

LiveVideoStackCon

# 隐藏在摄像头里的AI

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北京·丽亭华苑酒店

- 摄像头里的数据宝藏
- 视觉识别的挑战与应对
- AI+安防实践
- AI+自动驾驶实践



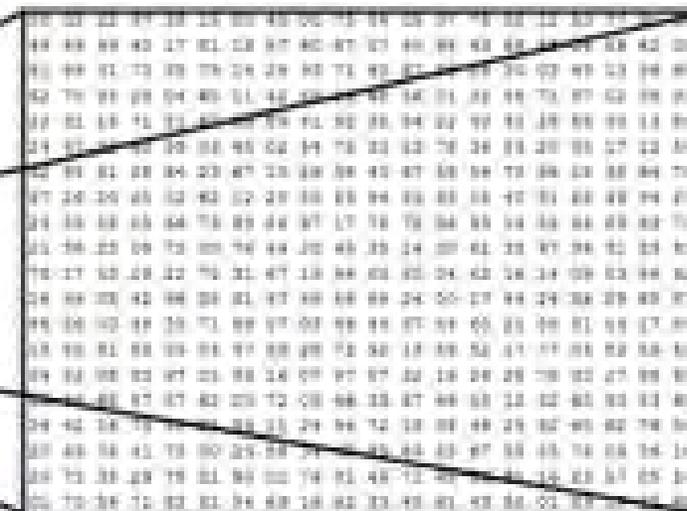


# 摄像头里的数据宝藏





# 视觉识别问题中的挑战



What the computer sees



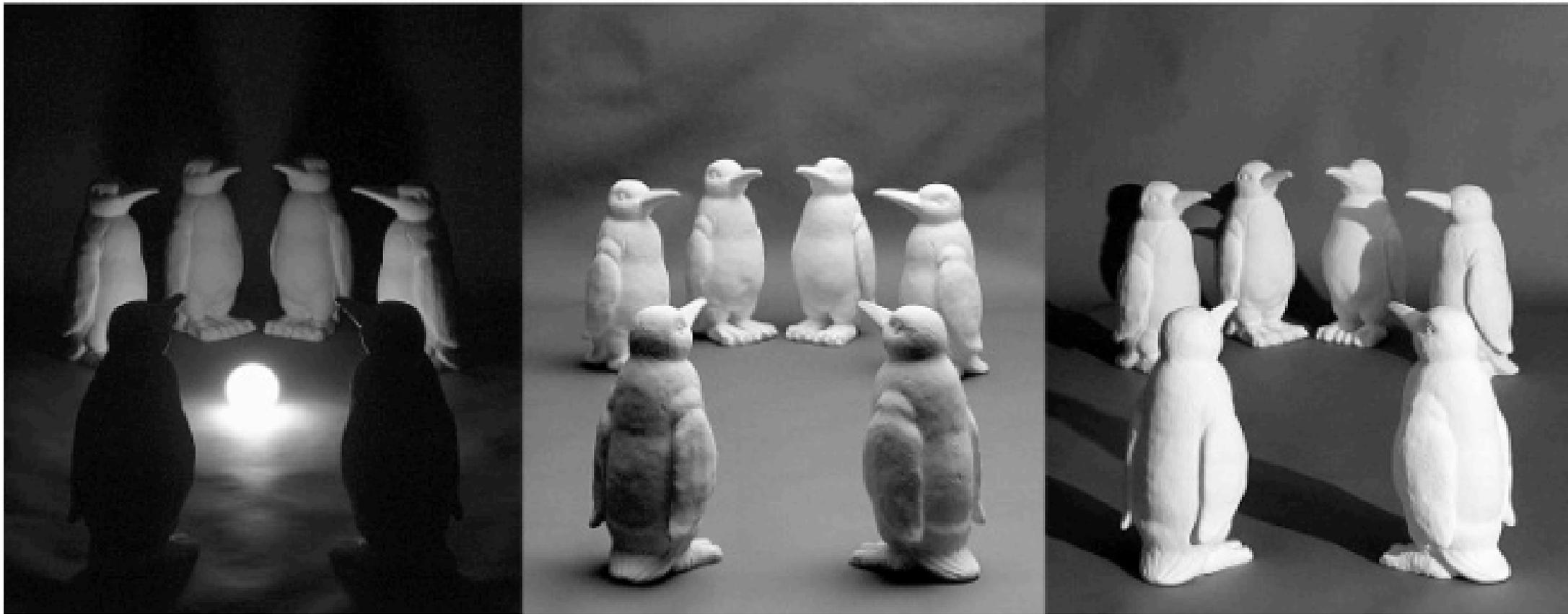
# 视角变化



Michelangelo 1475-1564



# 光影变化



# ▶ 尺度变化





# 形状变化





# 遮挡变化



Magritte, 1957



# 背景干扰



Kilmeny Niland. 1995



# 类内差距





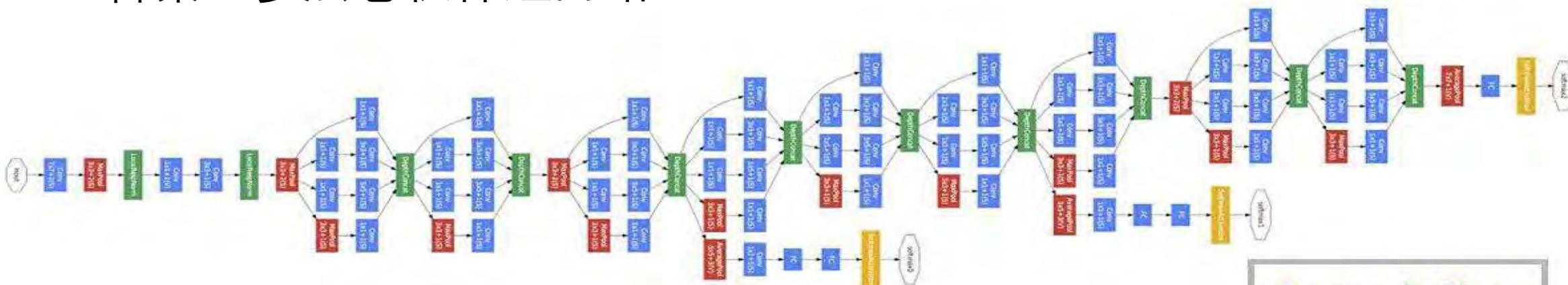
- 如何完成图像识别任务

```
def predict(image):
```

```
    # ???
```

```
    return class_label
```

- 答案：多层卷积神经网络

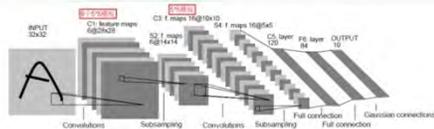


**Convolution**  
**Pooling**  
**Softmax**

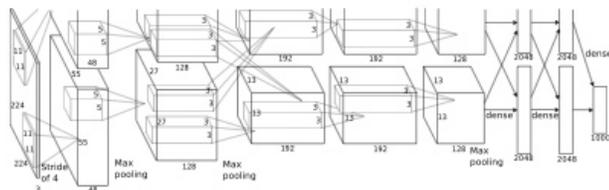


# Going deeper with convolution

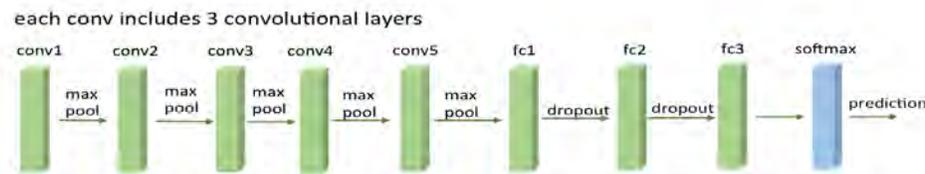
LeNet-5(1989)  
5层



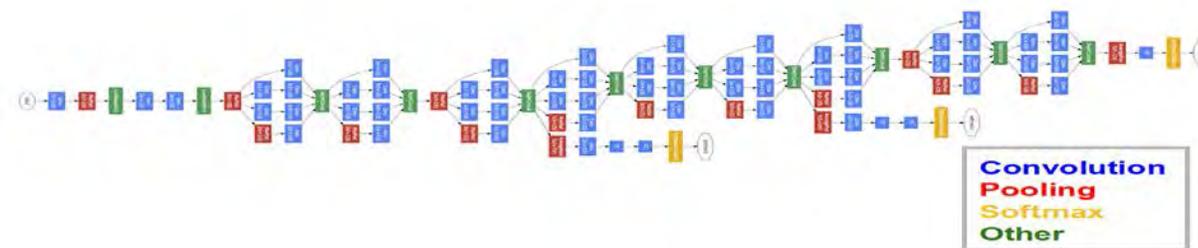
AlexNet(2012)  
8层



VGG(2013)  
19层



GoogLeNet(2014)  
22层



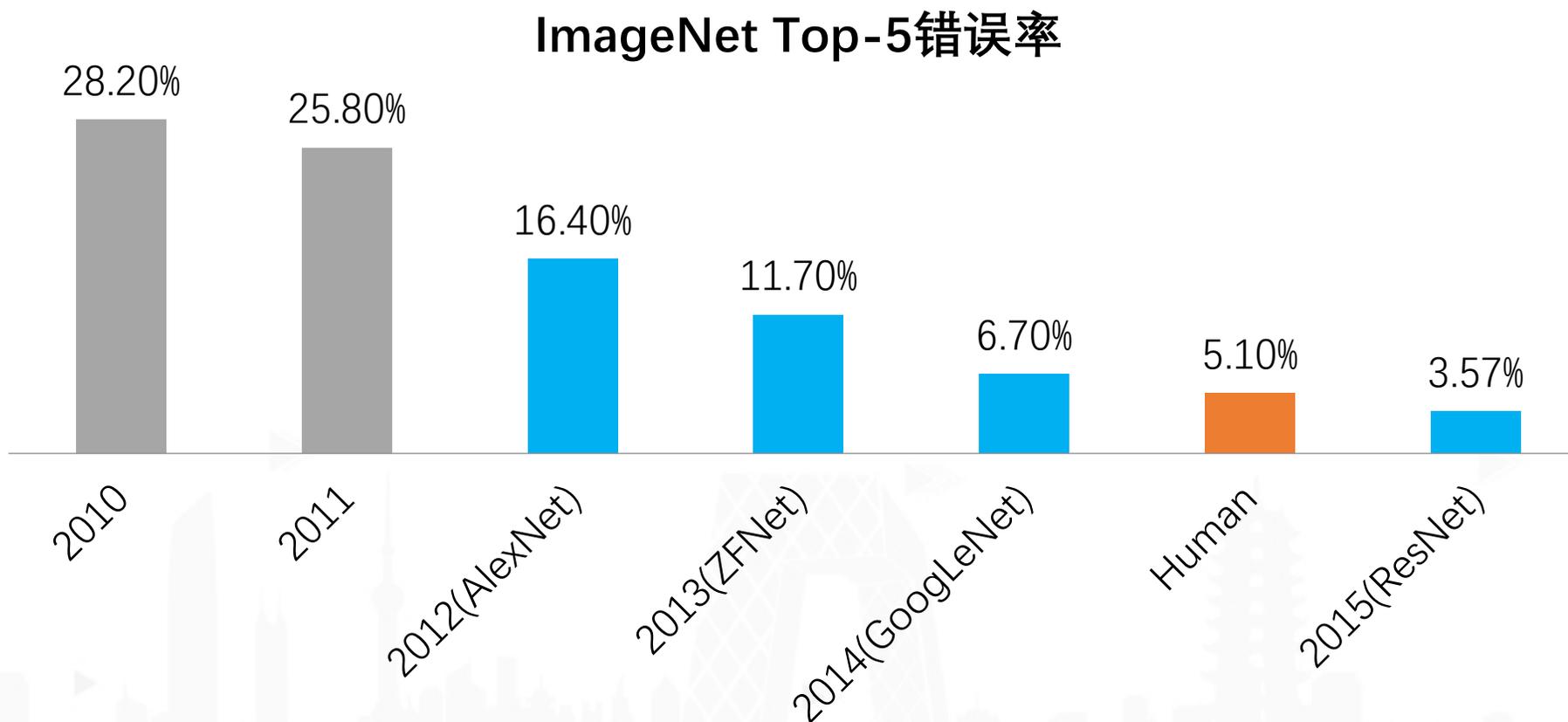
ResNet(2015)  
152层



网络越深,  
表达能力越强,  
训练难度越大,  
精度越高。



- ImageNet错误率下降图





# 视觉问题的深度学习方法

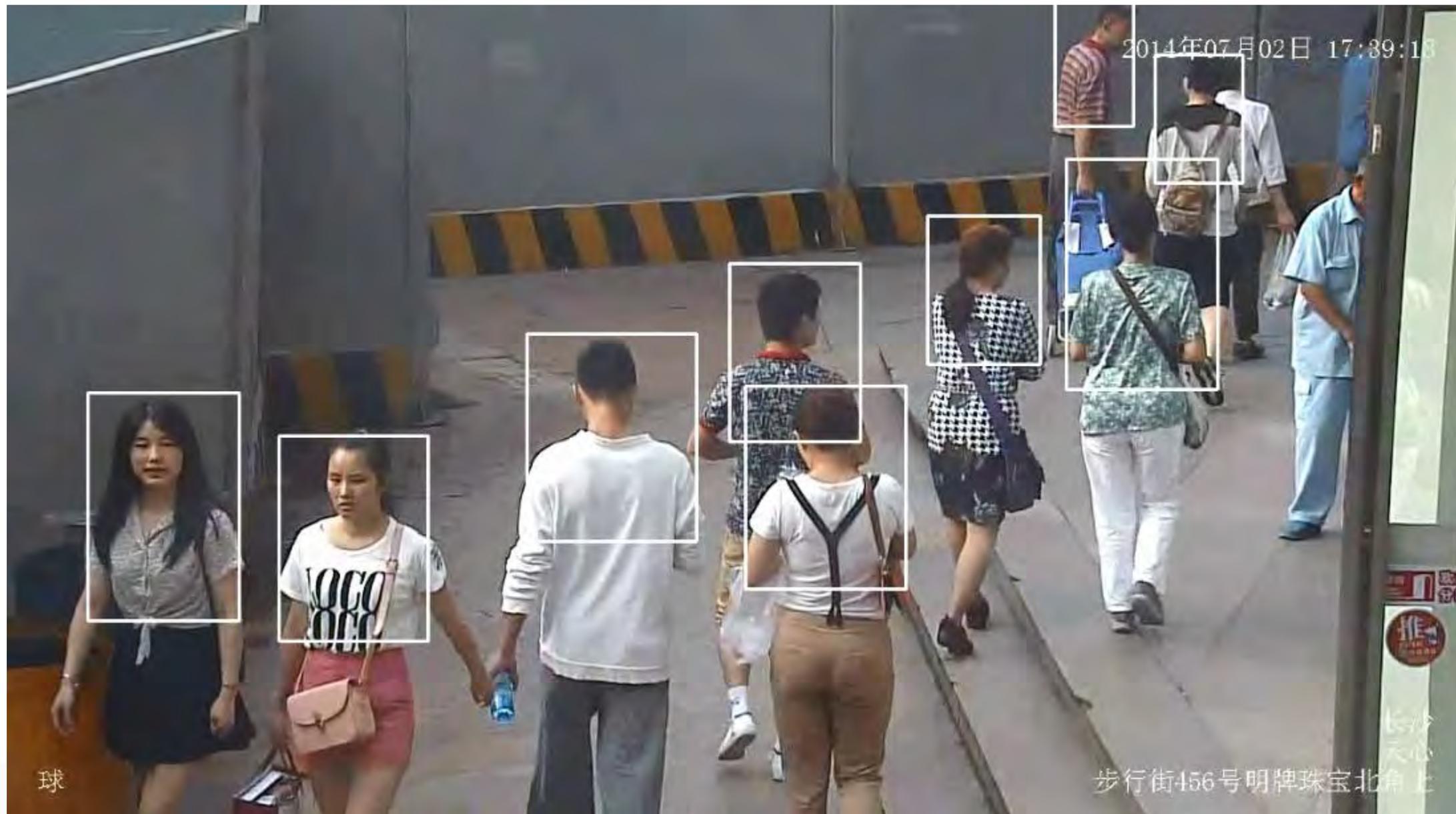
- 语义分割
  - FCN, Enet, PSPNet, ICNet, ...
  - 全卷积网络, 输出每个像素类别
- 物体检测
  - Faster RCNN, RFCN, SSD, ...
  - 全卷积网络提出候选框, 再做分类和回归
- 对比验证
  - 人脸验证, 跟踪, ReID
  - Siamese network
  - 缩小 (扩大) 类内 (类间) 网络输出的差距



- 安防行业关心的问题
  - 人都在哪里？
  - 这人从哪里来，到哪里去？
  - 这人是谁？
  - 这人在干什么？

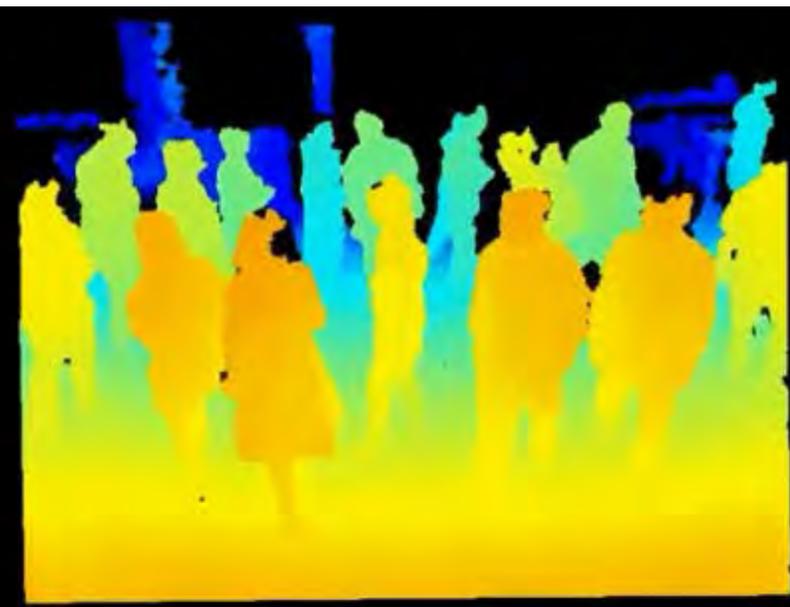


# ▶ AI+安防：人在哪里？

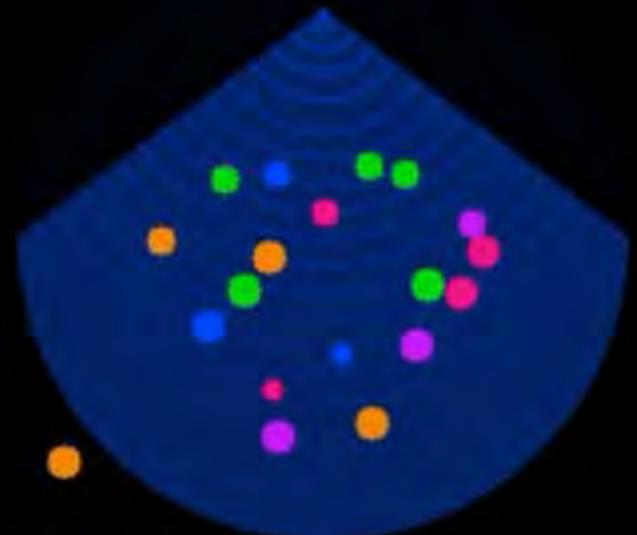




# AI+安防：从哪来，到哪去？



FPS: 26.92



# AI+安防：这些人是谁？

The image displays an AI facial recognition system in a security context. On the left, a live video feed shows a parking lot with a traditional Chinese building in the background. A red bounding box highlights a person in the distance. On the right, a grid of captured faces is shown, each with its corresponding database match result. The results include the distance from the camera and the similarity percentage.

| 人脸距离  | 相似度 |
|-------|-----|
| 28.6米 | 85% |
| 25.3米 | 81% |
| 44.7米 | 91% |

Additional captured faces are shown at the bottom of the interface, with timestamps ranging from 11:13:50 to 11:13:59.



# AI+安防：这些人在干什么



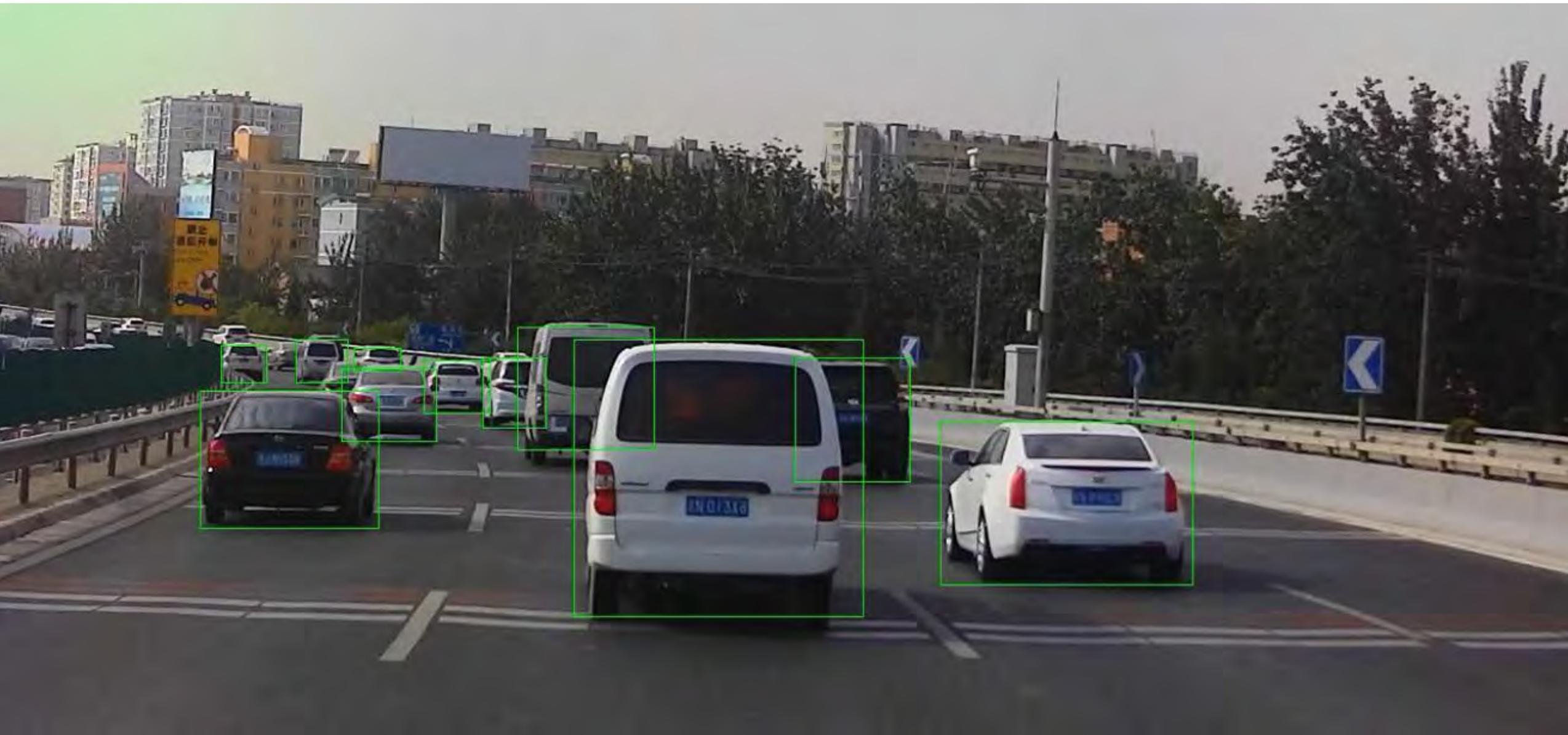
- 图像视频可以解决自动驾驶哪些问题？
  - 车道线识别
  - 行人和车辆检测
  - 红绿灯识别
  - 障碍物或可行驶区域识别
  - .....



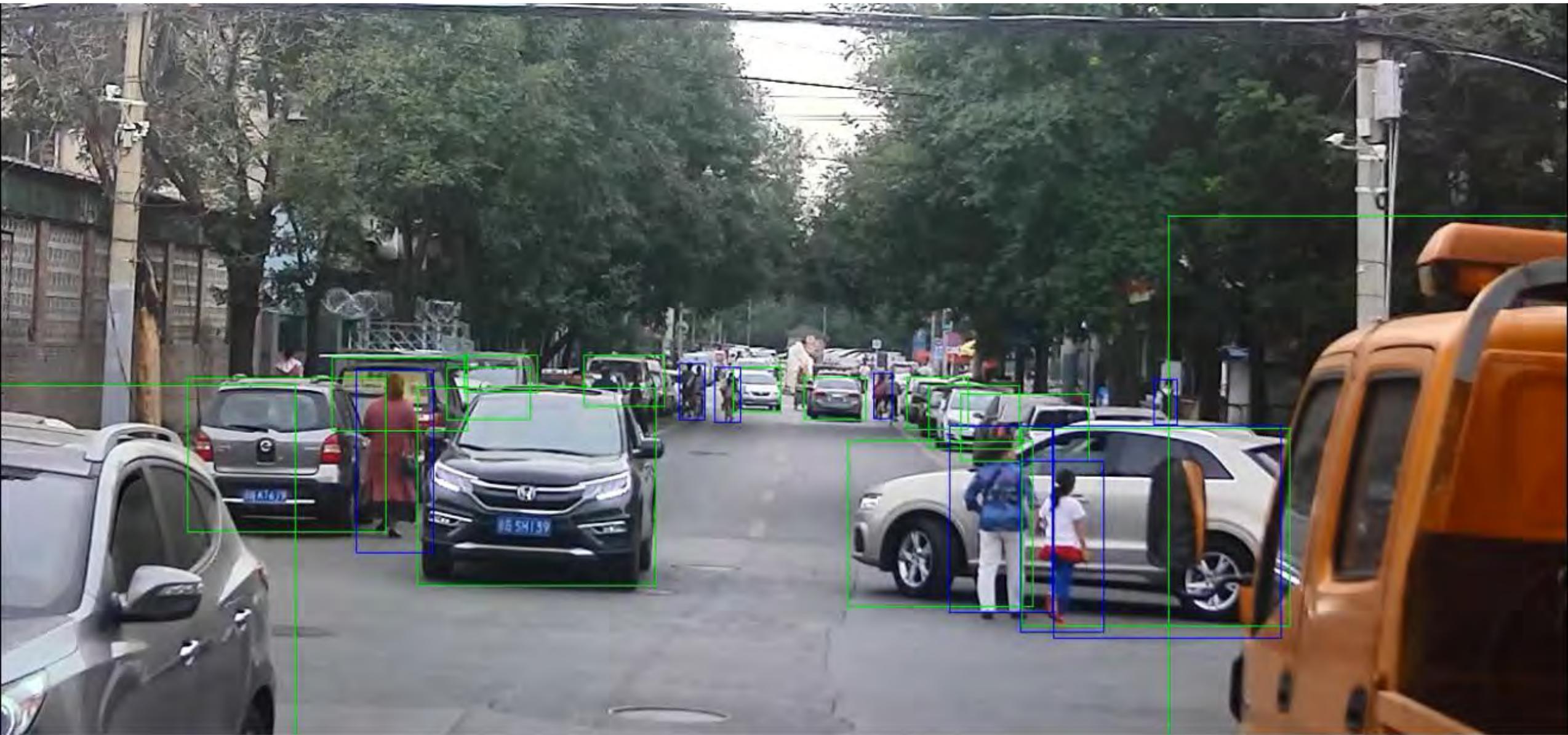
# AI+ 自动驾驶：车道线识别



# ▶ AI+ 自动驾驶：行人与车辆检测



# ▶ AI+ 自动驾驶：行人与车辆检测



# AI+ 自动驾驶：红绿灯识别



# ▶ AI+ 自动驾驶：可行驶区域识别



# Thank You

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