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The thesis will be performed at the IBM Research-Zurich in Rüschlikon.



Master Projects



Neurosymbolic Architectures to Approach Human-like AI

Introduction

Neither symbolic AI nor deep neural nets alone have reproduced the kind of intelligence expressed in humans. This is because, symbolic AI fundamentally lacks the ability to learn directly from examples, while neural nets are not able to dynamically bind information—an open problem that caused the persistent failure of neural nets to reuse knowledge and generalize systematically. To address this gap, neurosymbolic architectures [1] aim to combine the best of both worlds to approach human-level intelligence.

Goal

We will devise a novel look at data-driven representations, symbolic manipulations, and their integration. For benchmarking, we will focus on solving abstract visual reasoning problems that mainly involve two aspects of intelligence: visual perception and abstract reasoning.

Tasks and Type

There are several challenges that need to be overcome at algorithmic (80%), and implementation (20%) levels to realize abstract visual reasoning solvers. These include developing novel visual perception networks, symbolic reasoning engines, and their interactions. We are inviting applications from students to conduct their Master's thesis work on this exciting new topic. The work performed could span high-level algorithmic developments all the way to efficient implementations on emerging hardware platforms. It also involves interactions with several researchers across IBM research focusing on various aspects of the project. The ideal candidate should have a multi-disciplinary background, strong mathematical aptitude and programming skills. Prior knowledge on machine learning and AI is a bonus.

[1] <https://www.youtube.com/watch?v=Hhymld8dr5Q>

