

Frequency Domain Representation of Convolutional Neural Networks

ABSTRACT FOR THE TALK

My Talk will deal with the idea of translating the concept of convolutional neural networks to the frequency domain as presented in my bachelor thesis.

The talk will be structured as follows:

If needed, I will start with a short reminder on the topic of convolutional neural networks. Afterwards the main idea of translating convolutional neural networks to the frequency domain will be motivated. This will be followed by a brief consideration of the advantages and hurdles of such a concept.

We will then concretise the concept and introduce ways to overcome said hurdles in a beneficial way. In this manner we will be looking at the three main operations of convolutional neural networks and possible analogues in the frequency domain.

First we will take a closer look at a possible representation system for the convolutional filters in the frequency domain using shearlets.

This will be followed by thoughts on possible activation functions and frequency pooling.

Lastly we will discuss the issue of defining the backpropagation on the complex plane.

In the end, numerical results and possible applications will be presented.