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Logical Neural Networks: Opening the black box

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Abstract

This document gives some ideas about how to write a project proposal, and provides a template for a proposal. You should discuss your proposal with your supervisor.

1. Introduction

Neural Networks peform exceptonallty well over a wide range of different problems. However a problelm is that once trained these networks become a black box, near impossible for a human to understand what features the network is using to solve the problem presented to it. Logical Neural Netowrks (neural networks with logical activation functions) have been shown to provide a more understandable representation.

2. The Problem

Continueing on from previous work giving a proof of concept for LLN's, showing (in the case of the MINST dataset) that a trained LLN has significant improvements in the ease at which a human could understand the networks process. This improvement dosnt come free however, the cost is a significant accuracy decrcrease when compared to a standard NN.

The aim of this project is to explore the idea of LLN's and to investigate wether this accuracy cost can be mitigated but still maintain our ability to understand what the network is using to solve the given problem. This project will evaluate other activation functions based of this idea of Nosiy-OR/AND to see if we can achive a higher accuracy on datasets such as MNIST. Alog with evaluating the accuracy.

So far LLN's have only been evaluated on classification datasets (namely MNIST), we will implement and evaluate LLN's to solve a number of other non trivial problems which neural networks are often applyed to.

3. Proposed Solution

4. Evaluating your Solution

5. Resource Requirements