

CS294-164 Report - Week 6

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October 23, 2019

1 Modern Trends in Hyperspectral Image Analysis: A Review

1.1 Main Idea

The paper focuses on the basics of hyperspectral image analysis and also its applications in food quality assessment, medical diagnosis and image guided surgery. Recent research on the use of hyperspectral imaging for examination of forgery detection in questioned documents, aided by deep learning, is also presented. Hyperspectral imaging is a spectral sensing technique where the object is photographed using several well defined optical spectral bands in a broad spectral range. Hyperspectral images are characterized by their spatial as well as spectral resolution. The spatial resolution measures the geometric relationship of the image pixels to each other while the spectral resolution determines the variations within image pixels as a function of wavelength.

1.2 New Ideas based on readings

It would be interesting to see what design changes to existing neural networks would work better with hyperspectral images. Learning better representations of hyperspectral images and also understanding which features are important to a specific task is an interesting research direction.

2 Processing of chromatic information in a deep convolutional neural network

2.1 Main Idea

The paper analyzes how color information is processed in different layers of AlexNet. The authors also compare this color processing mechanism in deep network with color processing in primates and their findings reveal that there exist many correlations between the two. From their experiments they gather that AlexNet essentially performs a principal components analysis on the chromatic properties of the input signals in its first layer.

2.2 New Ideas based on readings

As a followup to this work, it would be interesting to see if other deep learning models similar to AlexNet follow a similar trend when it comes to processing color. Authors also mention that a degree of variability in the features learned by AlexNet from one training instance to another. It is unclear if images in ImageNet are sufficient to draw conclusions or it's necessary to collect data from the real world (in the wild).