Drone Object Counting

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Motivation

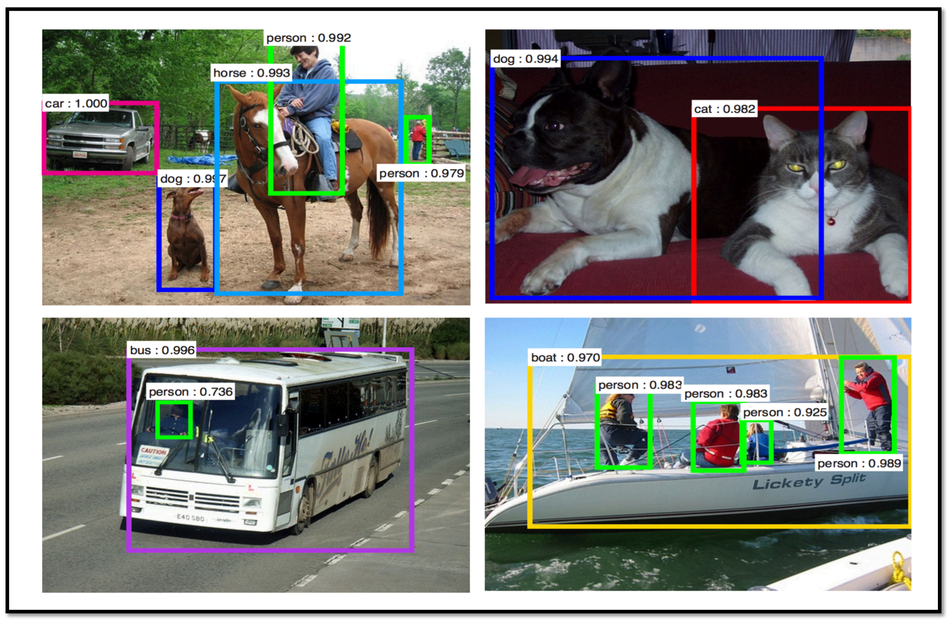
- When we want to control some object numbers in particular place, the simplest way is set a gate and counting at the gate. However, what can we do if we are in outside? It`s hard to surround and set a gate all the place at outside!
- Therefore, I think, if there`s a drone fly through all the place, count for us? This is much simpler than hiring lots people to count or surround all the place at outside.
- A drone fly for us, and it can count and manage some object number for us. And, what`s more, it`s more safely, because it`s flying in the sky. The only thing we need to do is just sit there and wait for it finish its mission. How Good it`s, Right?

Image stitching

- Image Spherical and Plane Warping
- Use ORB for feature finder
- Match feature (BestOf2Nearest)
- Estimate Camera Parameter
- Image Blending
- Easily to get the overlapping part of two image, which can help us avoid to count the same object in two overlap image.

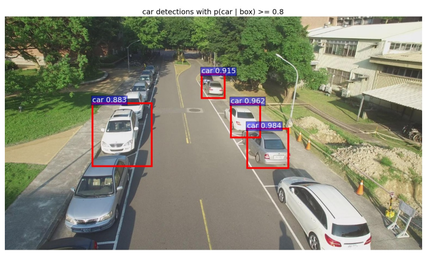
Faster RCNN

- Region Proposal Network + Object Detection
- Sharing Convolutional Feature for Region Proposal and Object Detection
- Almost Real time for image object detection
- About 73.2% mAP in PASCAL VOC 2007
- Running time for proposals is just 10 milliseconds



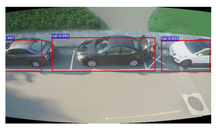
Special Moving and Recording

- Because Faster RCNN will fail to distinguish there`re two object when two object is too close, so I choose to record the video by side not by front, and it`s truly improve the counting accuracy, below is my own experiment.
- What`s more, if we record the video by side, it`s more easily to do image stitching and object counting.



Experiment & Result

I have recorded three videos, one is recorded from the side of the cars , another is recorded from more height, and the last one is recorded the front side of the cars. Below is the result of my experiment

	Side	**More Heigth from Side** 	**Front**
Human	10	29	29
Drone	10	27	32

Reference:

- **Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks** - Shaoqing Ren, Kaiming He, Ross Girshick, and Jian Sun
- **Automatic Panoramic Image Stitching using Invariant Features** - Matthew Brown and David G. Lowe
- **Recognising Panoramas** - M. Brown and D. G. Lowe