یادگیری عمیق با تنسورفلو و کراس در پایتون

فصل چهارم: شبکه های کانولوشنال عمیق

پژمان اقبالی

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EPFL

شبکه های کانولوشنال عمیق

1. Convolution
2. Convolutional and pooling layers
3. Convolutional neural networks (CNN)
4. Pretrained CNN in Keras
5. Localization
6. Object Detection
7. Segmentation

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1. Convolution

Image

1	5	4	3	2
2	2	3	4	5
2	1	2	1	1
1	1	2	1	4
5	2	1	3	2

Filter

0	1	0
0	-1	0
0	1	0

Convolved Image

4	3	0
2	3	4
2	1	3

Padding

0	0	0	0	0	0	0
0	1	5	4	3	2	0
0	2	2	3	4	5	0
0	2	1	2	1	1	0
0	1	1	2	1	4	0
0	5	2	1	3	2	0
0	0	0	0	0	0	0

Stride

1	5	4	3	2
2	2	3	4	5
2	1	2	1	1
1	1	2	1	4
5	2	1	3	2

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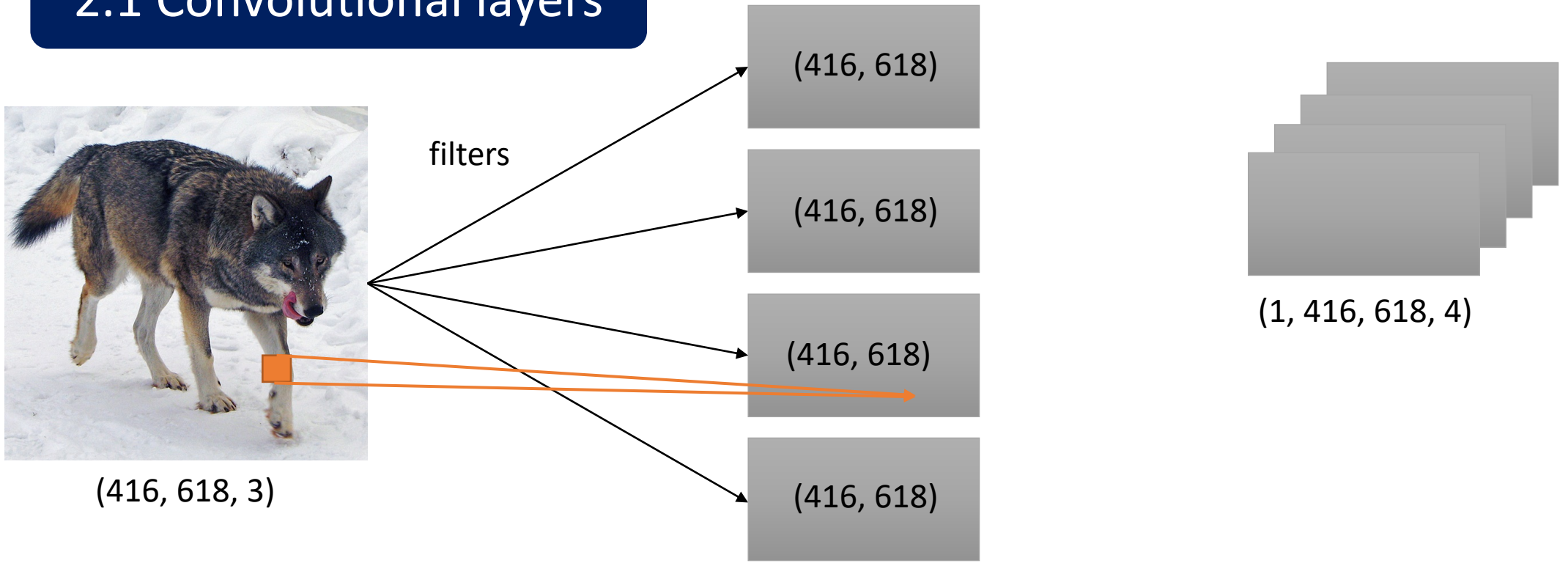
2. Convolution and pooling layers

2.1 Convolutional layers



https://upload.wikimedia.org/wikipedia/commons/5/5f/Kolmården_Wolf.jpg

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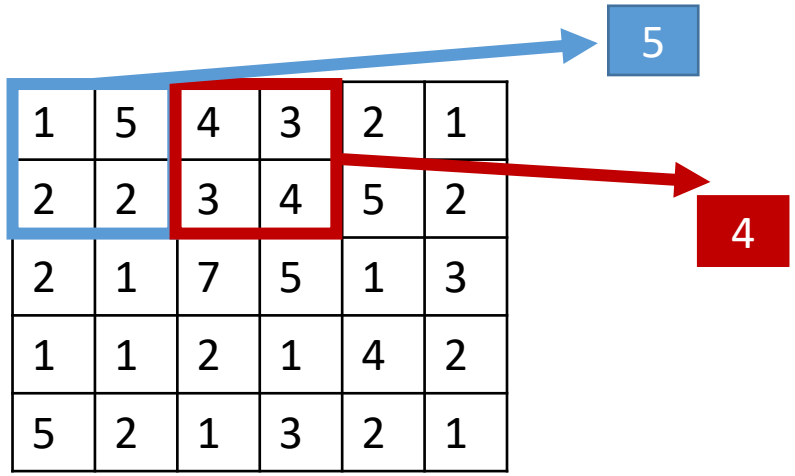
2. Convolutional and pooling layers

2.1 Pooling layers



Spatial max pooling

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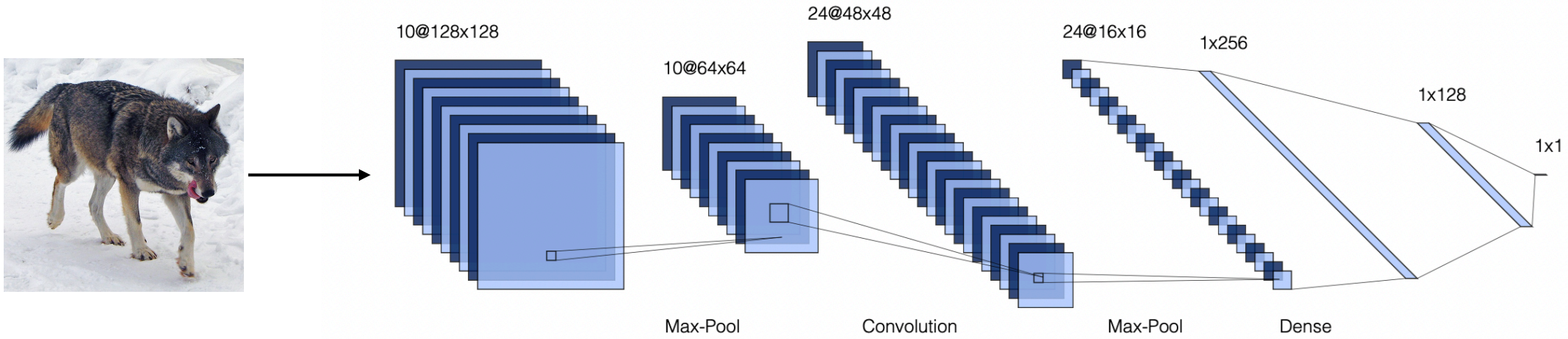
3. Convolutional neural networks (CNN)



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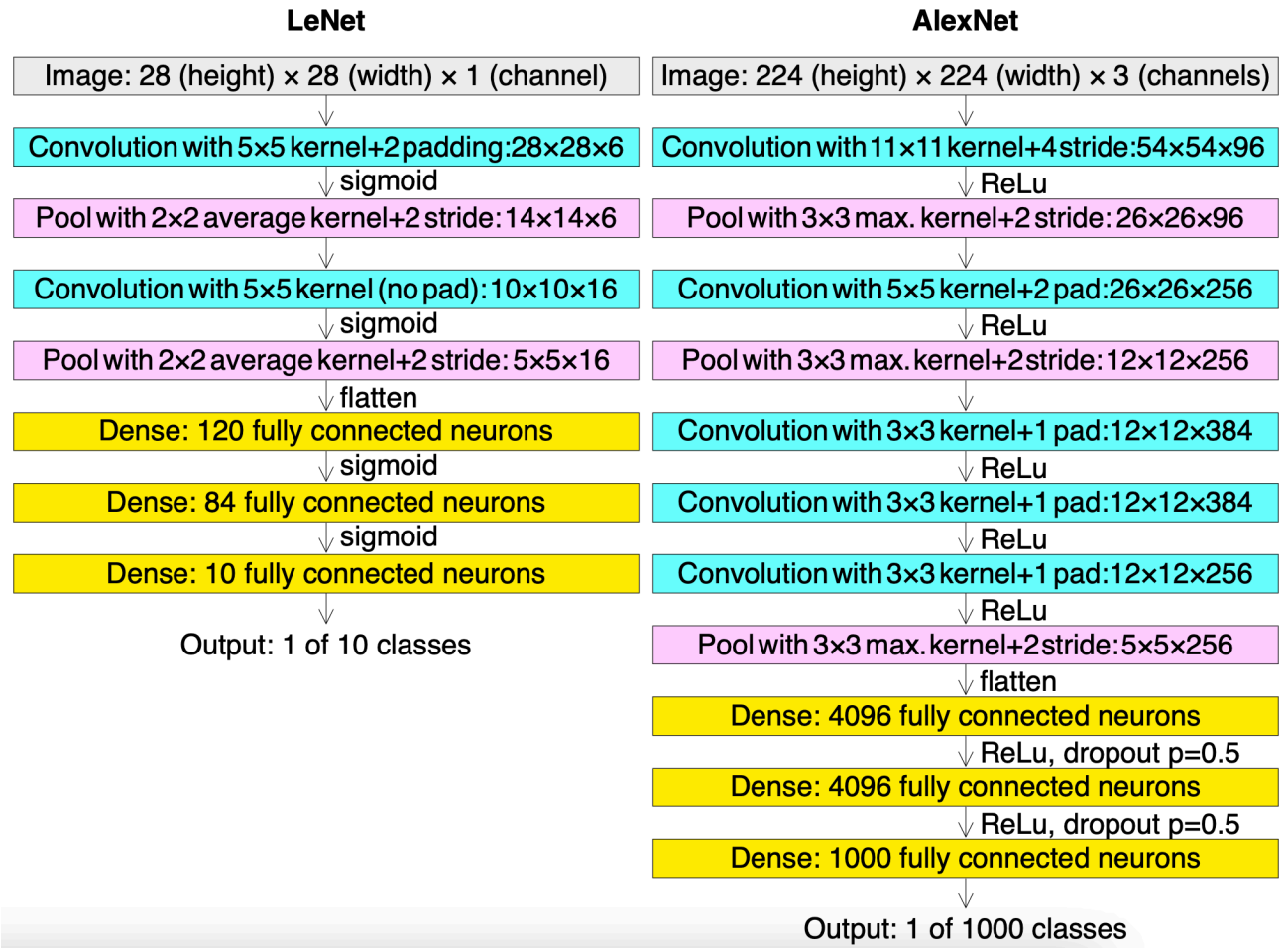
3. Convolutional neural networks (CNN)

- a. LeNet-5
- b. AlexNet



https://upload.wikimedia.org/wikipedia/commons/c/cc/Comparison_image_neural_networks.svg

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3. Convolutional neural networks (CNN)

c. ResNet

arXiv:1512.03385

https://www.mygreatlearning.com/blog/resnet/

d. GoogleNet

https://static.googleusercontent.com/media/research.google.com/en//pubs/archive/43022.pdf

e. Xception

https://openaccess.thecvf.com/content_cvpr_2017/papers/Chollet_Xception_Deep_Learning_CVPR_2017_paper.pdf

f. SENet

arXiv:1709.01507

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4. Pretrained CNN in Keras

https://keras.io/api/applications/

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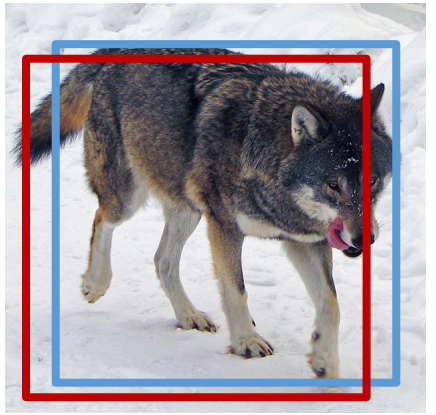


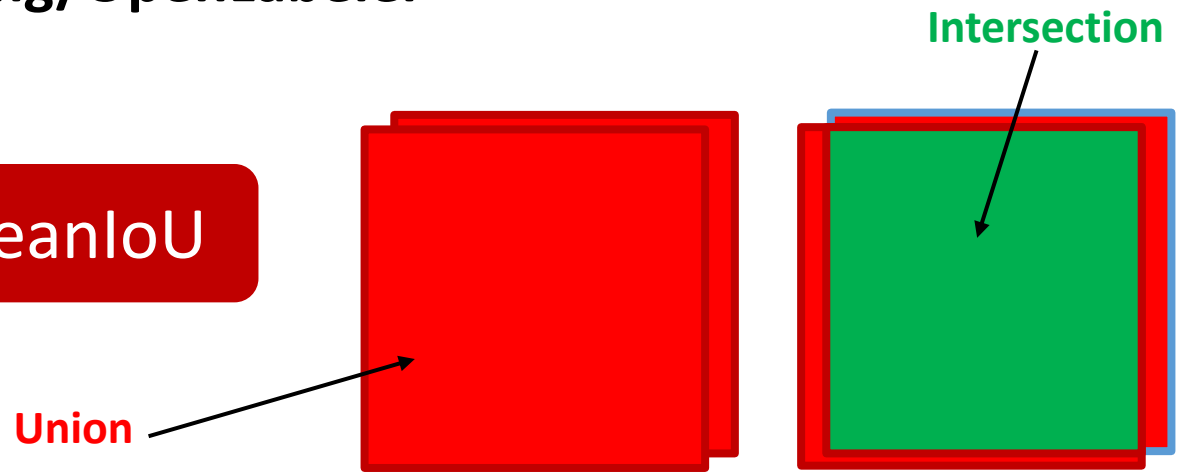
5. Localization

VGG Image annotator **https://www.robots.ox.ac.uk/~vgg/software/via/**

LabelImg **https://github.com/tzutalin/labelImg**

OpenLabeler **https://github.com/kinhong/OpenLabeler**

Localization metric: keras.metrics.MeanIoU



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6. Object Detection

https://www.tensorflow.org/hub/tutorials/object_detection

6.1 The simple way

1. Objectness score
2. Remove boxes with big IoU with bounding box with highest objectness

6.2 Fully Convolutional Networks

arXiv:1411.4038

6.3 You Only Look Once (YOLO)

arXiv:1506.02640 arXiv:1612.08242 arXiv:1804.02767

arXiv:2004.10934

https://github.com/AlexeyAB/darknet

https://colab.research.google.com/drive/12QusaaRj_lUwCGDvQNfICpa7kA7_a2dE

arXiv:1512.02325 SSD

Fatser-RCNN arXiv:1506.01497

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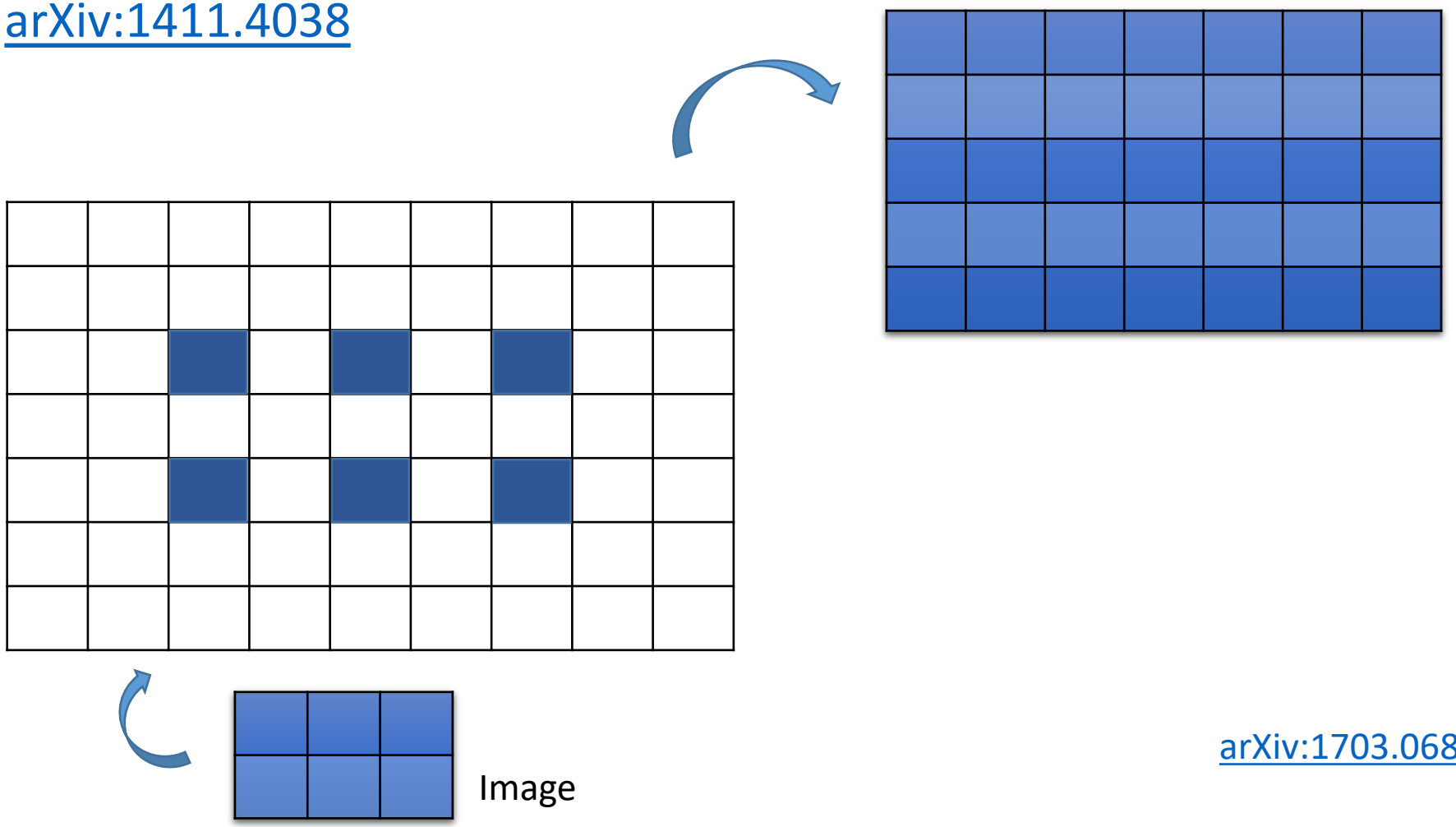
7. Segmentation

https://www.tensorflow.org/tutorials/images/segmentation

arXiv:1411.4038



Image

arXiv:1703.06870

Mask RCNN