

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



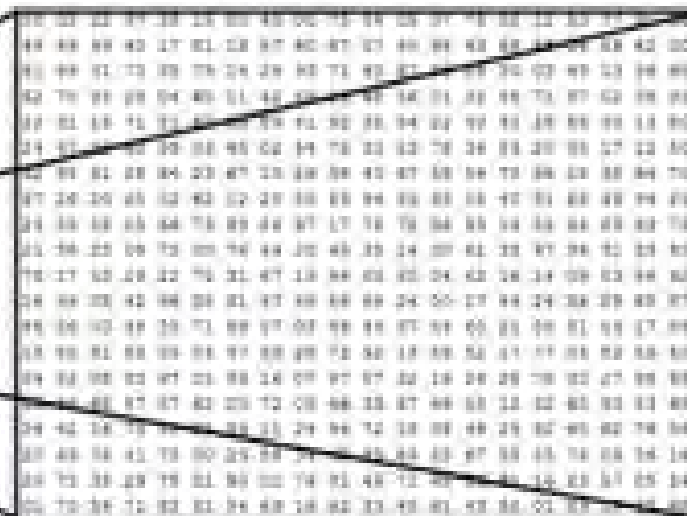


摄像头里的数据宝藏





视觉识别问题中的挑战



What the computer sees



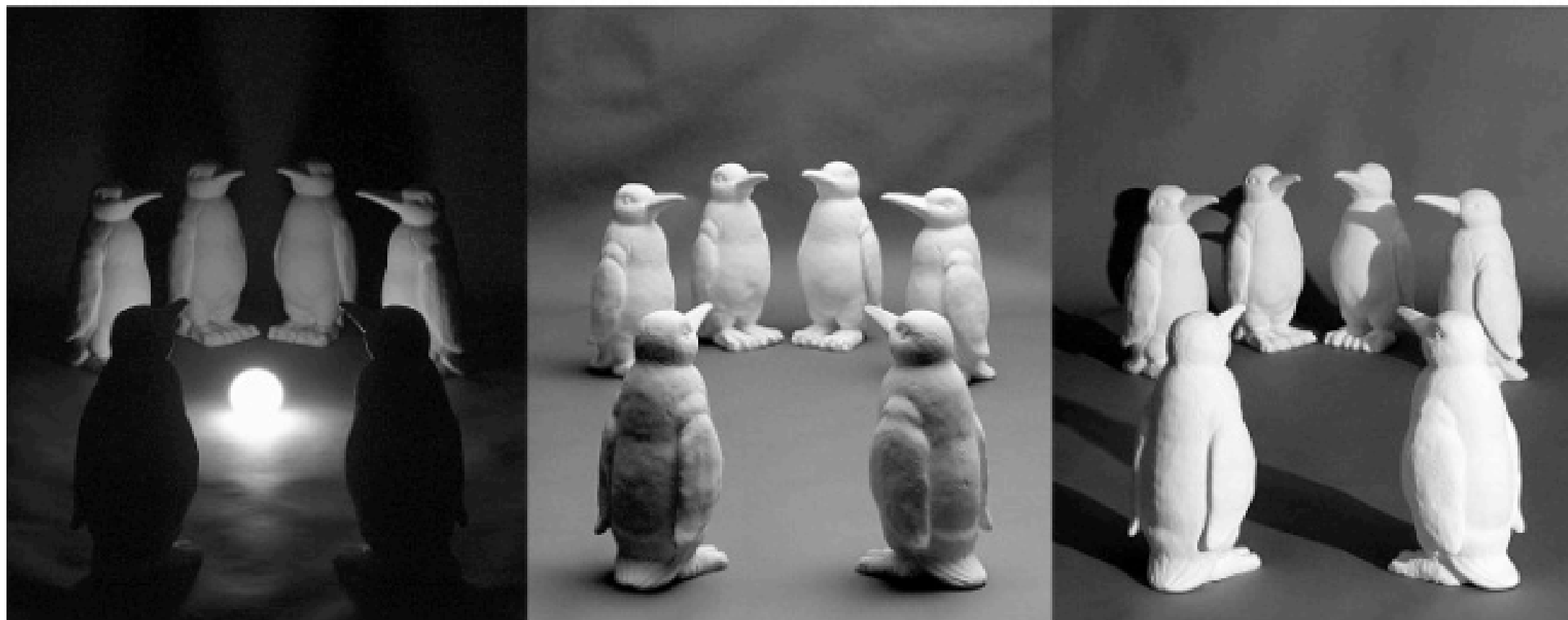
视角变化



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





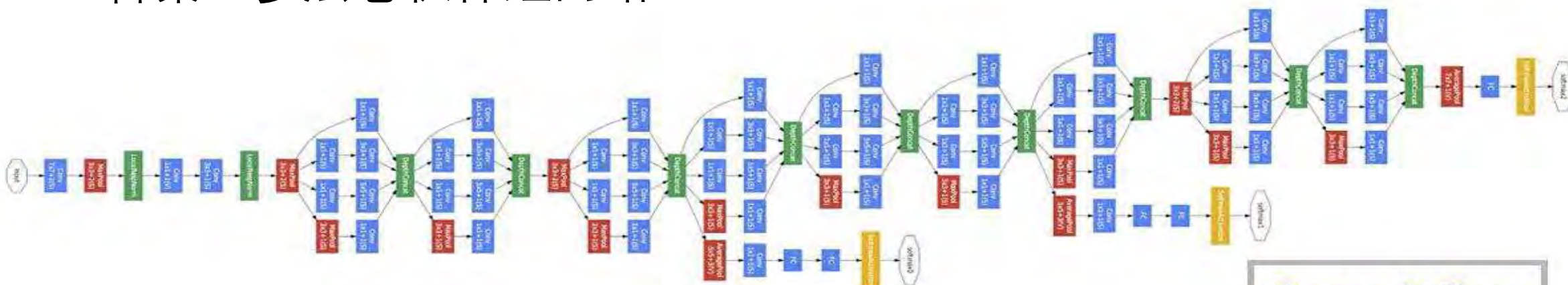
- 如何完成图像识别任务

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

```
    # ???
```

```
    return class_label
```

- 答案：多层卷积神经网络

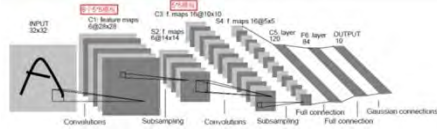


Convolution
Pooling
Softmax

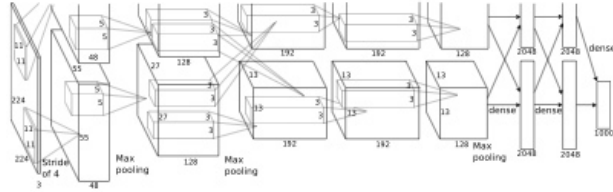


Going deeper with convolution

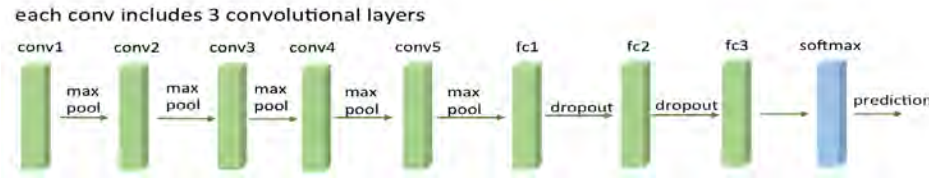
LeNet-5(1989)
5层



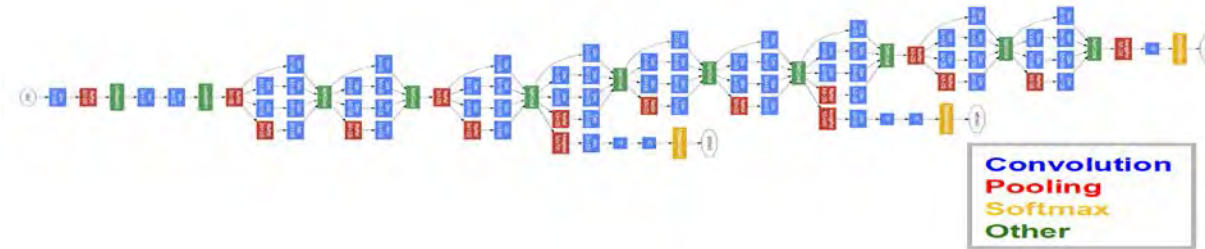
AlexNet(2012)
8层



VGG(2013)
19层



GoogLeNet(2014)
22层



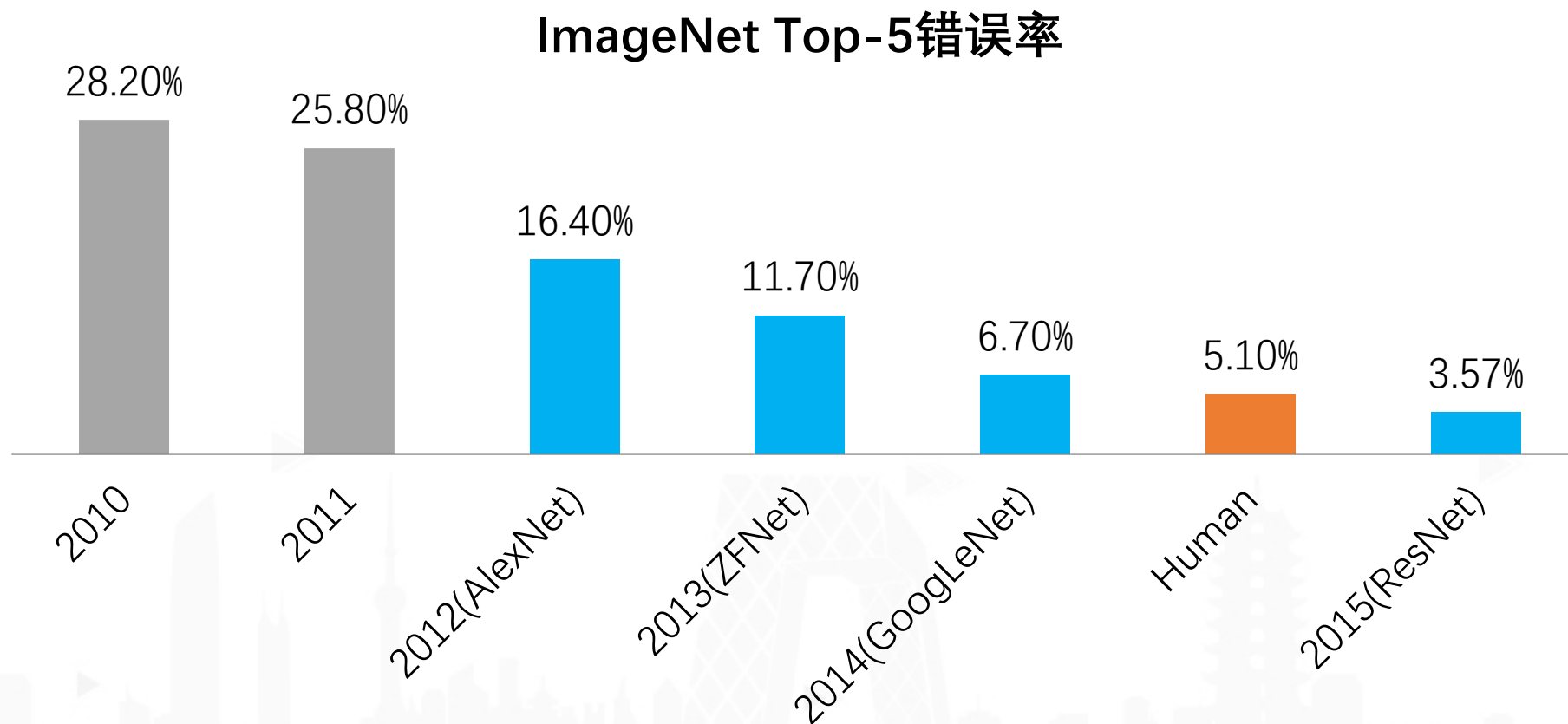
ResNet(2015)
152层



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

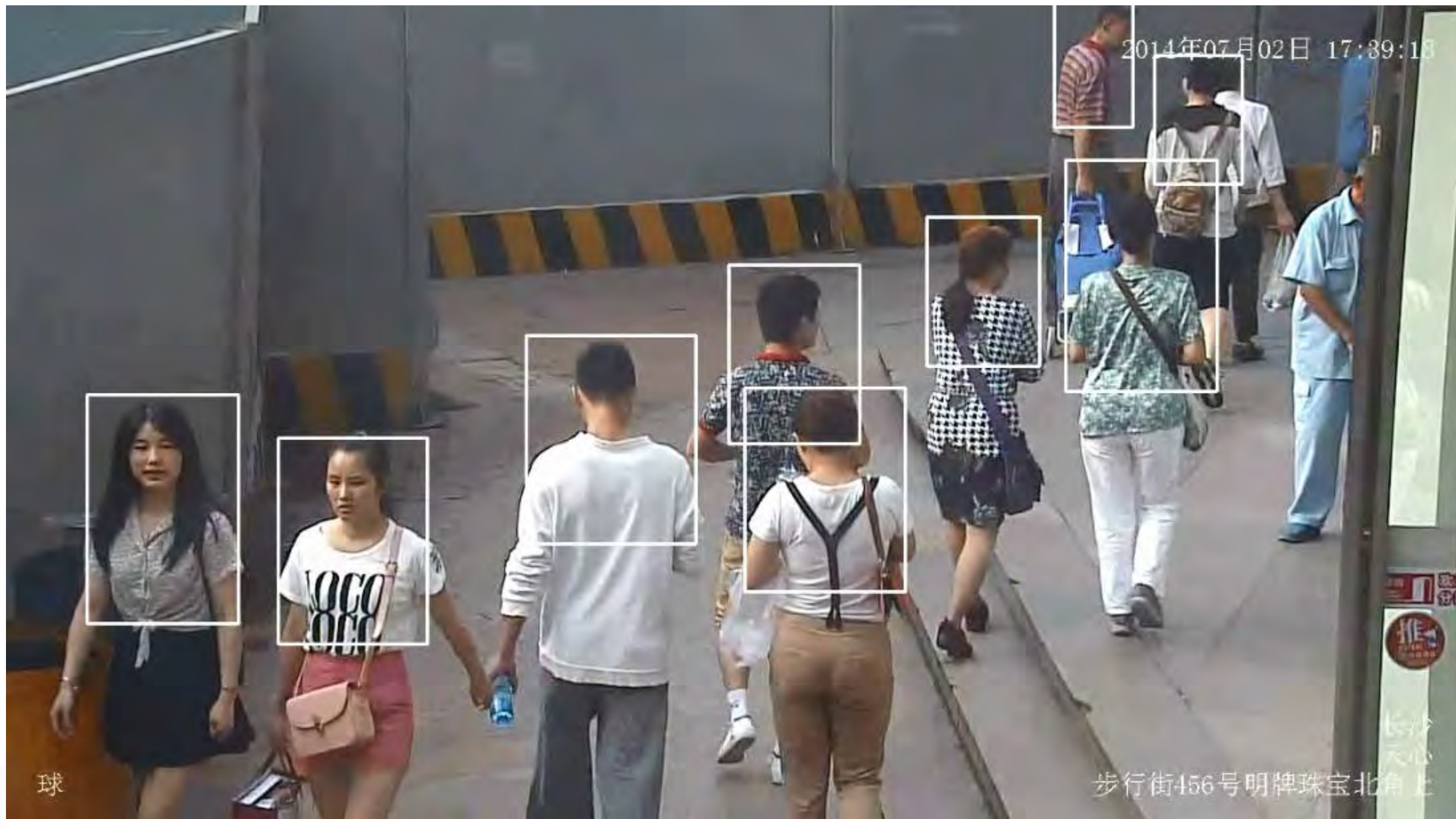


- 安防行业关心的问题
 - 人都在哪里？
 - 这人从哪里来，到哪里去？
 - 这人是谁？
 - 这人在干什么？



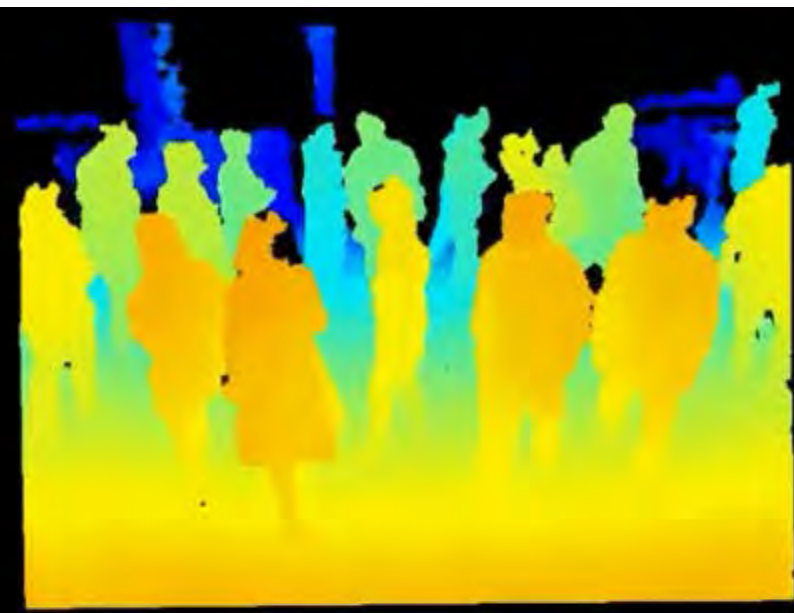


AI+安防：人在哪里？

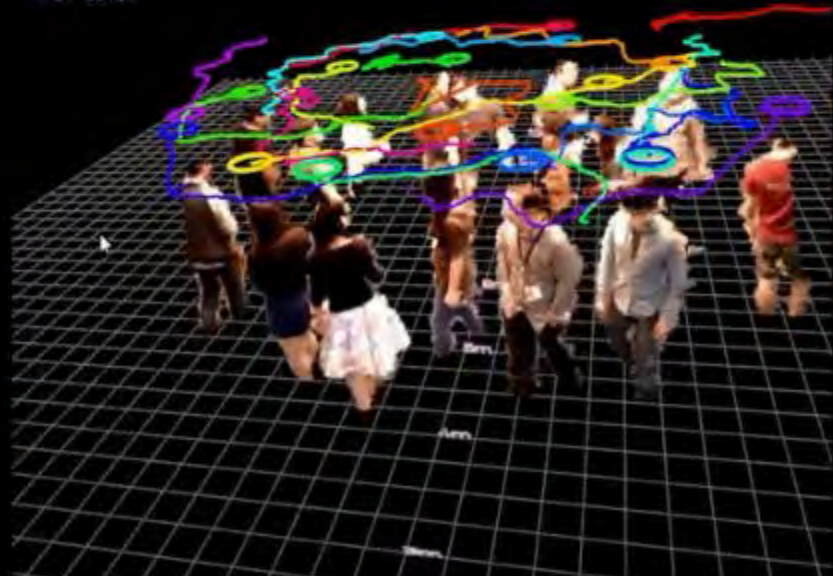
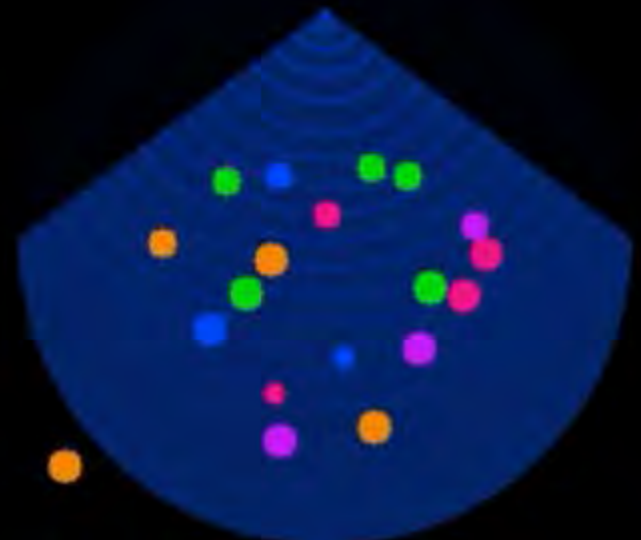




AI+安防：从哪来，到哪去？



FPS: 26.92



AI+安防：这些人是谁？

The image displays an AI facial recognition system interface. On the left, a large video feed shows an outdoor parking lot with a traditional Chinese building in the background. A red bounding box highlights a person in the distance. Below this feed is a horizontal strip of six smaller frames showing the person's face at different times, with timestamps: 11:13:50, 11:13:50, 11:13:50, 11:13:50, 11:13:50, and 11:13:50.

On the right, a panel titled "捕捉人脸" (Capture Face) shows a grid of captured faces. Below each face, a red box indicates the "人脸距离" (Face Distance) in meters. To the right of this panel, a "数据库比对结果" (Database Comparison Result) section shows the system's search results, displaying a reference face and the similarity percentage.

人脸距离 (米)	相似度 (%)
28.6	85%
25.3	81%
44.7	91%



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

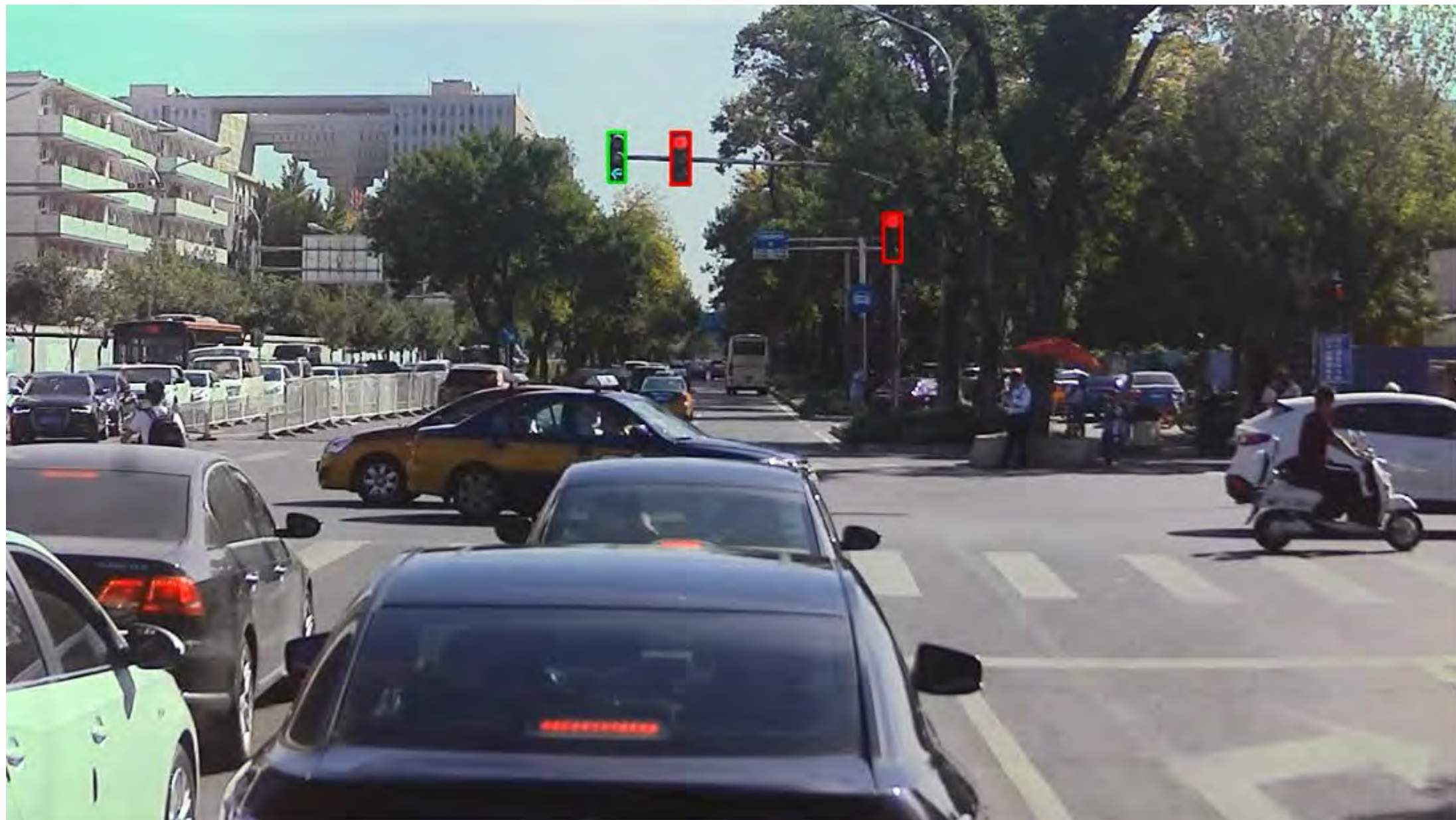


▶ AI+ 自动驾驶：行人与车辆检测





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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聚音视 研修不止于形



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