HoG + Linear SVM for object detection

kkgreen1964 **Aug 10**

Morning all,

As I am reviewing the HoG descriptor for object detection. What is the thoughts of the community regarding use the HoG descriptor to recognize Airplanes? I am learning that the downside of the HoG descriptor is that it is rotationally sensitive. Is the way to utilize this descriptor so that it isn't sensitive? Or, does it make sense to use SURF + FREAK, and then Linear SVM?

Thoughts anyone?

Adrian Chief PyImageSearcher **Aug 11**

Rotational is a huge problem for many object detection algorithms. Lately, I've been trying to wrap by head around the concept of training a CNN that learns rotation invariant filters on very similar object classes. It's a real struggle.

Local invariant descriptors and keypoint detection are good methods to overcome rotation issues, but you also might just want to try the Deep Learning feature extraction lessons (specifically, any lesson that mentions "OverFeat" and then throw the extracted features into a SVM.

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kkgreen1964 **Aug 12**

Good evening Adrian,

I hope all is well for you. This has been a great week, where I was able to marinate my *brain* with your great mental "*CV/ML*" food!

Here is my plan so far:

1. Use SURF / FREAK as my keypoint detector/extractor
2. Apply BOVW
3. Classify using linear SVM

I have a co-worker that has already has applied CNN with good success. In my new role, I am wanting to first explore the type of object detection performance we can get using alternative approaches. After applying SVM and

seeing what kind of performance we are able to achieve, I then want to explore decision forests and other types of CNNs. Also, I will send you some sample images to look at tomorrow for you to look at when you have a moment.

Any thoughts on my plan so far? I would love to hear your thoughts.

And, Happy Friday!

All the best,

Kev

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kkgreen1964 **Aug 12**

I forgot to mention that my colleague is exploring the usefulness of pulling out deep features to then be fed into other ML classifiers, such as SVM. So my contribution is to see how keypoint detection/extraction compares and contrasts.

Adrian Chief PyImageSearcher **Aug 14**

> kkgreen1964:
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> I forgot to mention that my colleague is exploring the usefulness ofpulling out deep features to then be fed into other ML classifiers, such asSVM

Do your recall which network architecture your colleague is using? And what training dataset was used to train the network?

The reason I ask is because lessons 8.7.1-8.7.4 can likely be used to mimic and even improve upon your colleagues work. I imagine your colleague used a network pre-trained on the ImageNet dataset which has a fair number of airplane-related class labels. If you extract features from images using these pre-trained networks, you'll likely obtain fairly good accuracy.

You can improve upon your colleagues method by using different architectures or even *multiple* architectures and creating an ensemble of classifiers. Depending on your dataset, you could even apply "fine-tuning" as well.

Regarding keypoint detection and local invariant description, my gut tells me that the CNNs will likely obtain better accuracy in this case. I'm not 100% confident without seeing the dataset, but given that I *think* your colleague used a CNN trained on ImageNet which contains a fair amount of airplane classes, these CNNs will do a good job of classifying "airplane" vs. "not airplane".