What combinations of classes of computations can a neural network support?

by Darius Barbano,
supervised by Dr. Michael Chary

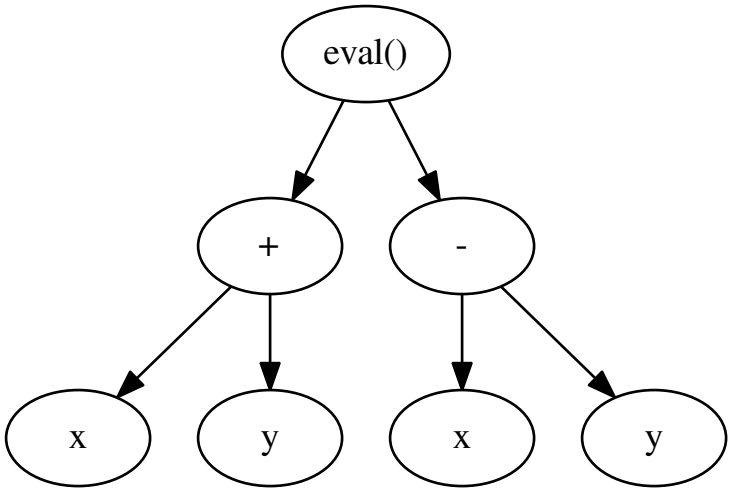
November 9, 2017

1 Preface

The purpose of our research is to understand how Artificial Neural Networks can support multiple classes of computations. This document will contain notes, diagrams, and explantations pertaining to each of the experiments we will conduct to investigate this problem. Code for each subsection of this document can be found at `https://github.com/DariusBxsci/NeuralNetworkResearch/tree/master/NeuralNets`.

2 Simple Addition/Subtraction Network

Possibly the simplest two computations to combine into a single network are addition and subtraction. This can be accomplished using a syntax tree-style structure where an eval function is given an operator and two inputs. For example, the eval function would evaluate "+ 5 4" to 9, or "- 5 4" to 1.



This structure is very similar to how compilers/interpreters view and evaluate code in a program.