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# Deep Learning on SpiNNaker: Report

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**Abstract**

# 1 Introduction

This paper concerns itself with the dissertation project: "Deep Learning on SpiNNaker", which will be conducted in the period from May 2019 to August 2019 as the final work for the author to achieve his Master of Science in High Performance Computing with Data Science. The report is mostly a summary of the preliminary work conducted in the months before the actual work on the disseration will be conducted. The finindings of the preliminary work and the changes made to the original project scope are the focal point of this report. The original title of the disseration project was "A Tensorflow Backend to SpiNNaker" but the preliminary work conducted to this point show, that the scope will be redirected from implementing a backend for tensorflow—a library for running fast linear algebra operations on distributed, heterogenous systems, mainly designed for implementing computationally demanding machine learning algorithms like deep learning in a fast manner (Abadi et al., 2015)—to an approach focused on implementing deep learning directly on SpiNNaker. Because of SpiNNakers specialized design, which works rather contrary to that of tensorflow and current hardware trends for building accelerators for deep learning, interfacing between SpiNNaker's runtime and tensorflow was deemed too difficult and not beneficial. Instead, this dissertation aims at implementing deep learning directly on SpiNNaker, providing an interface to the well known deep learning library Keras (Chollet et al., 2015). Mario Antonioletti and Alan Stokes (2019) shows the original disseration project's scope.

This paper starts with presenting a brief outline of the background of the dissertation, providing a discription of the technologies important in this report: SpiNNaker, deep learning and tensorflow in Section 2. Also, the updated goal for the dissertation is given. Afterwards, in Section 3, some papers and other literature crucial for the further doings for this project are presented. The paper continues by giving a work plan in Section 4, before presenting a risk analysis in Section 5. Afterwards the preliminary findings outlined above are disscussed in more depth in Section 6. At last, Section 7 gives the final project proposal and Section 8 will contain a review of a related dissertation project done in 2018: "Deep Learning Performance on Different Architectures" by Spyro Nita (Nita, 2018).

## 2 Background

## 3 Related Work

## 4 Work Plan

## 5 Risk Analysis

## 6 Preliminary Findings

## 7 Final Project Proposal

## 8 Deep Learning Performance on Different Architectures: Review

## References


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