1st edition](#) (2017)
- [2nd edition](#) (2018)

Next edition Winter/Spring 2019

Motion: Optical Flow: FlowNet

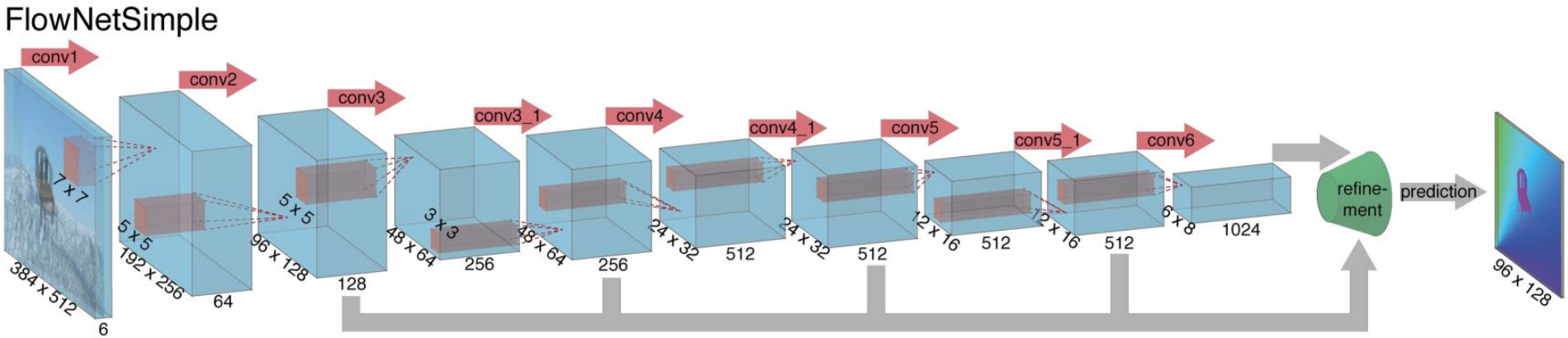
End to end supervised learning of optical flow.



Dosovitskiy, A., Fischer, P., Ilg, E., Hausser, P., Hazirbas, C., Golkov, V., van der Smagt, P., Cremers, D. and Brox, T., FlowNet: Learning Optical Flow With Convolutional Networks. ICCV 2015

Motion: Optical Flow: FlowNet (encoder)

Option A: Stack both input images together and feed them through a generic network.



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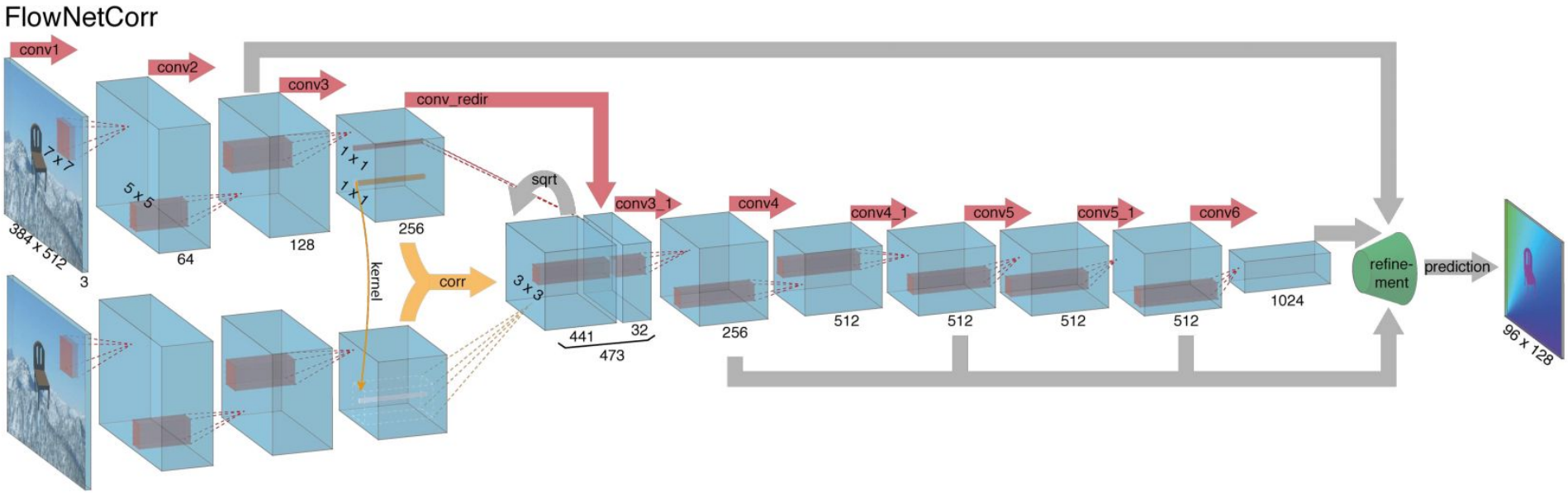
Motion: Optical Flow: FlowNet (encoder)

Option B: Create two separate, yet identical processing streams for the two images and combine them at a later stage.



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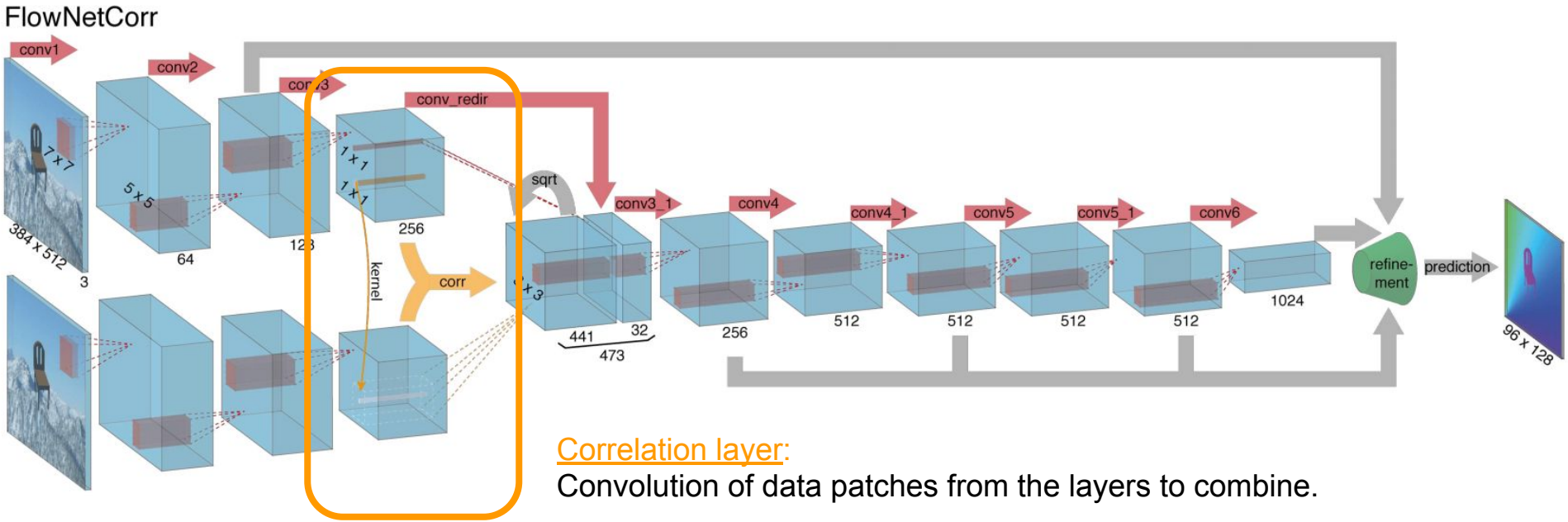
Motion: Optical Flow: FlowNet (encoder)

Option B: Create two separate, yet identical processing streams for the two images and combine them at a later stage.

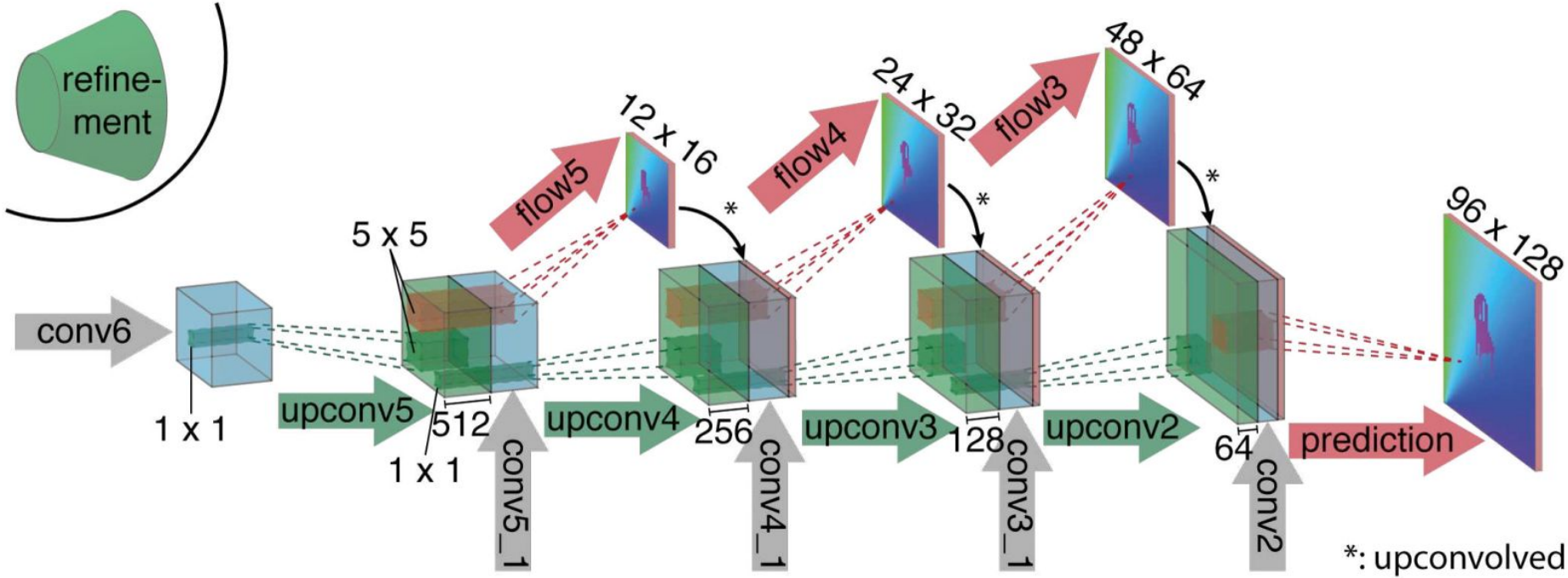


Correlation layer:
Convolution of data patches from the layers to combine.

Dosovitskiy, A., Fischer, P., Ilg, E., Hausser, P., Hazirbas, C., Golkov, V., van der Smagt, P., Cremers, D. and Brox, T., FlowNet: Learning Optical Flow With Convolutional Networks. ICCV 2015

Motion: Optical Flow: FlowNet (decoder)

Upconvolutional layers: Unpooling features maps + convolution.
Upconvolutioned feature maps are concatenated with the corresponding map from the contractive part.



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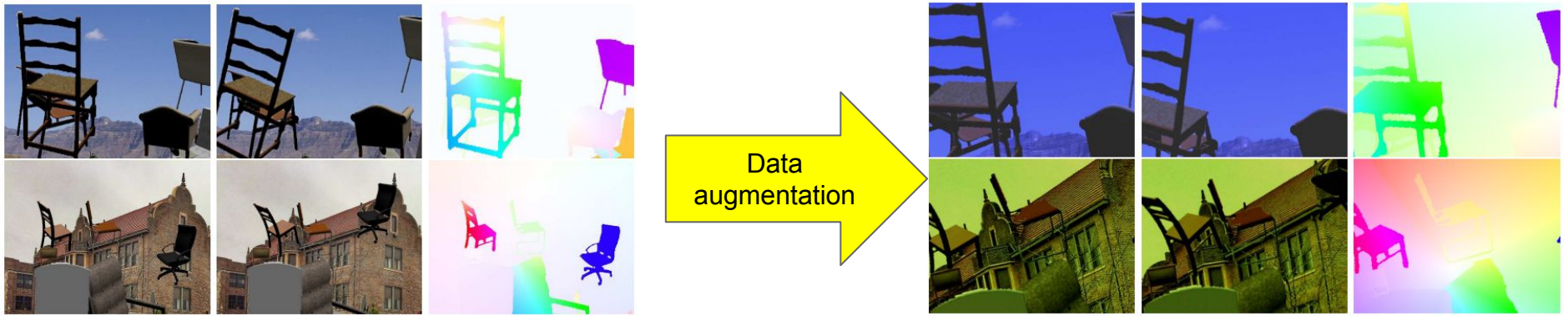
Motion: Optical Flow: FlowNet (synthetic)

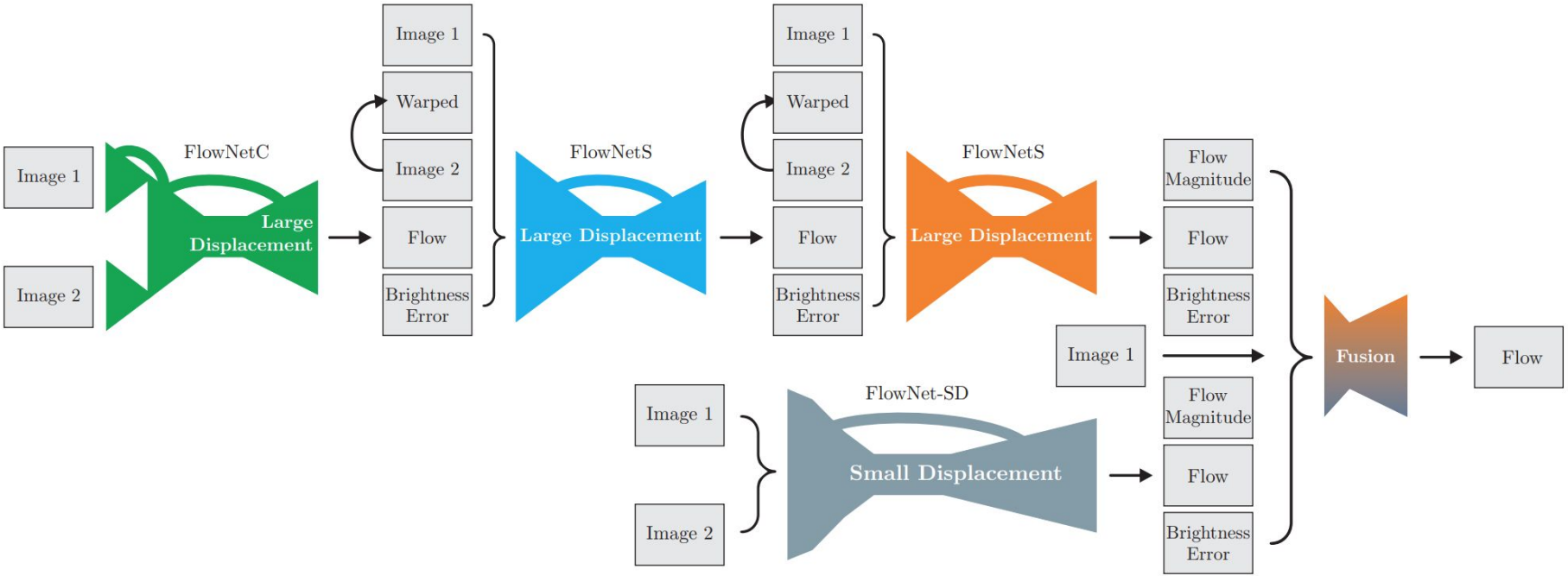


Convnets trained on these unrealistic data generalize well to existing datasets such as Sintel and KITTI.

Dosovitskiy, A., Fischer, P., Ilg, E., Hausser, P., Hazirbas, C., Golkov, V., van der Smagt, P., Cremers, D. and Brox, T., FlowNet: Learning Optical Flow With Convolutional Networks. ICCV 2015

Ilg, Eddy, Nikolaus Mayer, Tonmoy Saikia, Margret Keuper, Alexey Dosovitskiy, and Thomas Brox. "Flownet 2.0: Evolution of optical flow estimation with deep networks." CVPR 2017. [code]

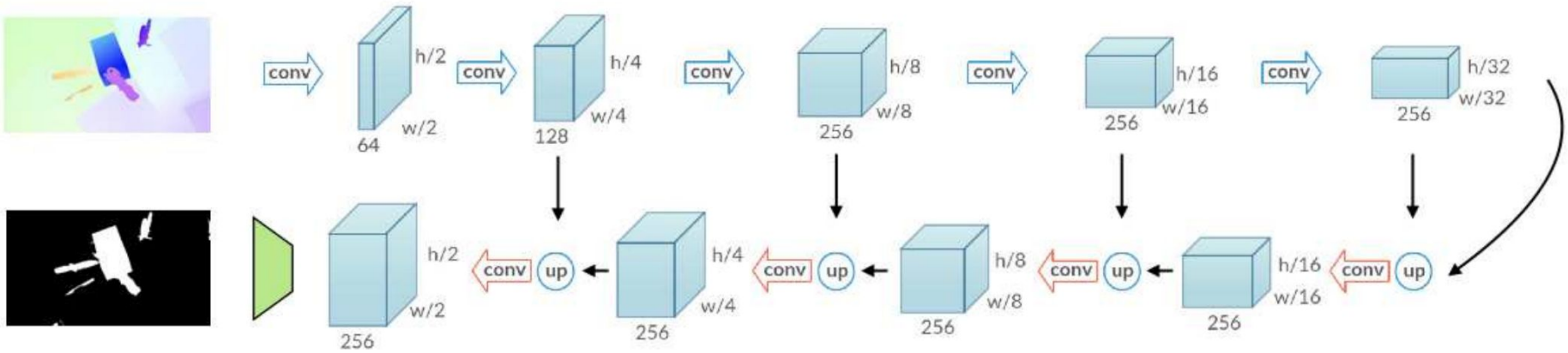
Motion: Optical Flow: FlowNet 2.0



Ilg, Eddy, Nikolaus Mayer, Tonmoy Saikia, Margret Keuper, Alexey Dosovitskiy, and Thomas Brox. "Flownet 2.0: Evolution of optical flow estimation with deep networks." CVPR 2017. [code]

Motion: MP-Net

Predict directly if the object is in motion, instead of the optical flow..



Tokmakov, Pavel, Karteek Alahari, and Cordelia Schmid. "Learning motion patterns in videos." CVPR 2017