Lecture 5 : Paper Work

Convolutional Neural Networks

Prasoon Raghuwanshi (15MI440)

1. Rikiya Yamashita, Mizuho Nishio, Richard Kinh Gian Do, Kaori Togashi, " Convolutional neural networks: an overview and application in radiology" https://doi.org/10.1007/s13244-018-0639-9.

   Convolutional neural network (CNN), a class of artificial neural networks that has become dominant in various computer vision tasks, is attracting interest across a variety of domains, including radiology. CNN is designed to automatically and adaptively learn spatial hierarchies of features through backpropagation by using multiple building blocks, such as convolution layers, pooling layers, and fully connected layers. This review article offers a perspective on the basic concepts of CNN and its application to various radiological tasks and discusses its challenges and future directions in the field of radiology. Two challenges in applying CNN to radiological tasks, small dataset and overfitting, will also be covered in this article, as well as techniques to minimize them. Being familiar with the concepts and advantages, as well as limitations, of CNN is essential to leverage its potential in diagnostic radiology, with the goal of augmenting the performance of radiologists and improving patient care.

2. Alex Krizhevsky, Ilya Sutskever, Geoffrey E. Hinton, " ImageNet Classification with Deep Convolutional Neural Networks" https://papers.nips.cc/paper/4824-imagenet-classification-with-deep-convolutional-neural-networks.pdf

   In the paper, the group discussed the architecture of the network (which was called AlexNet). They used a relatively simple layout, compared to modern architectures. The network was made up of 5 conv layers, max-pooling layers, dropout layers, and 3 fully connected layers. The network they designed was used for classification with 1000 possible categories.

3. Matthew D. Zeiler, Rob Fergus, "Visualizing and Understanding Convolutional Networks" https://arxiv.org/pdf/1311.2901v3.pdf

   In this paper titled "Visualizing and Understanding Convolutional Neural Networks", Zeiler and Fergus begin by discussing the idea that this renewed interest in CNNs is due to the accessibility of large training sets and increased computational power with the usage of GPUs. They also talk about the limited knowledge that researchers had on inner mechanisms of these models, saying that without this insight, the "development of better models is reduced to trial and error".