

中国铁路兰州局集团有限公司“十百千”人才项目

面向智能铁路的人工智能技术与应用 应用与创新（视觉）

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内容

- 背景
- 目标检测和识别
- 图像分割
- 应用
- 应注意的问题

基本研究问题

- 目标检测、分割、识别



困难

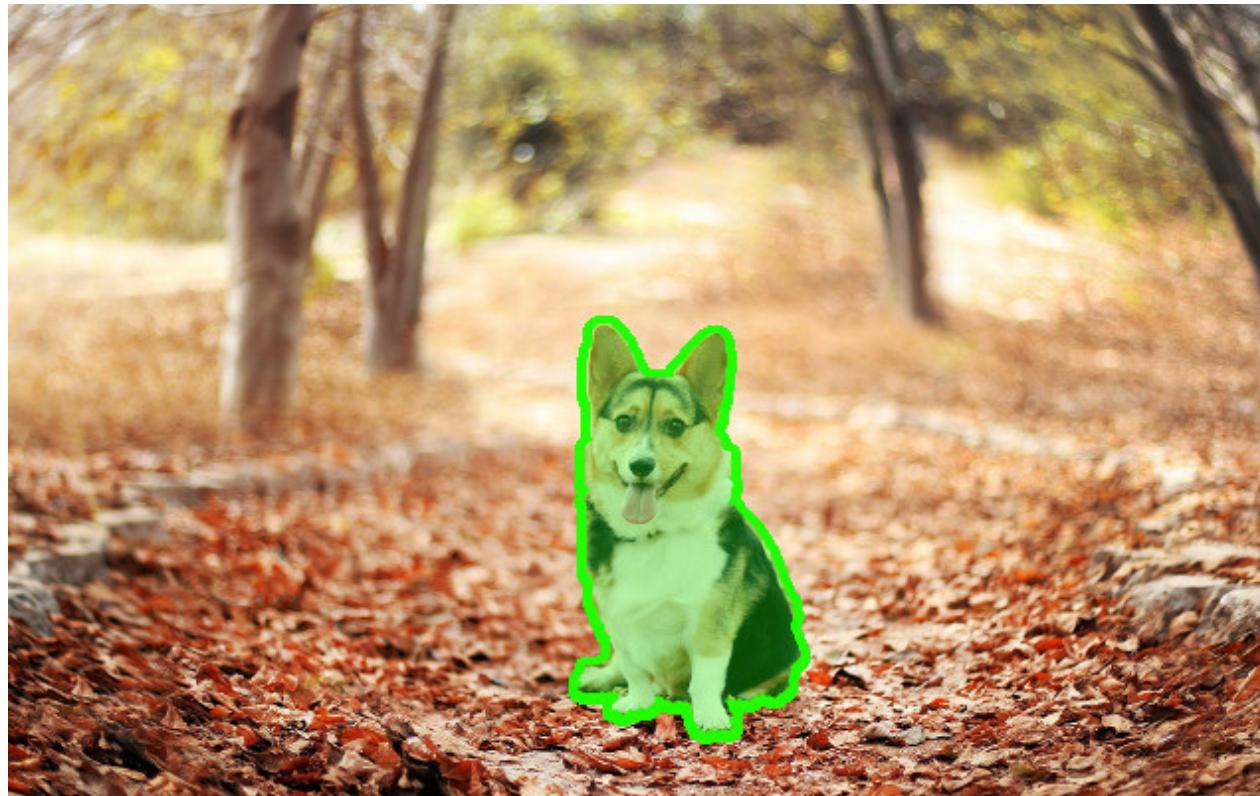
遮蔽、干扰、噪声

拖把狗

蛋糕 dog

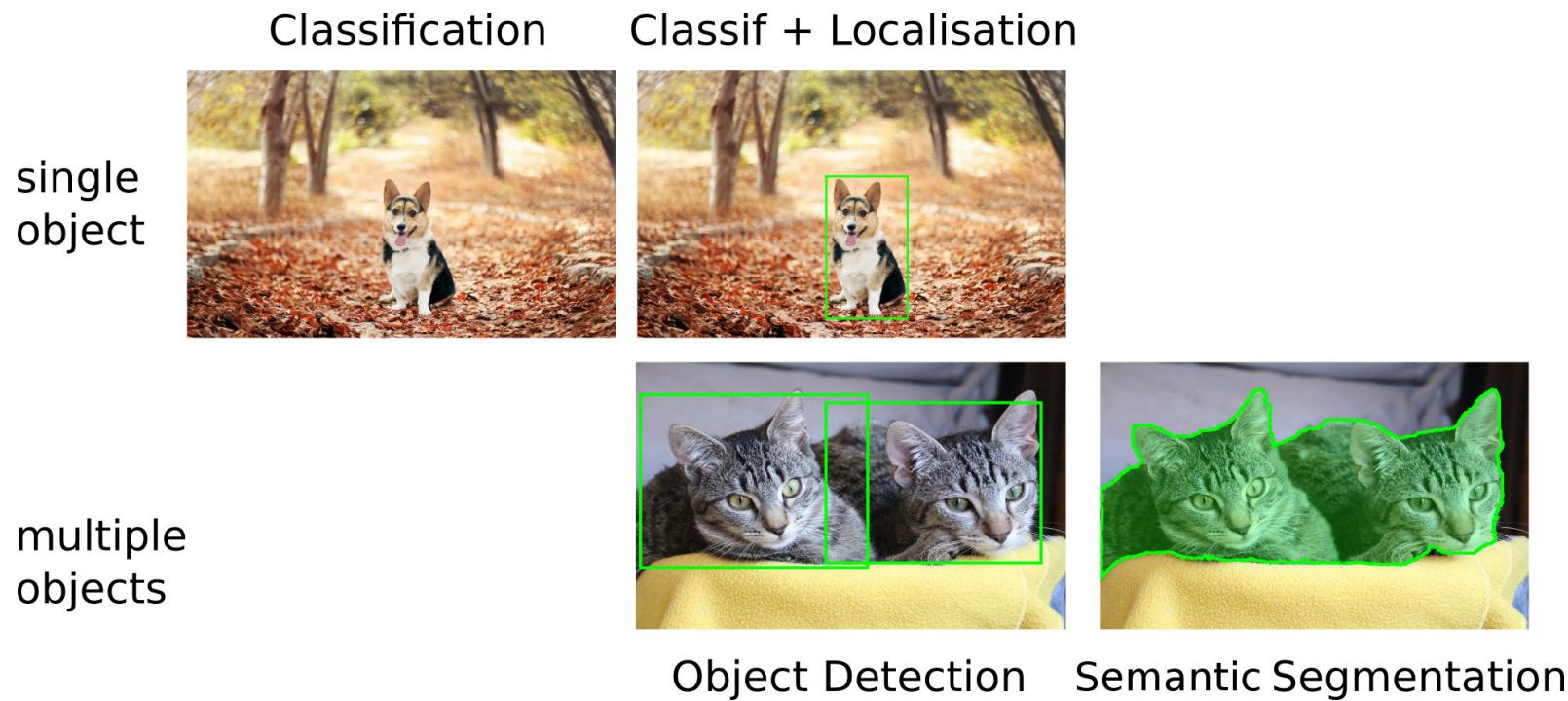
图像分割

- Object Segmentation
- 从图形中提取对象的轮廓



语义分割

- 同一类的多个物体可以分在一起
- 和另一类物体分开

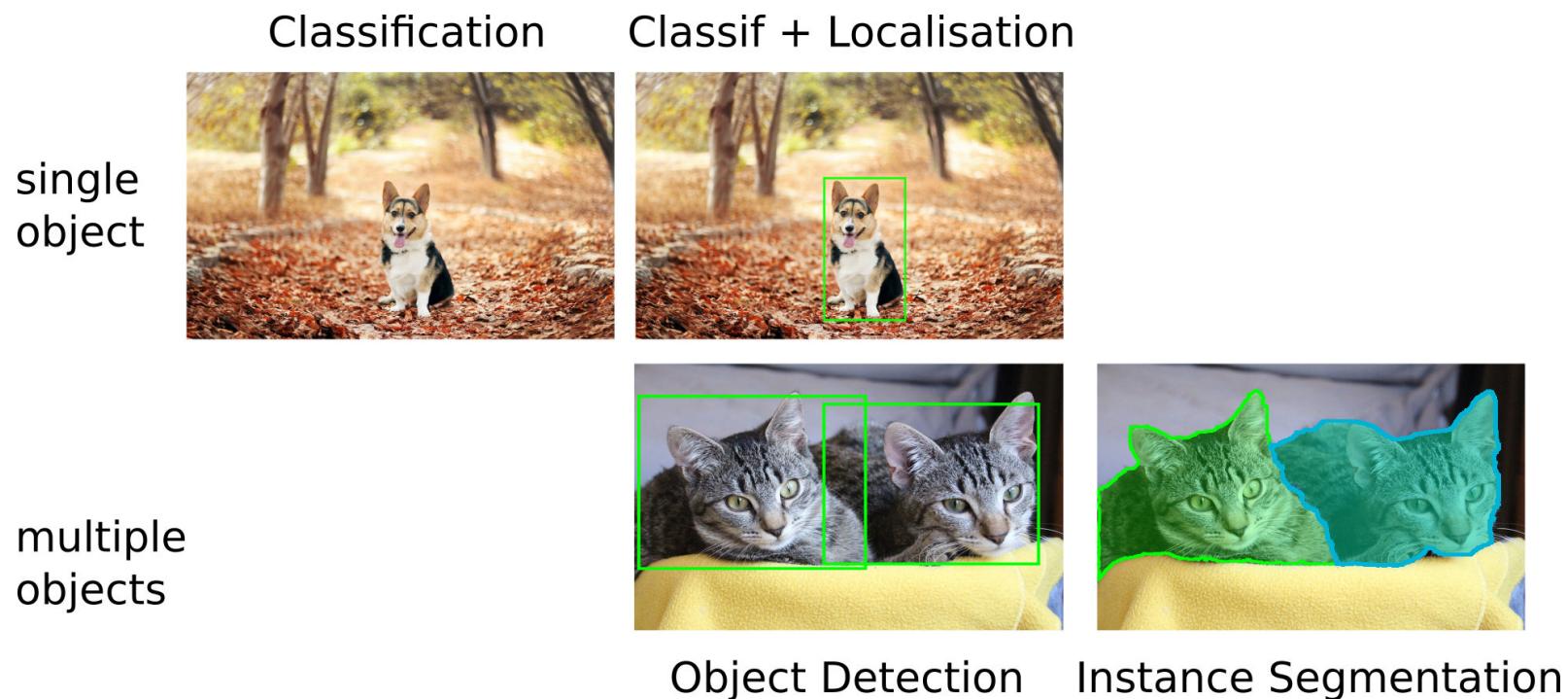


语义分割

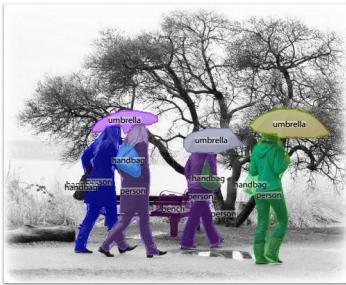
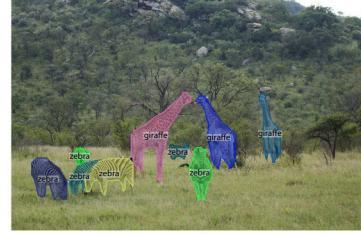
视频 (2017)

实例分割

- 同一类的多个物体，互相也要分开

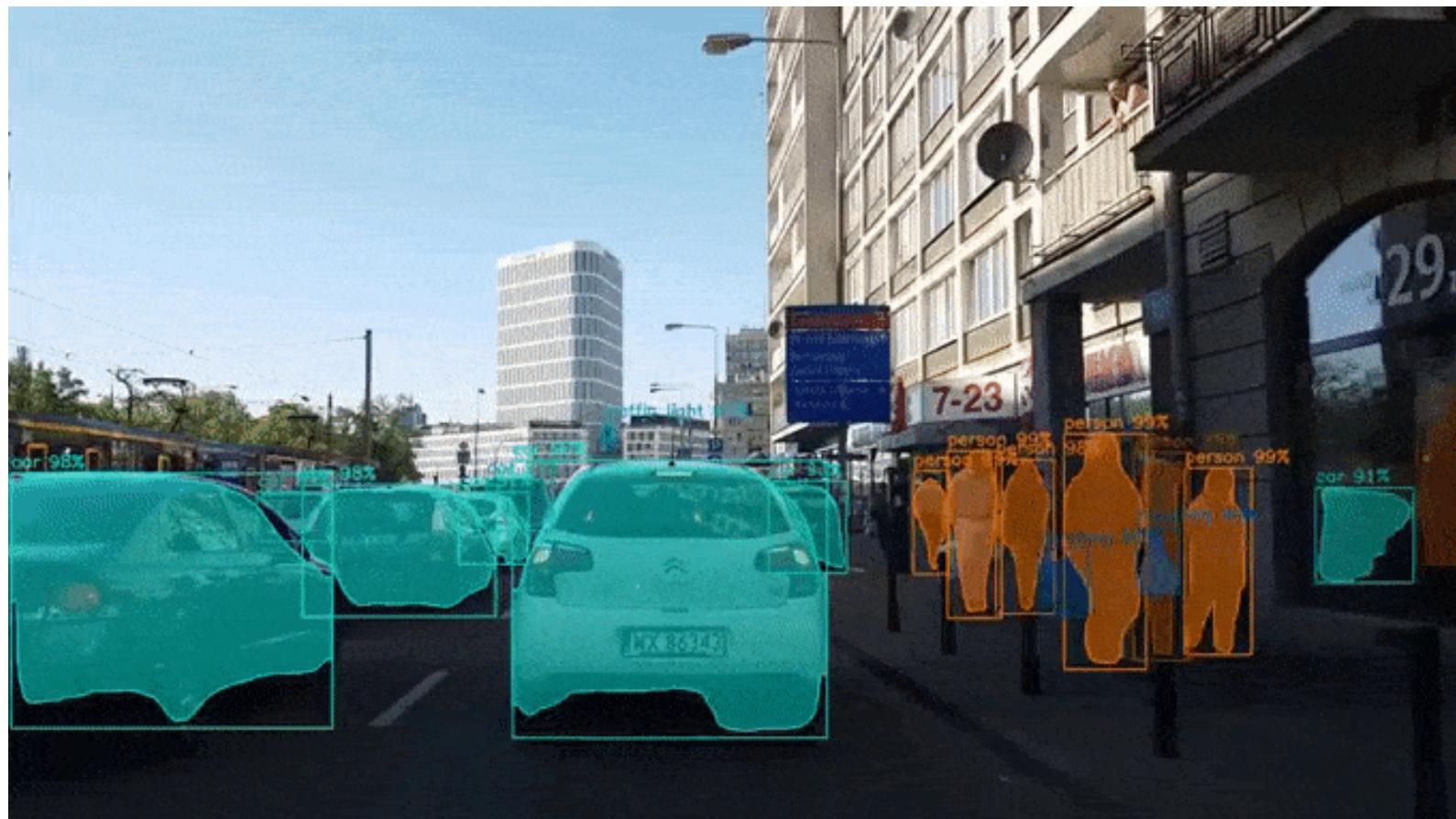


效果



效果

- Mask RCNN效果



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应用

3D建筑物



照片特效



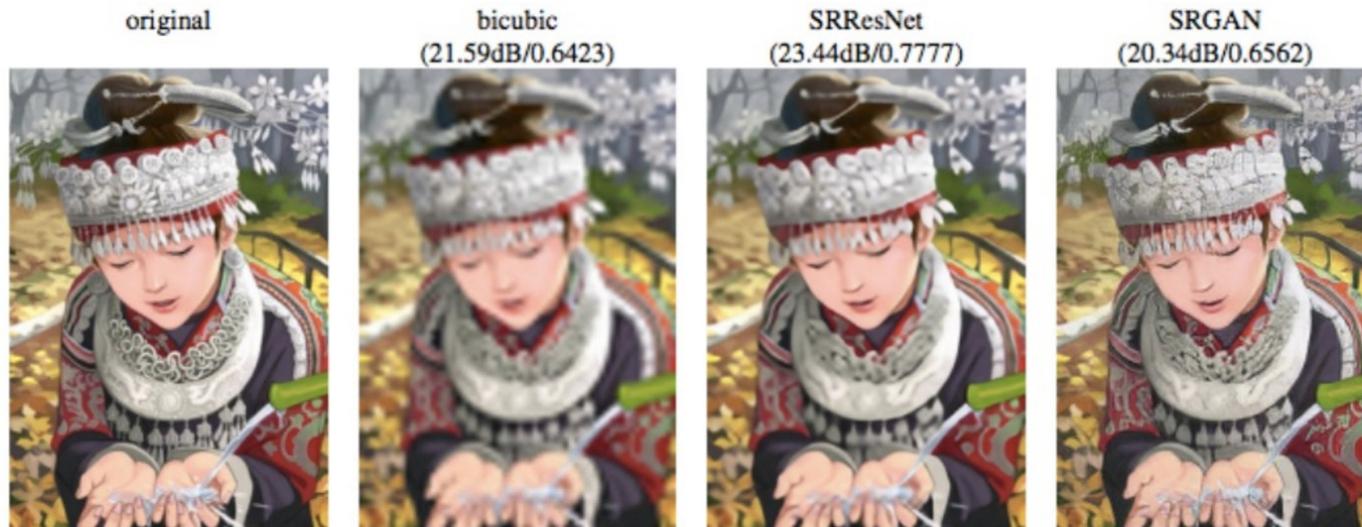
清晰度增强



[DeepDream 2015]



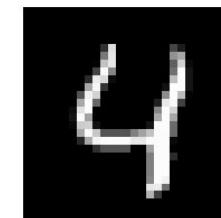
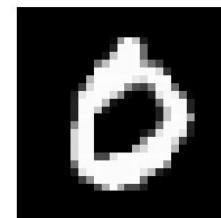
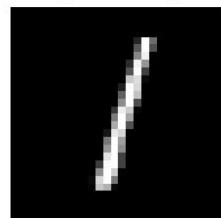
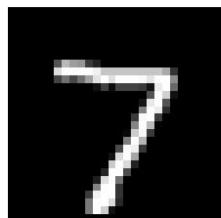
[Gatys 2015]



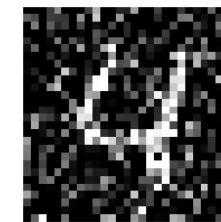
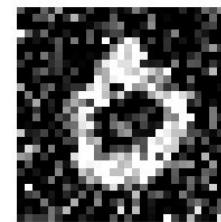
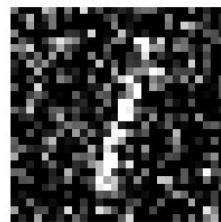
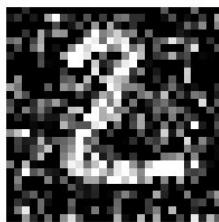
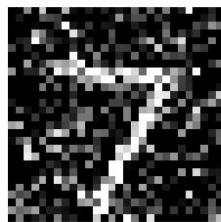
[Ledig 2016]

去噪

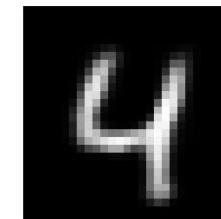
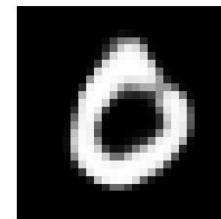
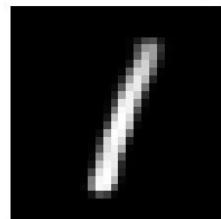
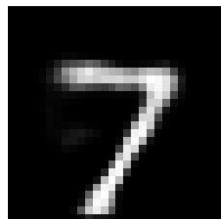
Original Images



Noisy Input

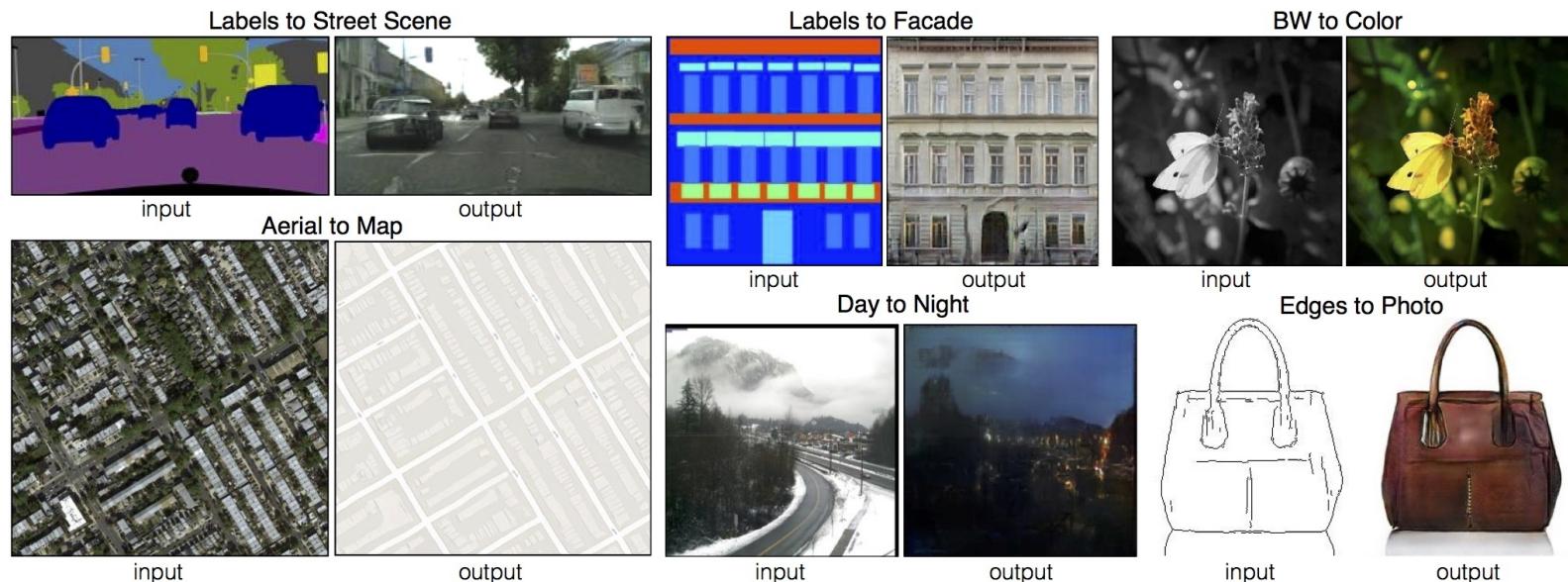


Autoencoder Output

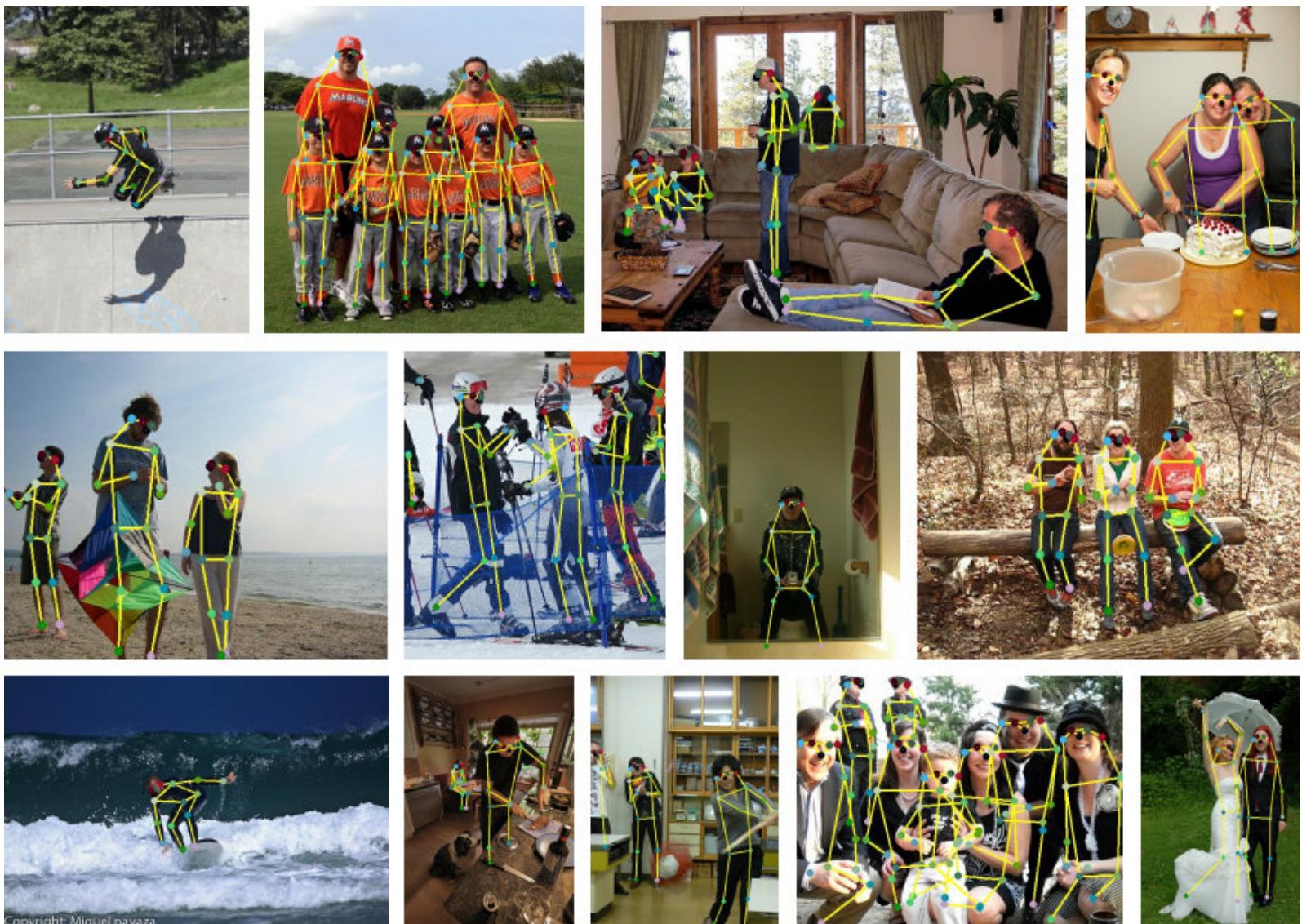


图像转换

- 图像还原、渲染、着色
- 地图提取、场景转换



姿势检测与识别



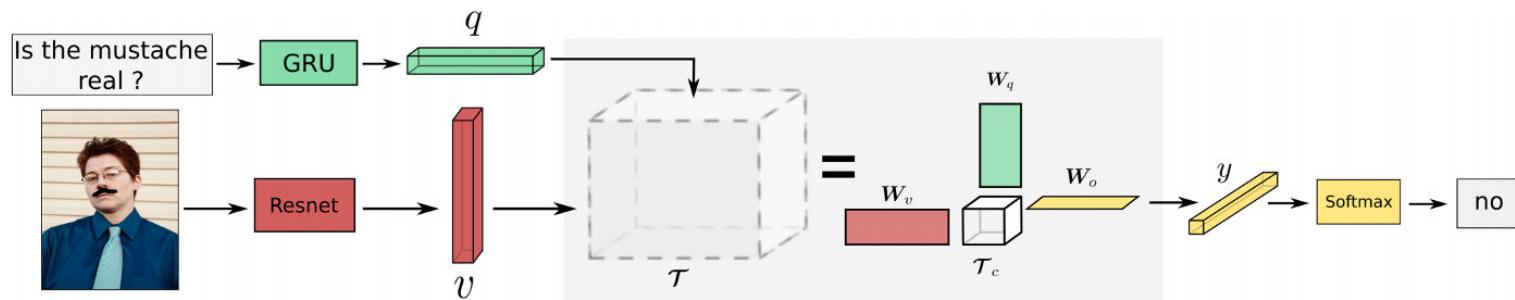
Copyright: Miquel Navaza

情感识别



图像理解

图像 - 问答 - 文本描述



[VQA - Mutan 2017]



"man in black shirt is playing guitar."



"construction worker in orange safety vest is working on road."



"two young girls are playing with lego toy."



"boy is doing backflip on wakeboard."

[Karpathy 2015]

实时图像理解 (2015)

视频

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应注意的问题

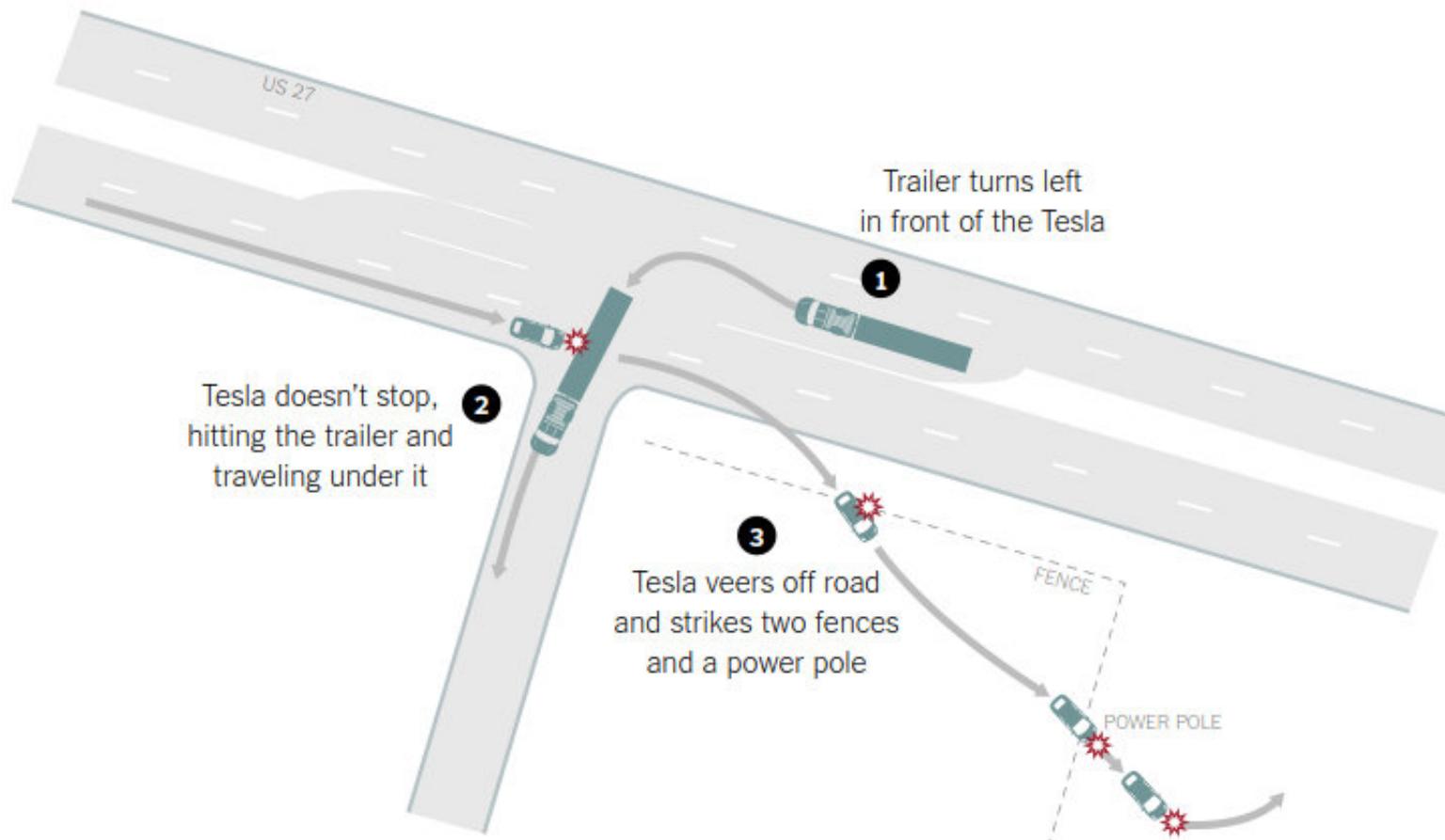
- 准确率
- 隐私保护
- 公平

准确率问题

- 2018年7月，“美国公民自由联盟”测试了亚马逊的人脸识别系统
- 将535名国会议员面孔，对照25000张公开的警方嫌疑犯照片。有28个无辜的国会议员被认成了嫌疑犯
- 对于皮肤较黑的人和女性，人脸识别通常不太准确。所有国会议员的错误率是5.2%，非白人国会议员错误率达39%

识别错误付出生命代价

特斯拉自动驾驶系统未成功识别出白色货车



识别错误付出生命代价

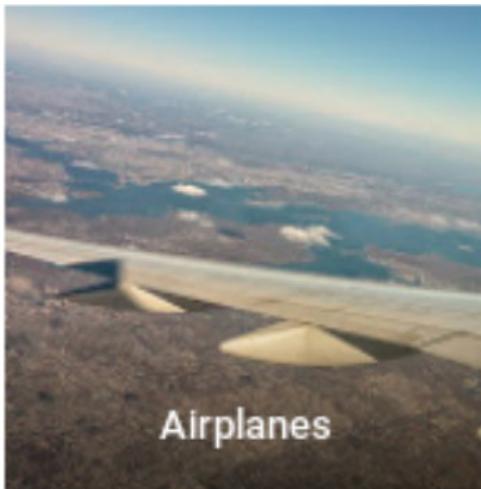


识别错误引起民愤

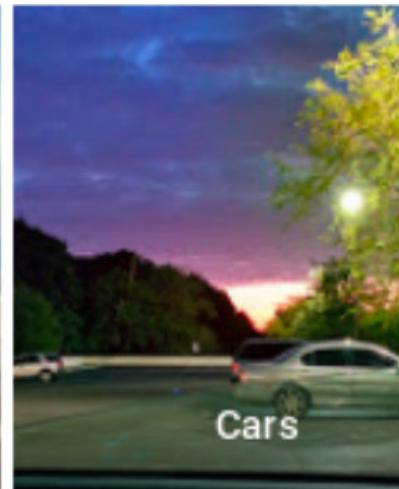
把人识别成大猩猩



Skyscrapers



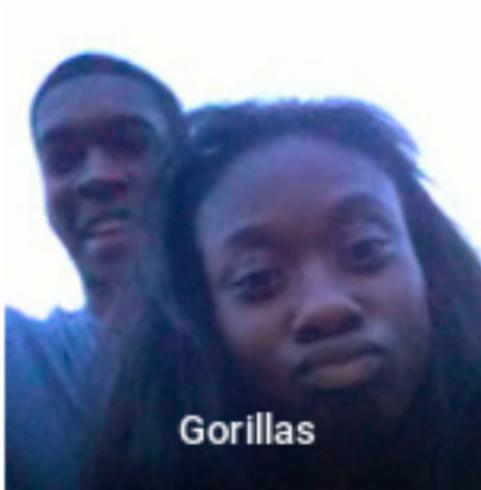
Airplanes



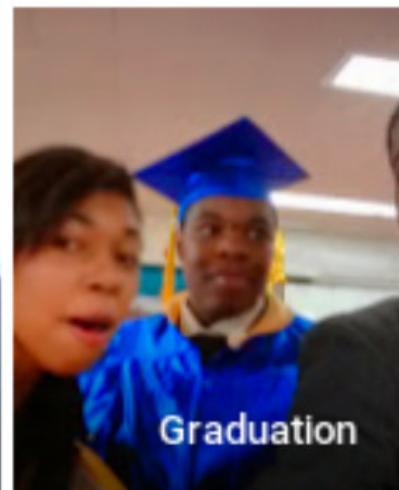
Cars



Bikes



Gorillas



Graduation

隐私保护

- 2019年5月14日，旧金山城市监督委员会以8票对1票通过法令，禁止城市工作人员购买和使用人脸识别技术
- “人脸识别技术危害公民权利和公民自由的倾向大大超过了其声称的好处，这项技术将加剧种族不平等，并威胁到我们不受政府长期监控的生活能力”

小结

- 困难
- 目标检测和识别
- 图像分割
- 应用
- 应注意的问题
 - 准确率、隐私保护、公平