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Health and Computing

Summaries

**Grad-CAM: Visual Explanations from Deep Networks via Gradient-based Localization**

This paper focuses on the need for transparency on why CNN based models made a certain prediction so they can be more easily diagnosed when something goes wrong, and maybe seem less scary to the overall population. To that end, they introduce Gradient-weighted Class Activation Mapping, or Grad-CAM which shows how any CNN came to it’s decisions. They then go on to show proof of concept and an example.

**Error Corrective Boosting for Learning Fully Convolutional Networks with Limited Data**

Here the authors introduce a method to create auxiliary labels for unlabeled medical data, error corrective boosting, and a new Fully convolutional neural network architecture (SkipDeconv-Net). Creating labels allows for the bypassing of the very time intensive step of an expert sitting down with a bunch of data and labelling it themselves one by one. The error corrective boosting looks at classes with a fault in their segmentations, while the SD-Net is a new architecture for brain segmentation.

**Predicting Depth, Surface Normals and Semantic Labels with a Common Multi-Scale Convolutional Architecture**

With this paper, the authors introduce a single multiscale convolutional network architecture with an eye towards depth prediction, surface normal estimation, and semantic labeling. This new approach helps simplify the implementation of other systems that require multiple modalities, as well as allows computation to be shared between modalities, making it more efficient.

**Deep Residual Learning for Image Recognition**

The authors of this paper reveal a residual learning framework to make it easier to train deep neural networks which are inherently hard to train. They explicitly fit stacked layers to a residual mapping, making it easier to optimize the residual mapping than to optimize the original. Furthermore, they claim the residual networks can gain accuracy from greatly increased depth.

**Gradient-Based Learning Applied to Document Recognition**

This older paper made the case for, automatic learning or more specifically, gradient-based learning and less on hand designed heuristics. They show that learning machines looking at individual pixels can replace an older method called hand-crafted feature extraction, where the problem of the designer coming up with an appropriate set of features. Much like second paper generating labels to cut out time intensive processes, this aimed to do the same by introducing Graph Transformer Networks.

**CNN Features off-the-shelf: an Astounding Baseline for Recognition**

These researchers focused on different recognition tasks using the publicly available code and model of the OverFeat network which performs object classification. They extracted features from this network to look at image classification, scene recognition, fine grained recognition, attribute recognition, and image retrieval with a diverse set of datasets. The surprise was that, when looking at increasingly different datasets, it outperformed other systems which were more finely tuned to those specific datasets.