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Python 深度学习

深度学习实战篇：猫狗分类网络训练与调优

讲师：彭靖田

本章目录

- 猫狗分类理论：CNN理论基础与实现
- 猫狗分类基础：训练一个最简单的分类模型
- 猫狗分类进阶：数据增强（举一反三造数据）
- 猫狗分类进阶：特征提取（站在巨人肩膀上）
- 猫狗分类进阶：模型微调（青出于蓝胜于蓝）

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Python 深度学习

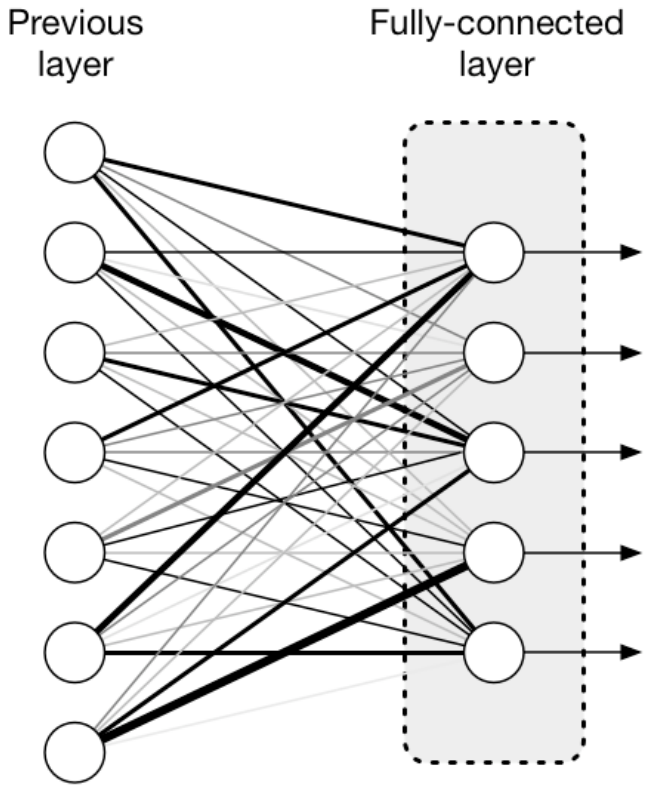
猫狗分类理论：CNN理论基础与实现

讲师：彭靖田

神经网络层对比

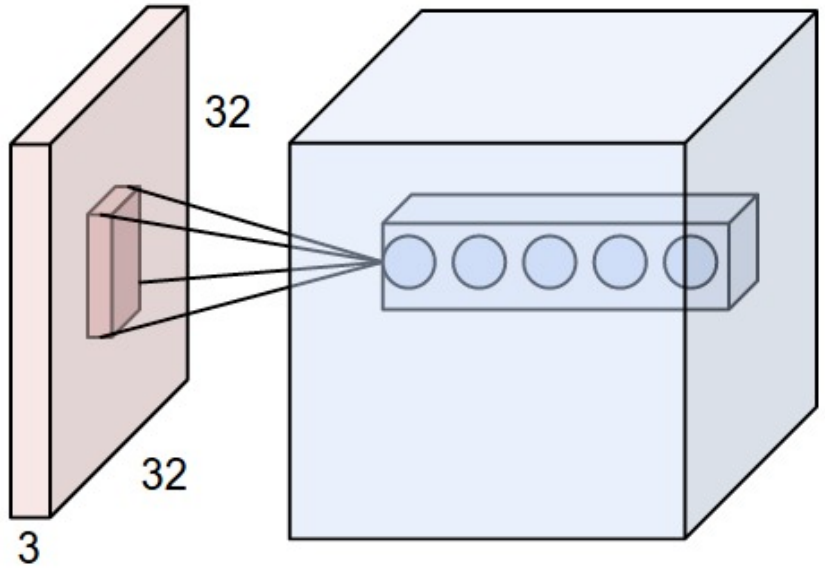
全连接层/密集层

(FC/Dense)

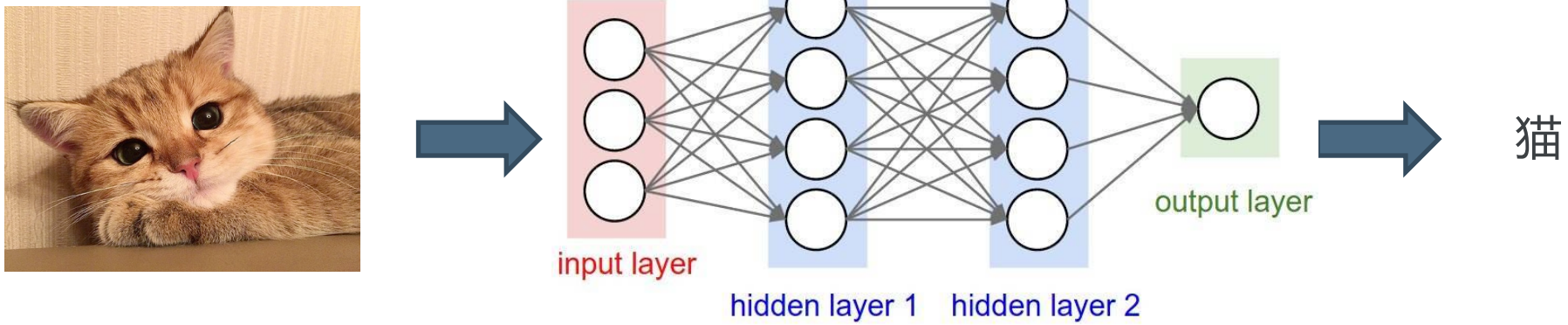


卷积层

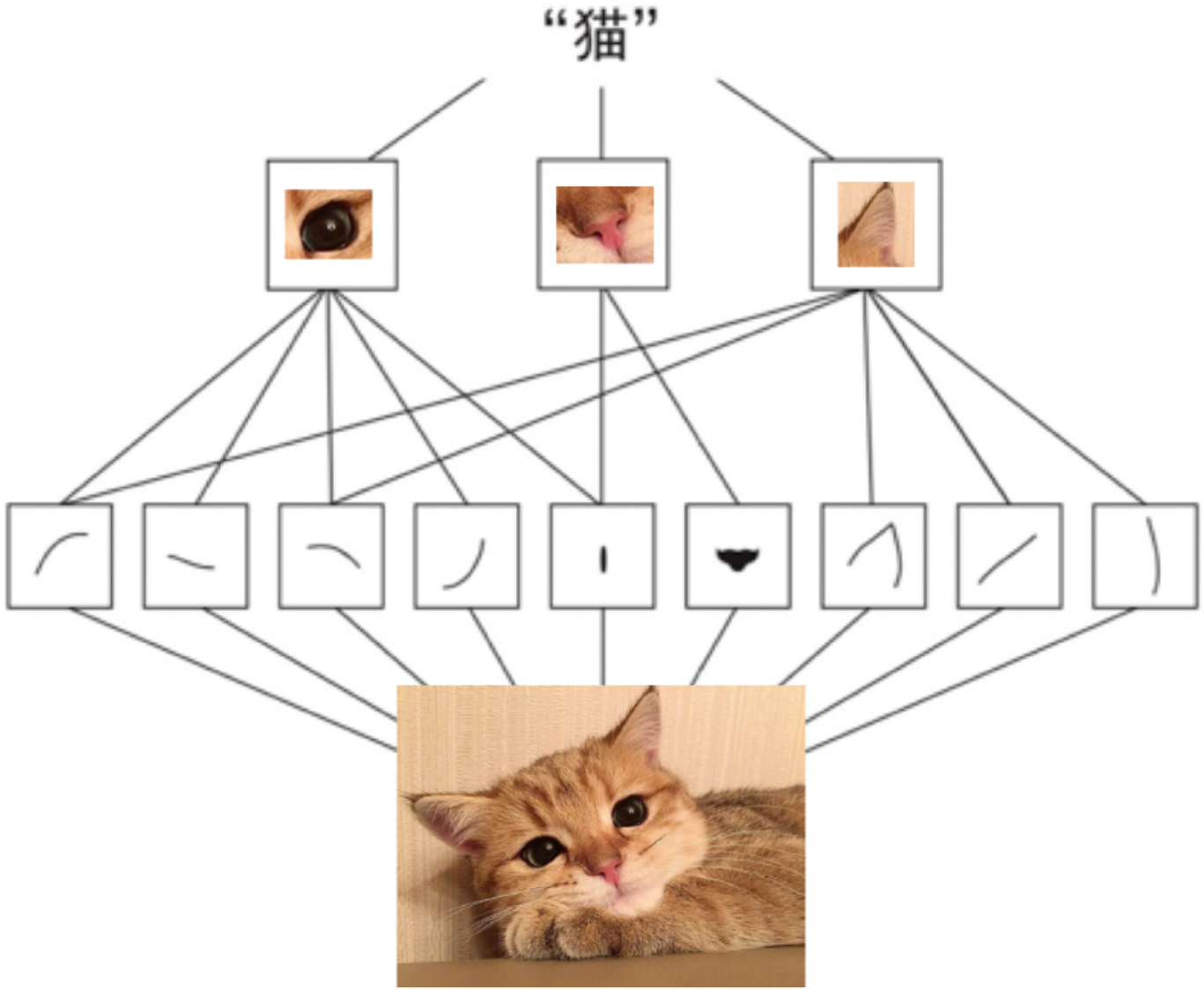
(Conv)



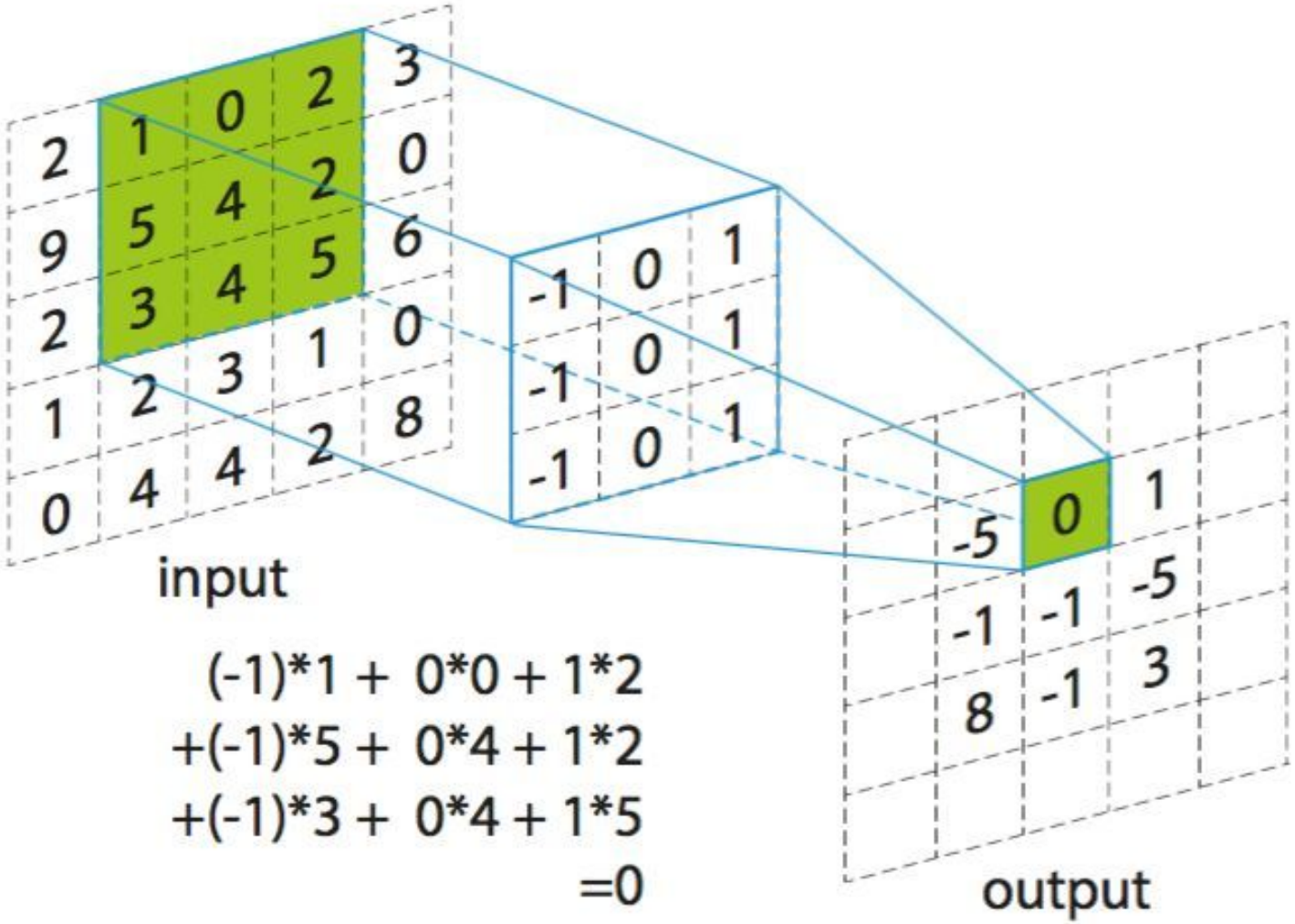
全局学习模式：全连接



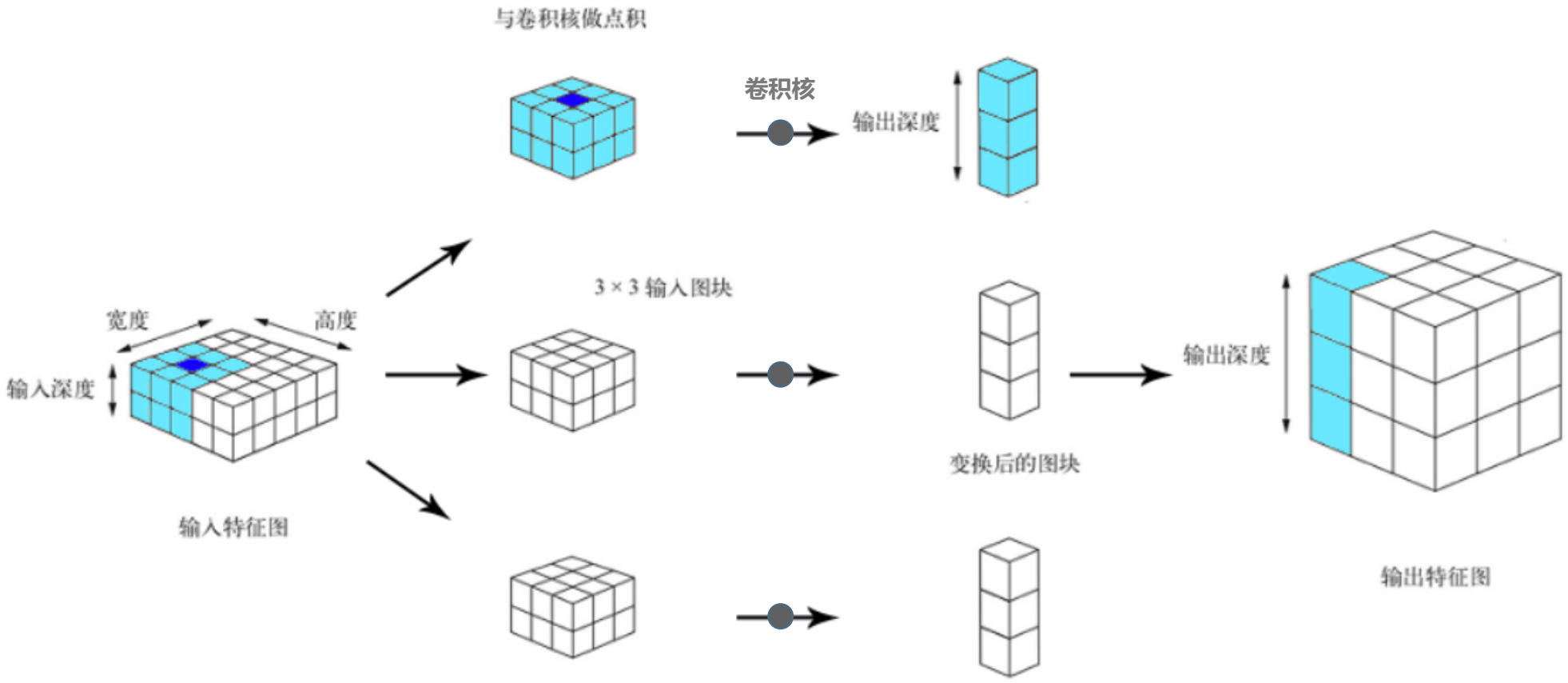
局部学习模式：卷积



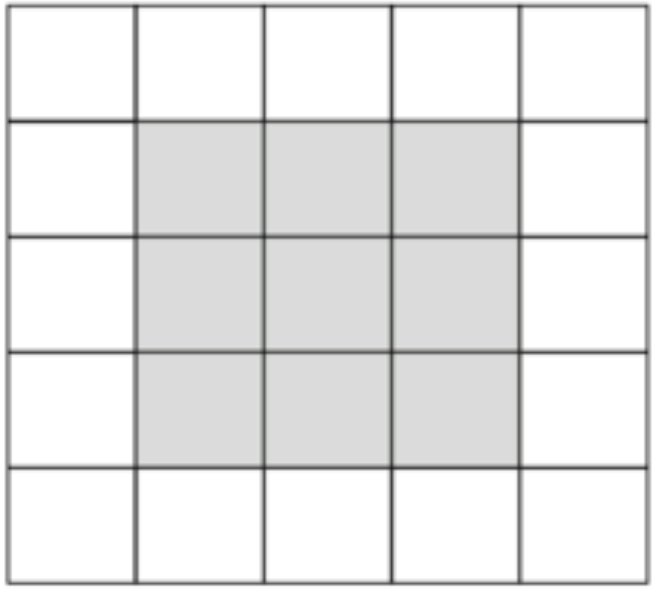
卷积工作原理：计算方法

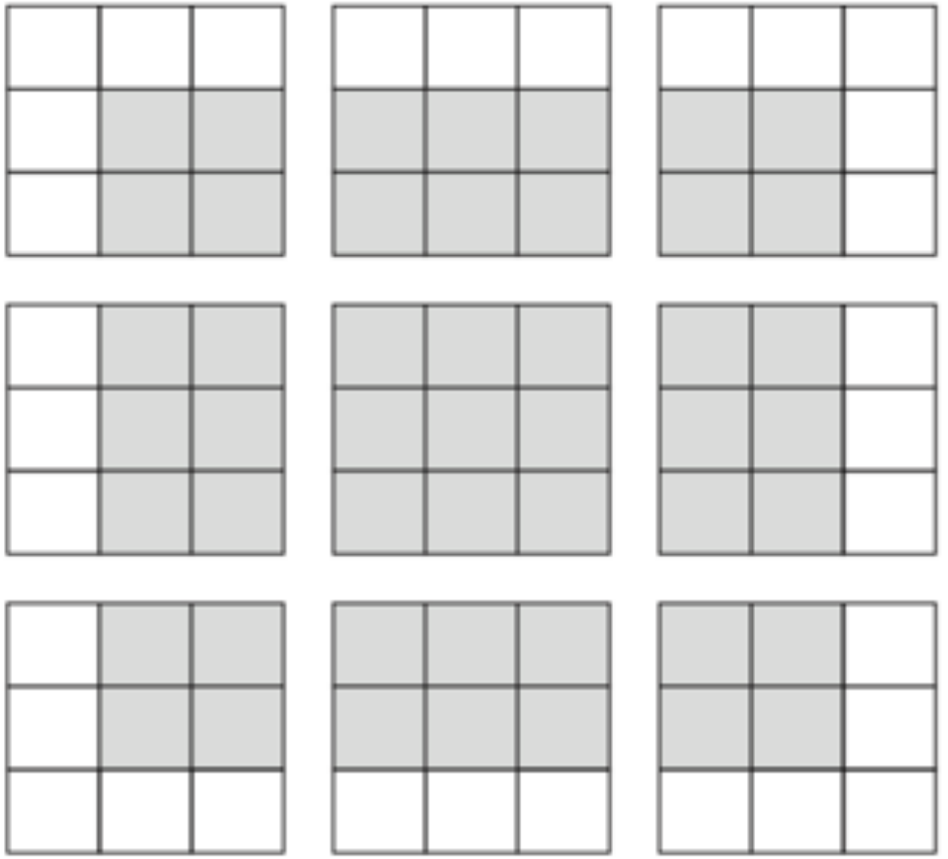


卷积工作原理：卷积

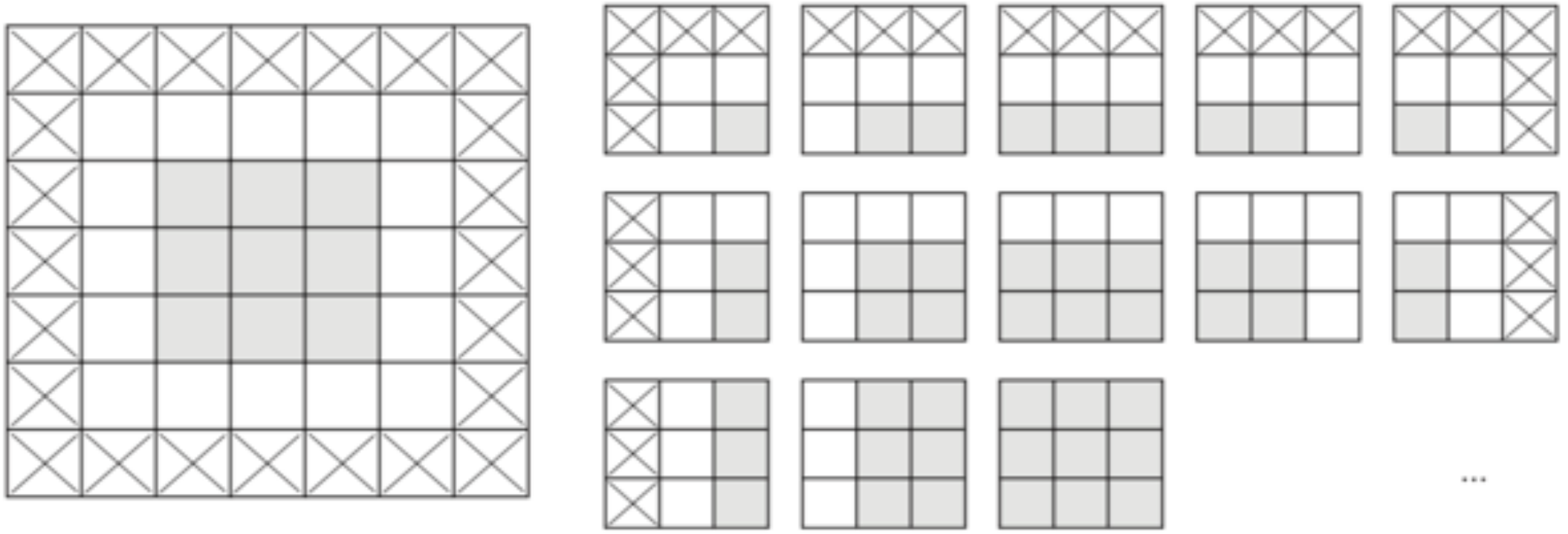


卷积工作原理：边界效应

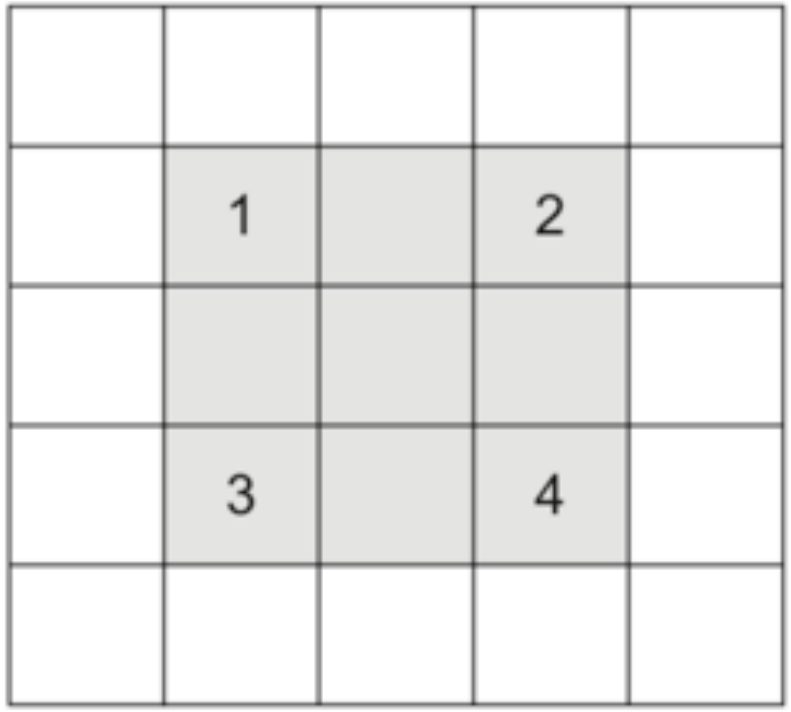


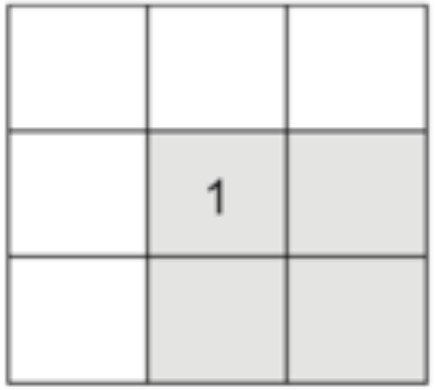


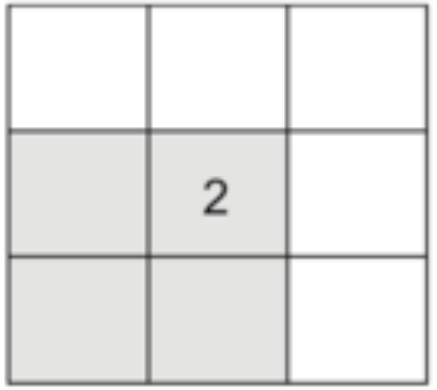
卷积工作原理：边缘填充

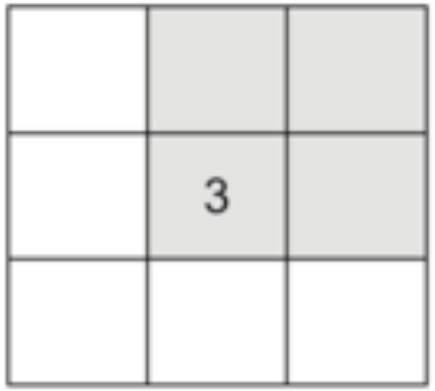


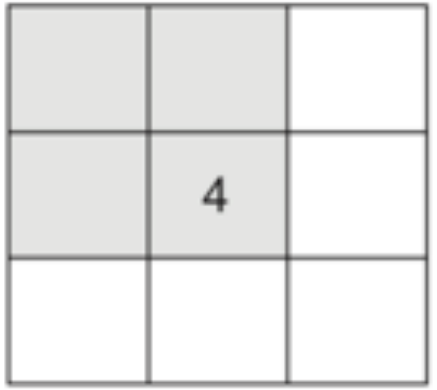
卷积工作原理：步进卷积





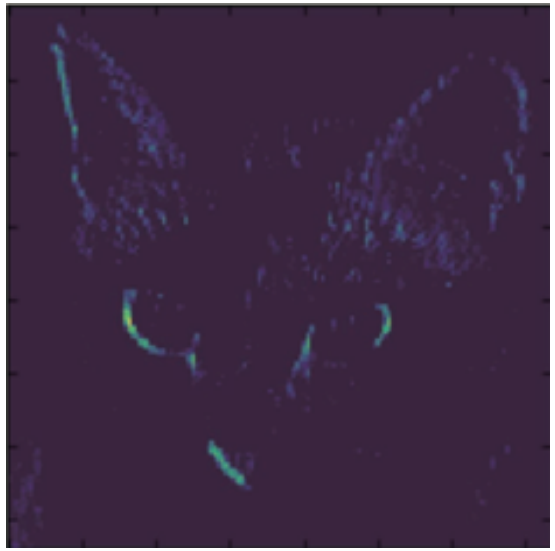






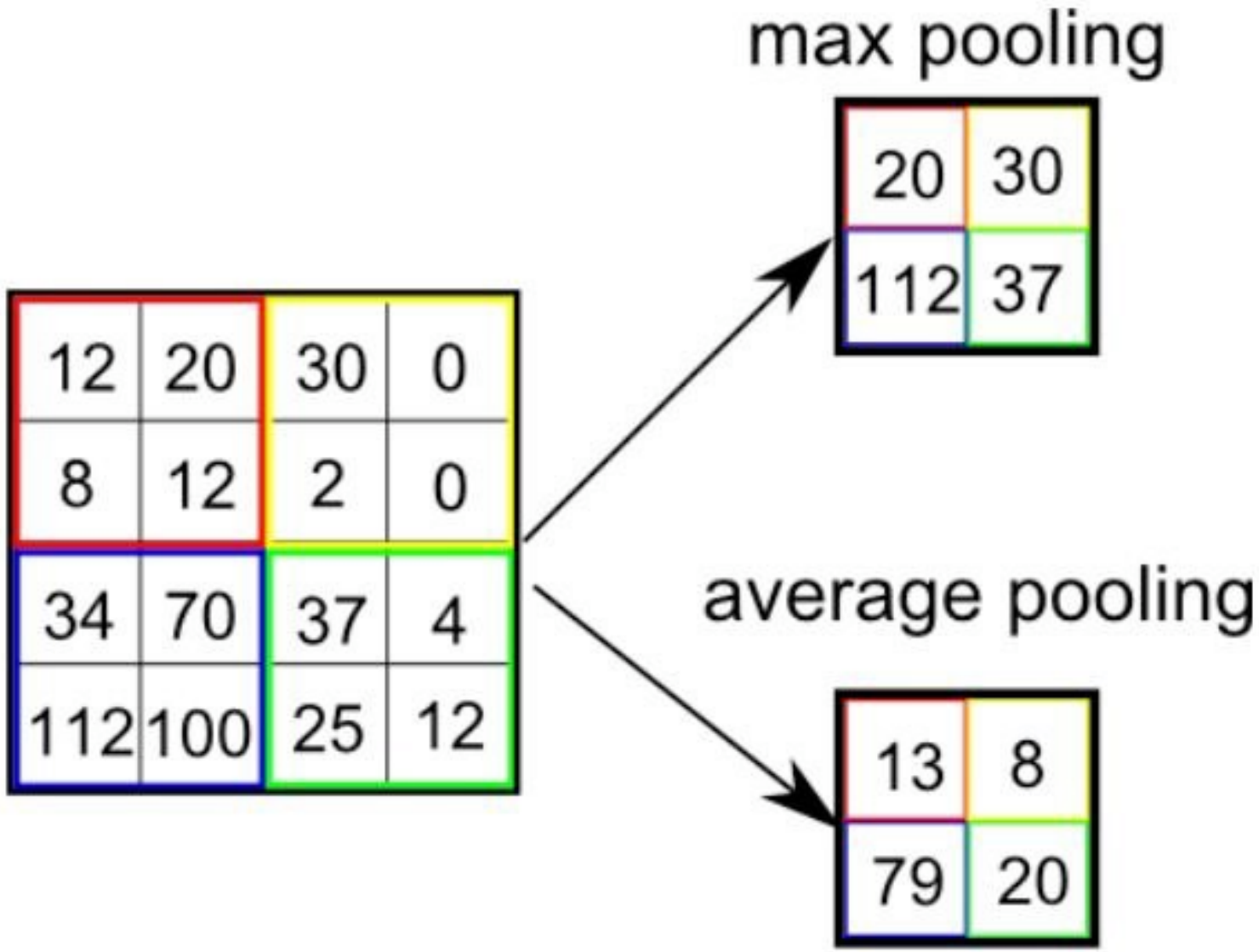
过滤器与特征图

通道1



通道2

池化层


max pooling
20 30
112 37
12 20 30 0
8 12 2 0
34 70 37 4
112 100 25 12
average pooling
13 8
79 20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Python 深度学习

猫狗分类基础：训练一个最简单的分类模型

讲师：彭靖田

通用模型训练流程

Kaggle 猫狗分类数据集

Dogs vs. Cats

Create an algorithm to distinguish dogs from cats

215 teams · 6 years ago

Overview | Data | Notebooks | Discussion | Leaderboard | Rules

Data Description

The training archive contains 25,000 images of dogs and cats. Train your algorithm on these files and predict the labels for test1.zip (1 = dog, 0 = cat).

A note on hand labeling

Per the rules and spirit of this contest, please do not manually label your submissions. We work hard to fair and fun contests, and ask for the same respect in return.

"I'm a good doggie who deserves a good algorithm.
And chew bones. *Please send chew bones.*"

However, given that there is always one willing to cheat to rise to glory, **we reserve the right to wield the following anti-doping measures:**

kaggle

Data (812 MB) API kaggl

Data Sources

- sampleSubmission.csv 12.5k x 2
- test1.zip
- train.zip

https://www.kaggle.com/c/dogs-vs-cats/data

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Python 深度学习

猫狗分类进阶：数据增强（举一反三造数据）

讲师：彭靖田

数据增强

随机旋转

水平/垂直平移

错切变换

随机缩放

水平翻转

填充像素

数据增强示例

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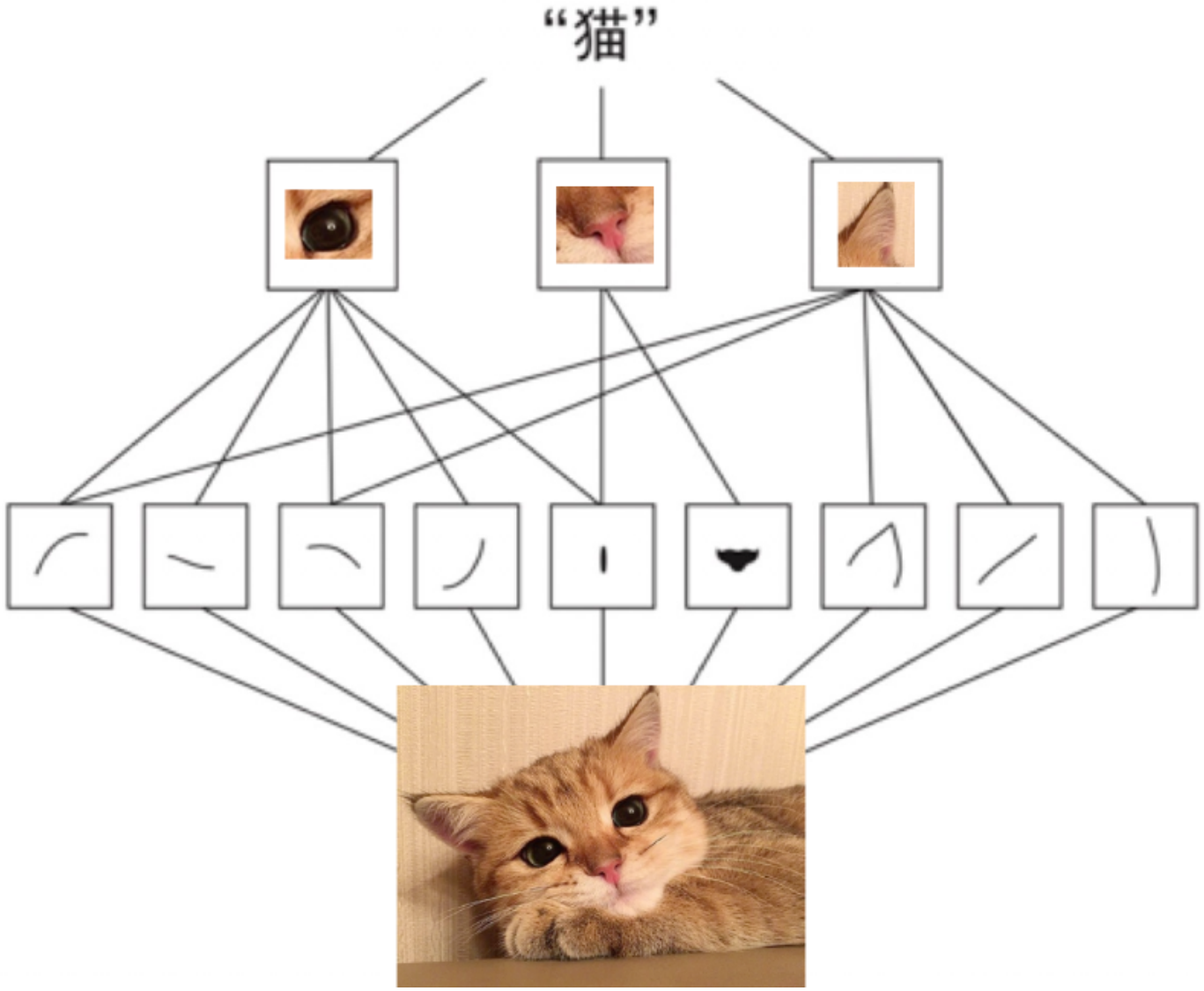
Python 深度学习

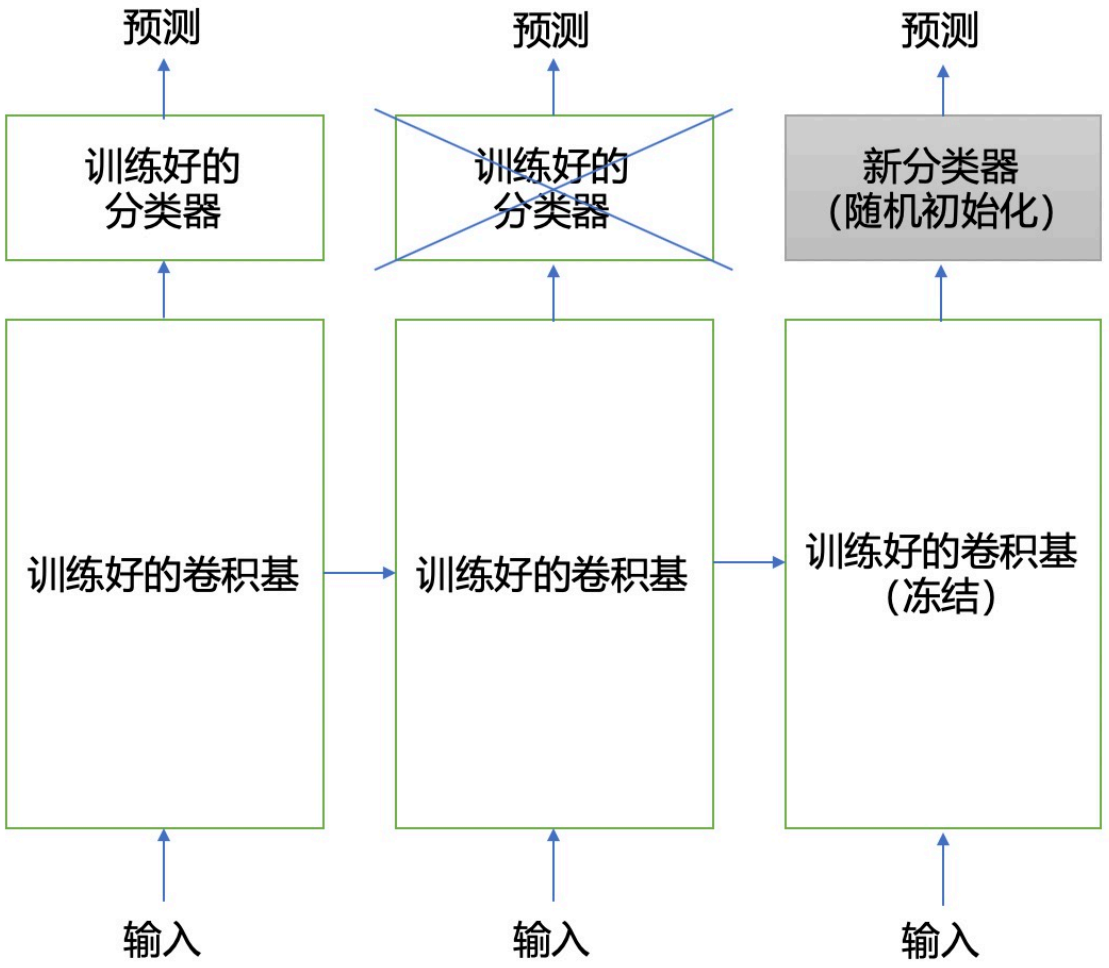
猫狗分类进阶：特征提取（站在巨人肩膀上）

讲师：彭靖田

分层特征提取



卷积基与新特征


预测
预测
预测
训练好的
分类器
训练好的
分类器
新分类器
(随机初始化)
训练好的卷积基
训练好的卷积基
训练好的卷积基
(冻结)
输入
输入
输入

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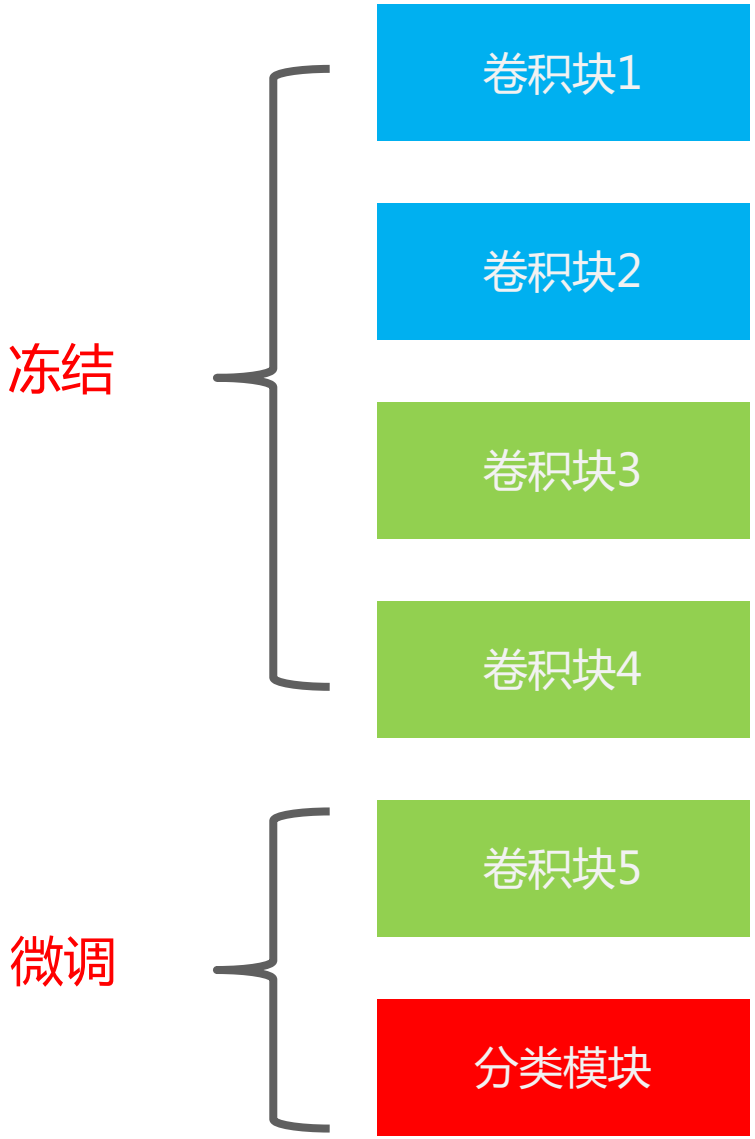
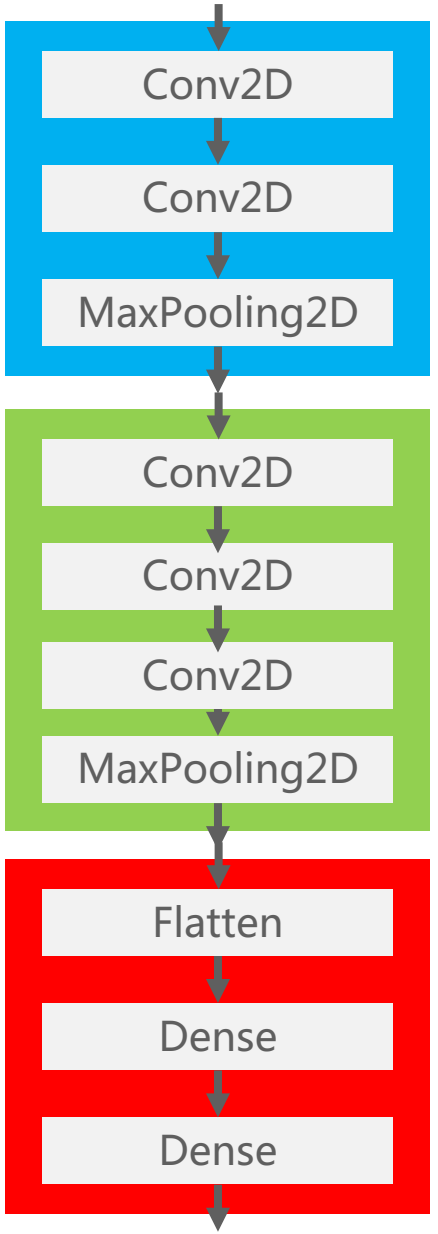
Python 深度学习

猫狗分类进阶：模型微调（青出于蓝胜于蓝）

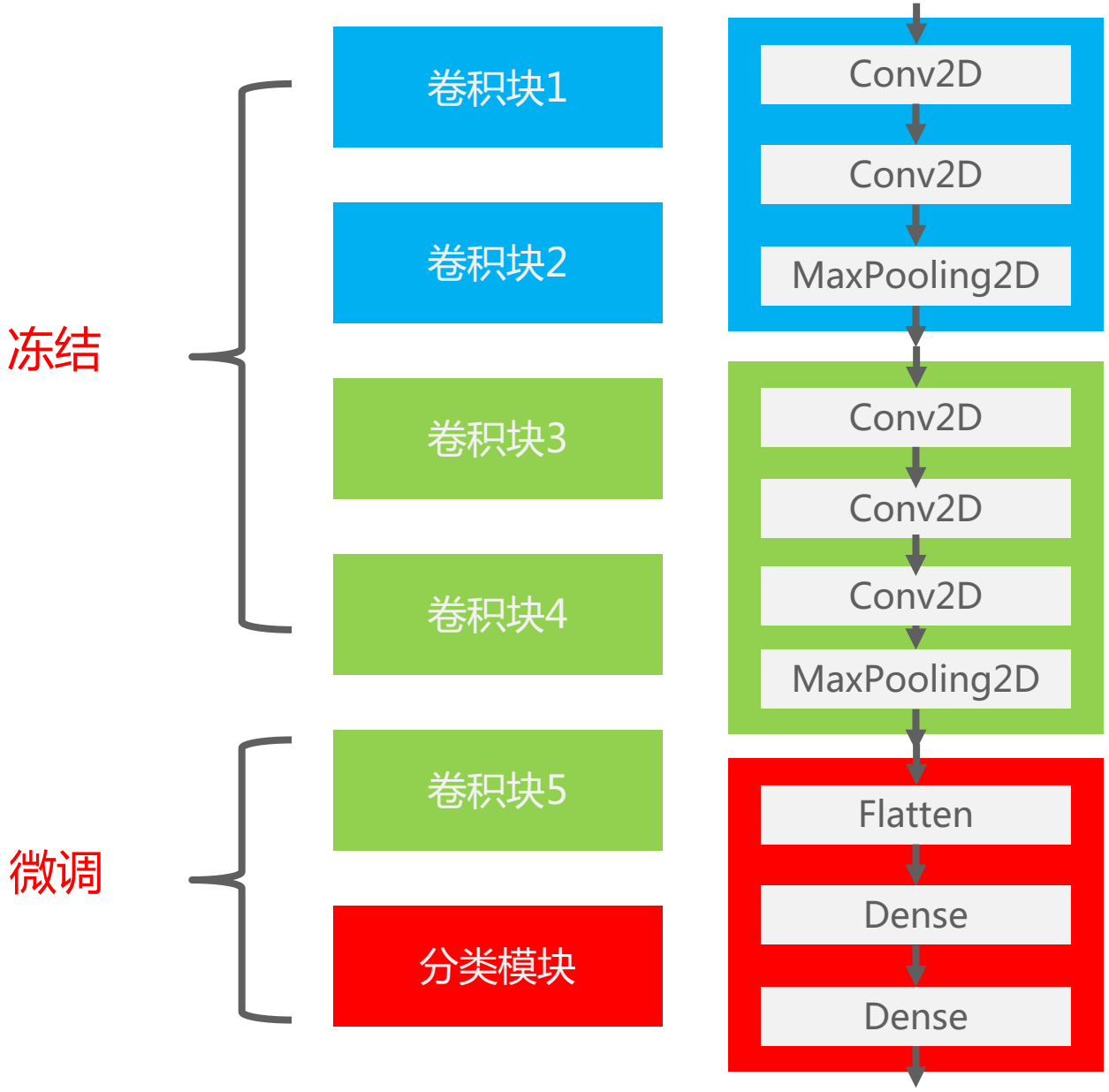
讲师：彭靖田

模型微调：VGG16


冻结
卷积块1
卷积块2
卷积块3
卷积块4
微调
卷积块5
分类模块


Conv2D
Conv2D
MaxPooling2D
Conv2D
Conv2D
Conv2D
MaxPooling2D
Flatten
Dense
Dense

模型微调：VGG16



Layer (type)	Output Shape	Param #
input_1 (InputLayer)	(None, 150, 150, 3)	0
block1_conv1 (Conv2D)	(None, 150, 150, 64)	1792
block1_conv2 (Conv2D)	(None, 150, 150, 64)	36928
block1_pool (MaxPooling2D)	(None, 75, 75, 64)	0
block2_conv1 (Conv2D)	(None, 75, 75, 128)	73856
block2_conv2 (Conv2D)	(None, 75, 75, 128)	147584
block2_pool (MaxPooling2D)	(None, 37, 37, 128)	0
block3_conv1 (Conv2D)	(None, 37, 37, 256)	295168
block3_conv2 (Conv2D)	(None, 37, 37, 256)	590080
block3_conv3 (Conv2D)	(None, 37, 37, 256)	590080
block3_pool (MaxPooling2D)	(None, 18, 18, 256)	0
block4_conv1 (Conv2D)	(None, 18, 18, 512)	1180160
block4_conv2 (Conv2D)	(None, 18, 18, 512)	2359808
block4_conv3 (Conv2D)	(None, 18, 18, 512)	2359808
block4_pool (MaxPooling2D)	(None, 9, 9, 512)	0
block5_conv1 (Conv2D)	(None, 9, 9, 512)	2359808
block5_conv2 (Conv2D)	(None, 9, 9, 512)	2359808
block5_conv3 (Conv2D)	(None, 9, 9, 512)	2359808
block5_pool (MaxPooling2D)	(None, 4, 4, 512)	0

Total params: 14,714,688
Trainable params: 14,714,688
Non-trainable params: 0

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