Implementing learnable Activation Functions in Google's Tensorflow

Bachelor Thesis / Master Project

![Graphs](image)

(a) classical (ReLU, tanh)  (b) radial basis functions  (c) linear/spline interpolated

Objective:

Today's convolutional neural networks consist typically of two fundamental building blocks, i.e., trainable convolutions and fixed activation functions (tanh, ReLU, ...). The combination of these simple blocks enables the construction of complex, trainable models. Recently, also trainable activation functions have been successfully applied to image reconstruction tasks [1, 2].

The aim of this project is to implement trainable activation functions in the tensorflow (TF) framework. Your task is to first familiarize yourself with TF, especially the implementation of custom operators. Then you extend TF by implementing trainable activation functions using radial basis functions and interpolation based methods (linear, cubic spline). Finally, you need to evaluate the performance of your implemented activation functions.

Qualifications:

- Student of Information and Computer Engineering, Computer Science, Software Engineering and Management
- Basic knowledge of Machine Learning
- Programming skills in Python and C++ (optionally Cuda)

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References


[https://www.tensorflow.org/](https://www.tensorflow.org/)