

LiveVideoStackCon

# 深度学习在视频分析中的 架构、算法与应用

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## Security&Safety

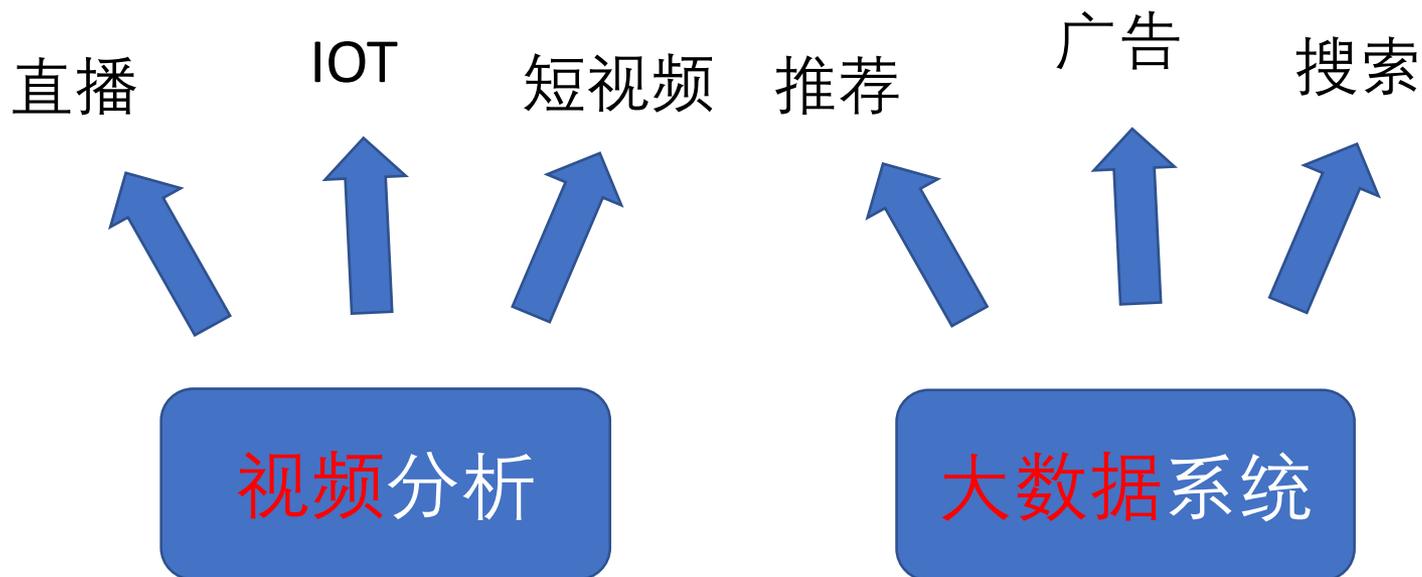


AI拓展360安全呵护的范畴>> 物理世界安全

## Information Services



AI让信息的生产>分析>获取>消费更智能



深度学习平台

大规模GPU集群  
40GE光纤连接

360 NET  
多机并行，支持多个框架

系统平台  
整体调度，任务管理，资源复用



业务

云端

移动端

数据

语音

视频

核心

检测

识别

分割

跟踪

# ▶ 视频分析 - 核心问题

核心

检测

识别

分割

跟踪

Object  
Classification

Person, Horse,  
Barrier, Table, etc



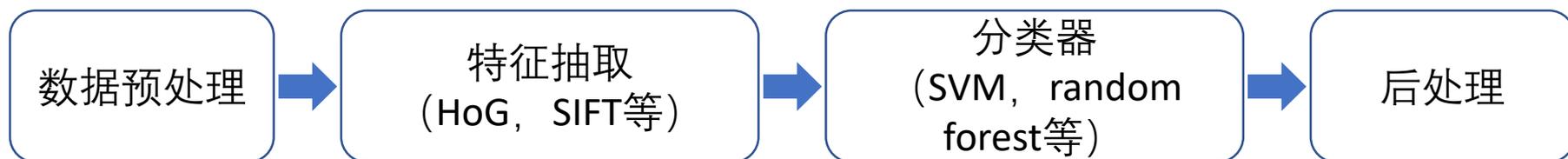
Object  
Detection



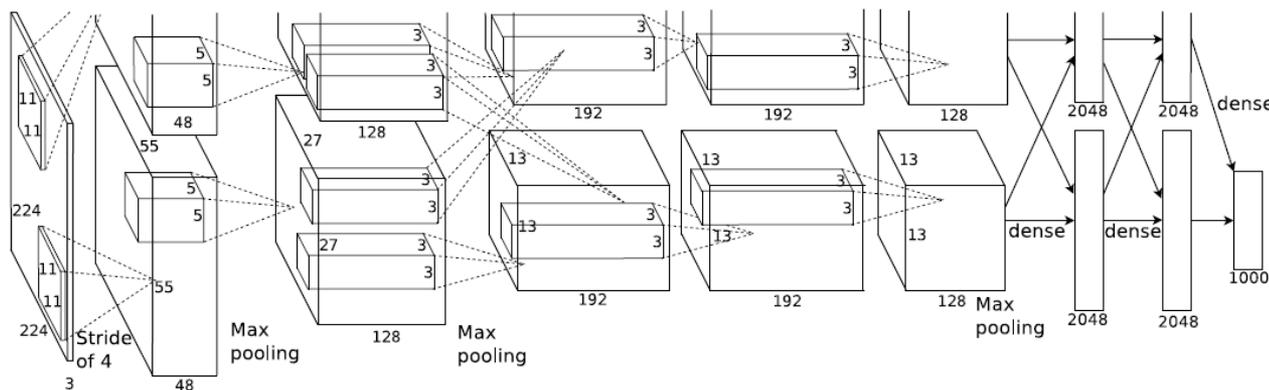
Object  
Segmentation



- 传统分类框架

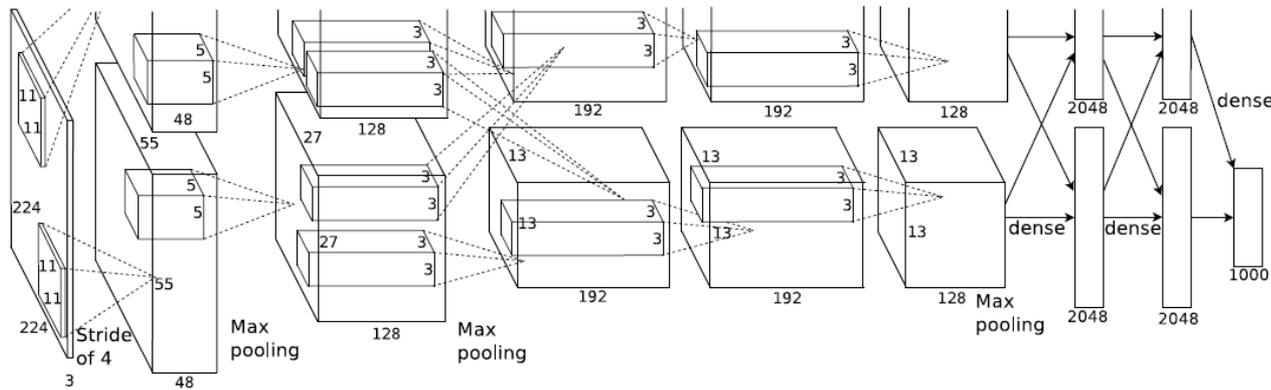
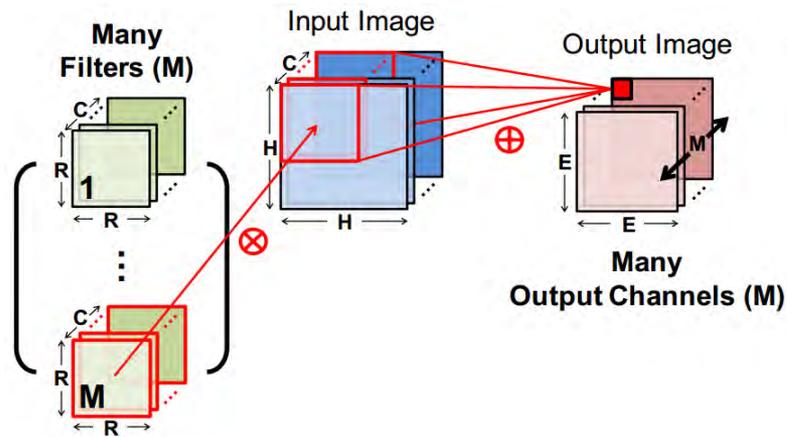


- 卷积神经网络

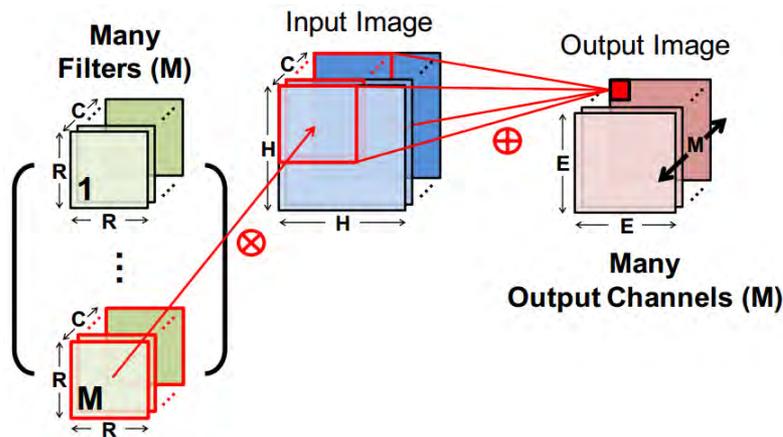




- 卷积神经网络



## • 卷积神经网络



$$x_{i,j} = \max_{|k| < \tau, |l| < \tau} y_{i-k, j-l}$$

pooling stage  
mean or subsample also used

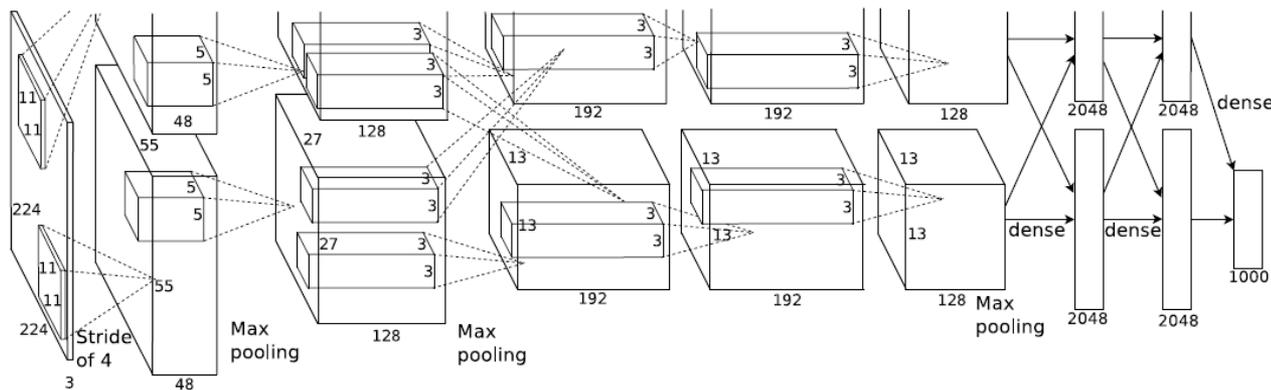
$$y_{i,j} = f(a_{i,j})$$

e.g.  $f(a) = [a]_+$   
 $f(a) = \text{sigmoid}(a)$

non-linear stage

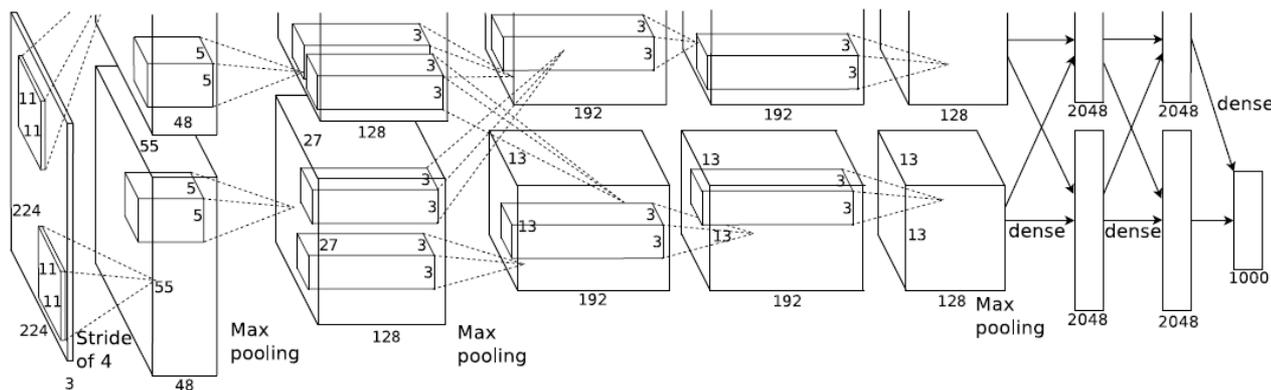
$$a_{i,j} = \sum_{k,l} w_{k,l} z_{i-k, j-l}$$

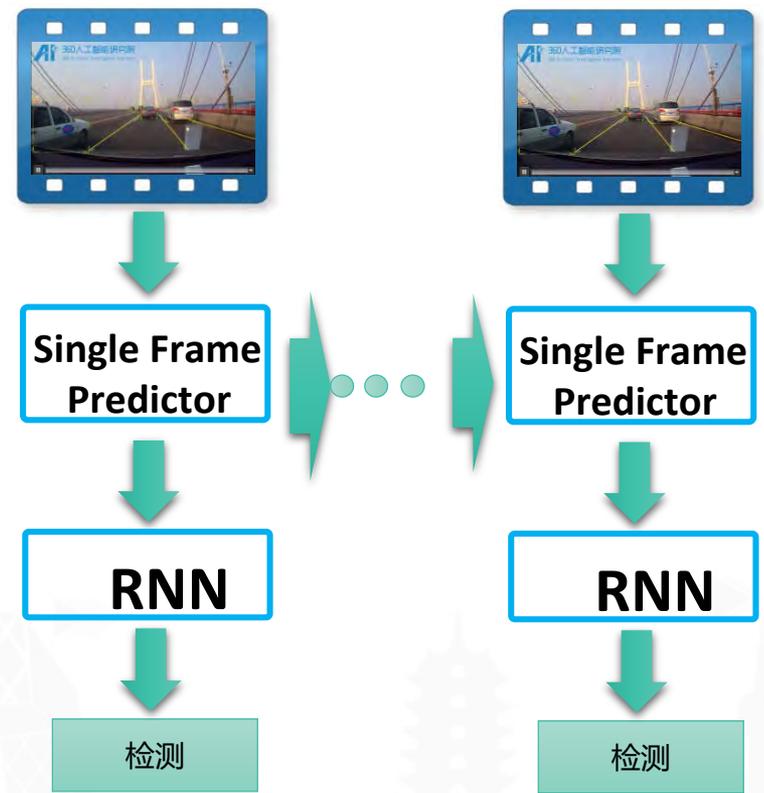
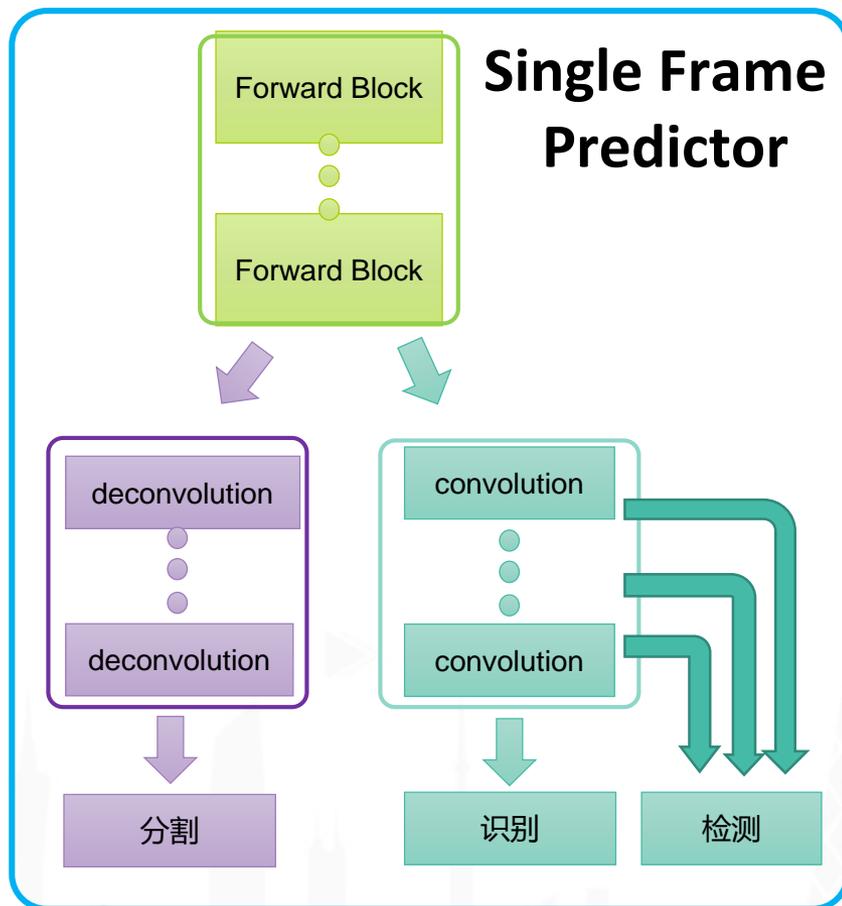
convolutional stage  
only parameters



## • 卷积神经网络

- 深层非线性系统的叠加
- 端到端的特征和任务学习
- 低层次和高层次特征的级联



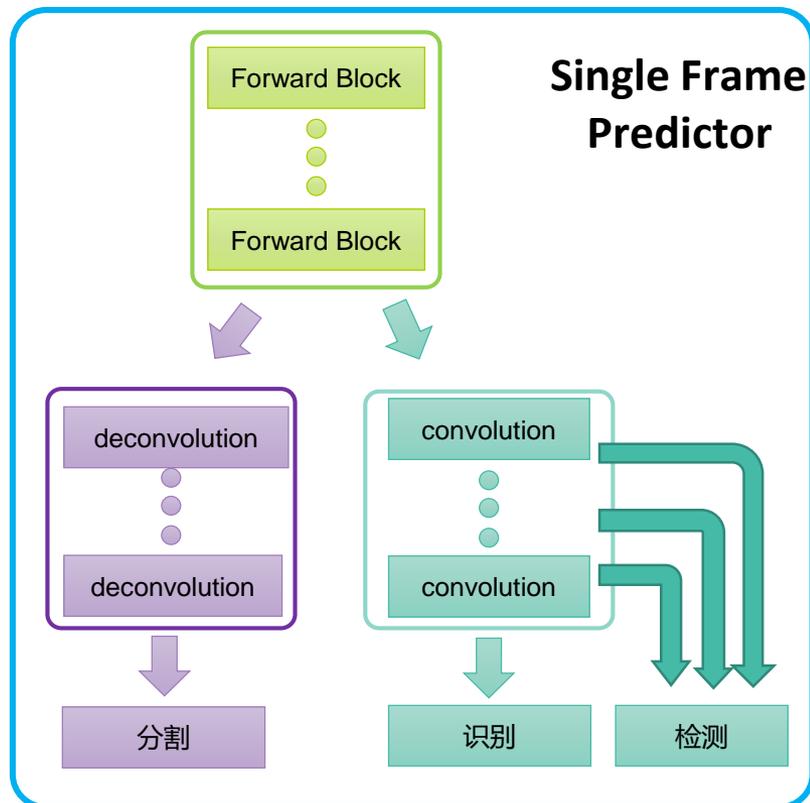


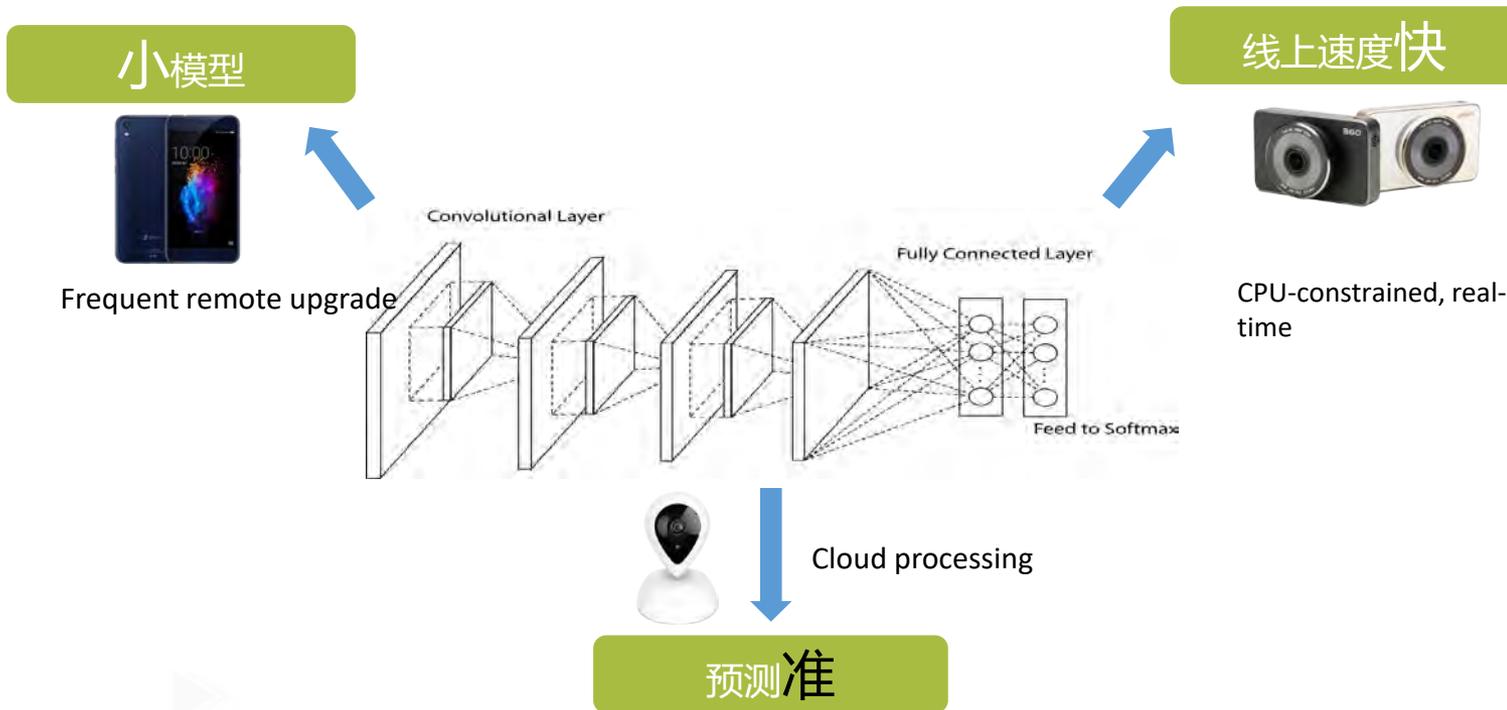
# 视觉感知模型-融合

核心



- 完全基于深度学习
- 统一分类，检测，分割，跟踪
  - ✓ 通过共享计算提高算法效率
  - ✓ 通过多个相关任务共同学习提高算法性能
- 稀疏标注
  - ✓ 在节省标注工作量的同时，充分利用视频数据



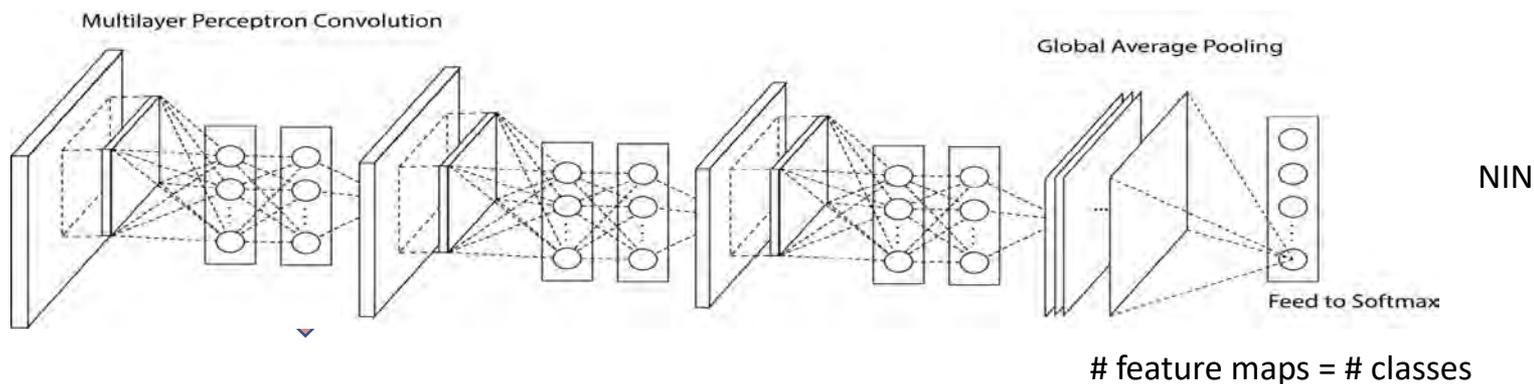


深度学习已经逐步取代各领域的传统方法



# 深度学习原创贡献: Network in Network

**NIN:** complex-cell filters, pure convolutional, 1x1 convolution layers

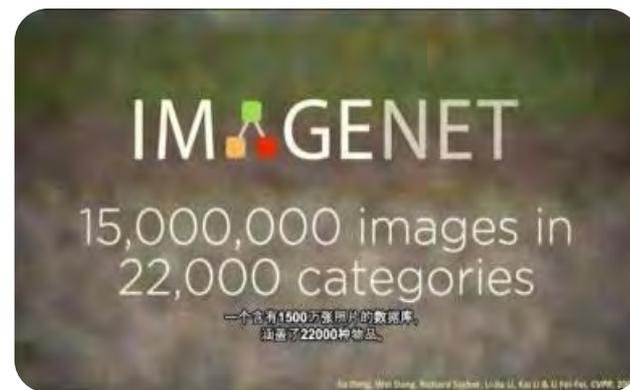
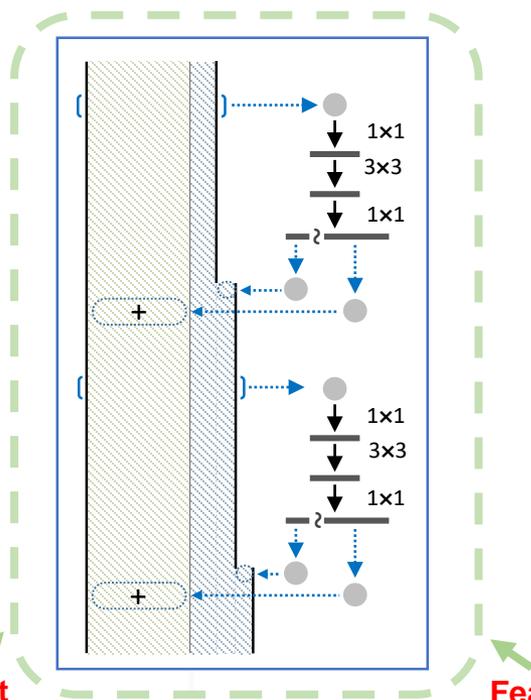


I can also tell you that some of the ideas developed in your Network-in-Network paper were **instrumental** to other strong performers in the challenge, so congratulations for that contribution as well.

--- Vincent and Jeff, Google



# 深度学习原创贡献: Dual-path Networks



ImageNet 1000类物体识别

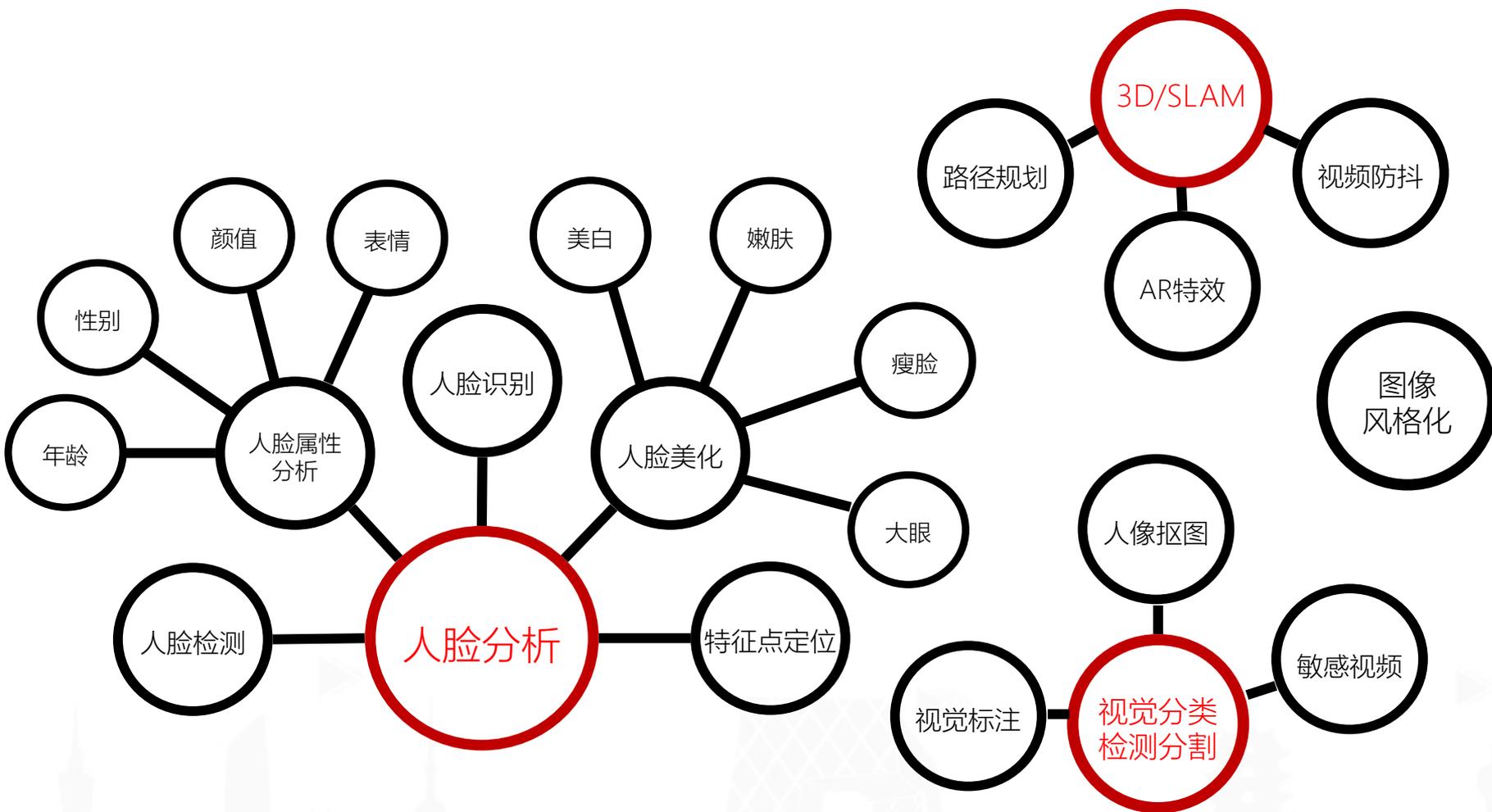
3项比赛、14个指标全部全球前三！

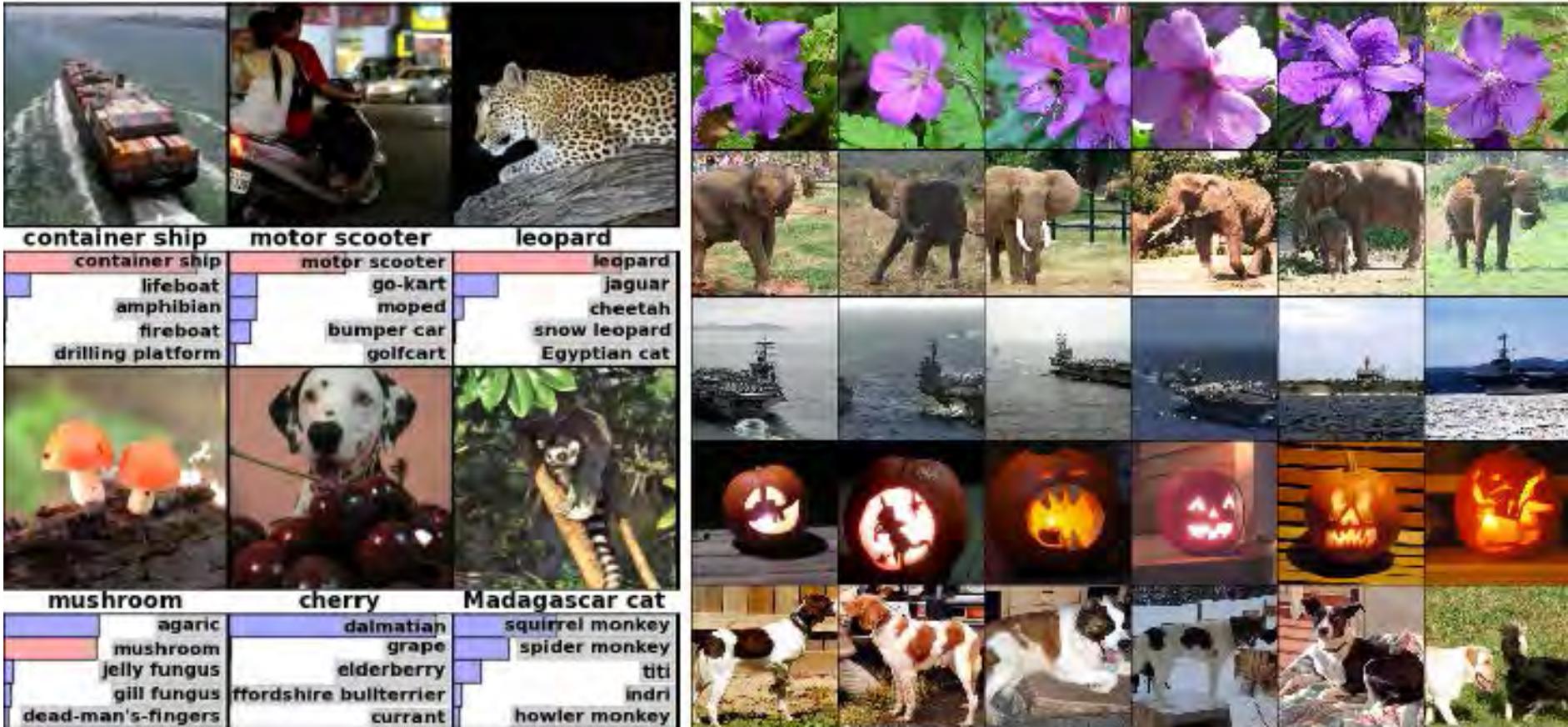
错误率 6.2%

(ImageNet收官之战 冠军)

Dual Path Networks



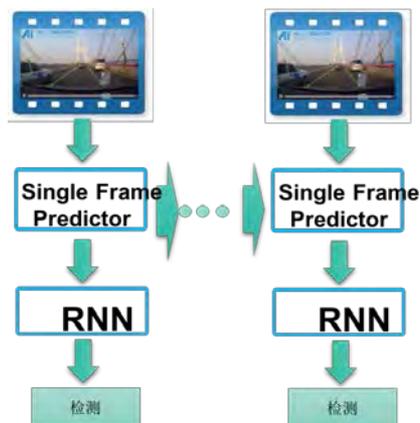




原图

卷积特征

预测类别



- 问题：（1）缺乏标注数据，（2）缺乏显示的标注体系
- 解决方案：聚类到分类
- 应用场景：短视频内容Tag。



**家人/陌生人识别**  
**疲劳监控**  
**萌拍、换脸等娱乐/游戏功能**

**准确、稳定、鲁棒、低功耗**  
**人脸检测、定位、识别多项世界前沿的性能**



男, 24岁, 魅力四射

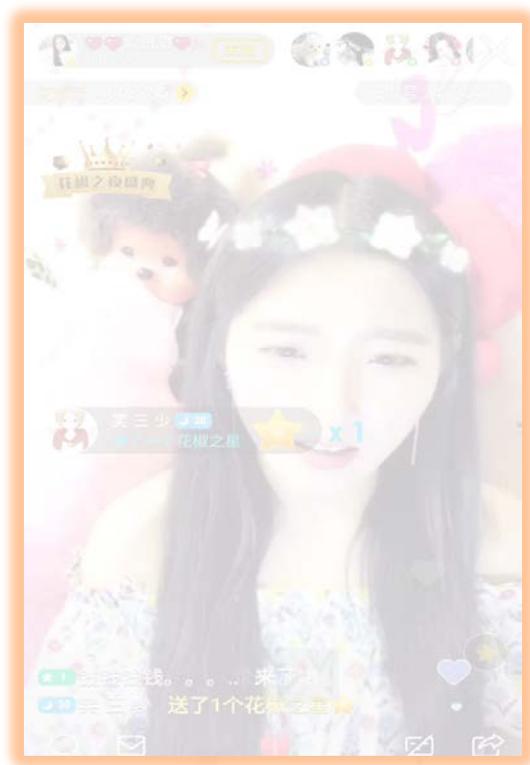
面具 识别 检测 美颜 竞品



最早在人脸标准库上LFW达到99.7%的团队之一!

3.15 晚会 破解 人体活体认证

# ▶ 视频增强：AR直播、相机、短视频



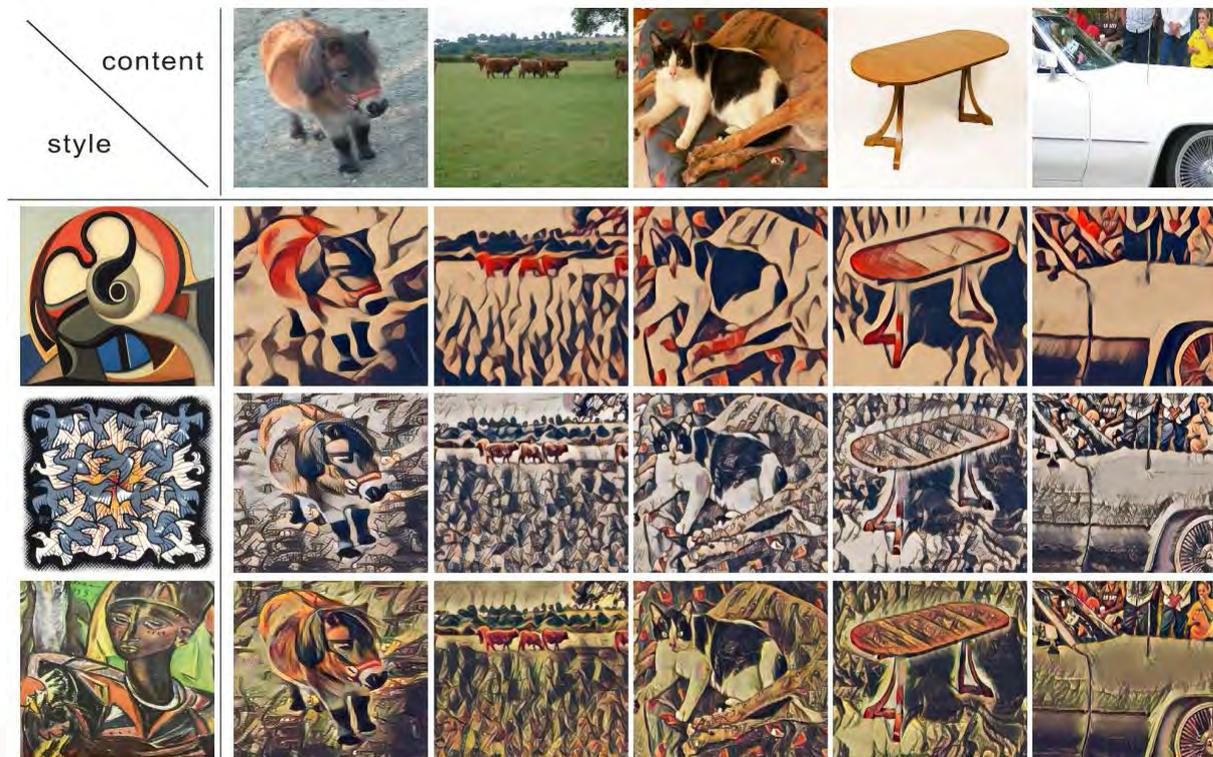
花椒直播：美颜、萌颜



花椒相机：美颜、萌颜



# 短视频风格化



Cost <0.5s to generate stylization model for any give style image, and then run stylization in real-time!



花椒相机  
视频美颜神器

# Thank You



[ai.360.cn](http://ai.360.cn)

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聚音视 研修不止于形



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