DEPARTMENT OF INFORMATICS

TECHNISCHE UNIVERSITÄT MÜNCHEN

Master's Thesis in Robotics, Cognition, Intelligence

Evaluation and Generalization of Capsule Networks in Neurorobotics

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I confirm that this master's thesis in robotics, cognition, intelligence is my own work and I have documented all sources and material used.

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Acknowledgments

Abstract

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1 Introduction

2 State of the Art

This chapter presents an overview of state of the art approaches to object recognition, while focusing on two families of architectures, which are motivated quite differently. Object recognition techniques based on convolutional neural networks (*CNN*s) currently dominate the field, giving state of the art performance on many datasets [1, 2]. CNNs however, are only loosely based on biological neurons. Spiking neural networks (*SNN*s) on the other hand, try to mimic the physical properties of neurons more closely and are therefore biologically more plausible models [3]. Generally speaking, CNNs may be regarded as a more engineering-based approach (or top-down), while SNNs are motivated by results from neuroscience and biology (bottom-up approach).

2.1 Deep Learning for Object Recognition

2.1.1 Convolutional Neural Networks

2.1.2 Spiking Neural Networks

2.2 Limits of Deep Learning Approaches

3 Capsule Network Architectures

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Bibliography

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