Can a neural network manipulate symbols and perform calculations?

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Abstract

Abstract here.

1   Preface

1. What is symbolic computation?

   A symbolic computation is a calculation performed with symbolic representations of values and operations. A simple example would be the expression $(x+1)(x-1)$ which would evaluate to x^2-1, rather than to some numerical result.

2. What is calculation?

   A calculation is a process by which one or more inputs is transformed into one or more results. One may calculate that the product of 5 and 4 is 20.

3. What is meant by a computational class? - do you mean complexity class?

   Code for each subsection of this document can be found at `https://github.com/DariusBxsci/NeuralNetworkResearch/tree/master/NeuralNets`.

2 Simple Addition/Subtraction Network

Consider the construction of a neural network to alternately add and subtract numbers. It is useful to represent all binary operations in list form, $(+\ a\ b)$. The neural network, then, becomes a representation of a stack.
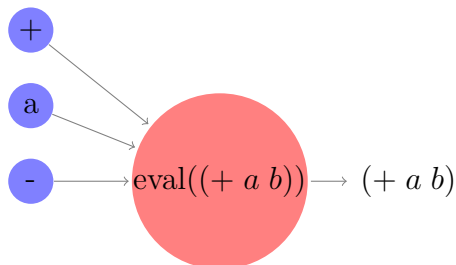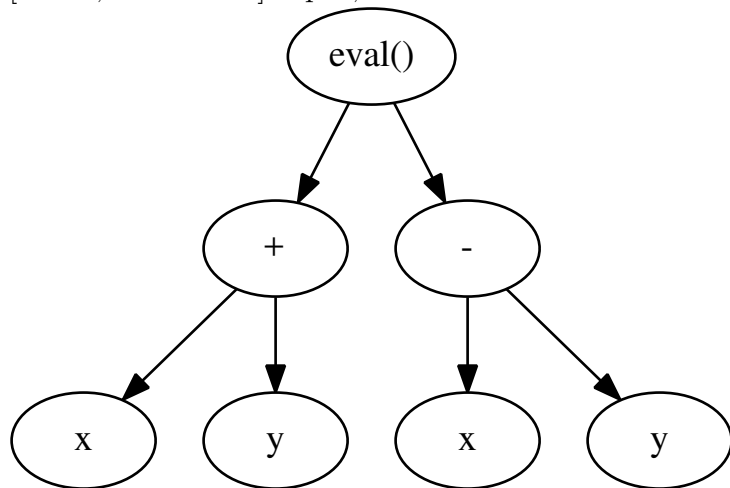

; ; ;
yshift=0.5cm]nodehidden neuron] (H-1) at (2.5cm,-1cm) +;yshift=0.5cm]nodehidden neuron] (H-2) at (2.5cm,-2cm) a;yshift=0.5cm]nodehidden neuron] (H-3) at (2.5cm,-3cm) -;
[output neuron,pin=[pin edge=-¿]right:$(+\ a\ b)$, right of=H-3] (O) `eval((+ a b))`;
H-\source)edgeO);H-\source)edgeO);H-\source)edgeO);

[annot,left of=H-1] Input;

This tree-like structure closely mimics the abstract syntax tree which is generated by compilers when processing code in a program. For example, to evaluate the results of the expressions "+ 5 4" and "- 5 4", a compiler may generate the following trees:
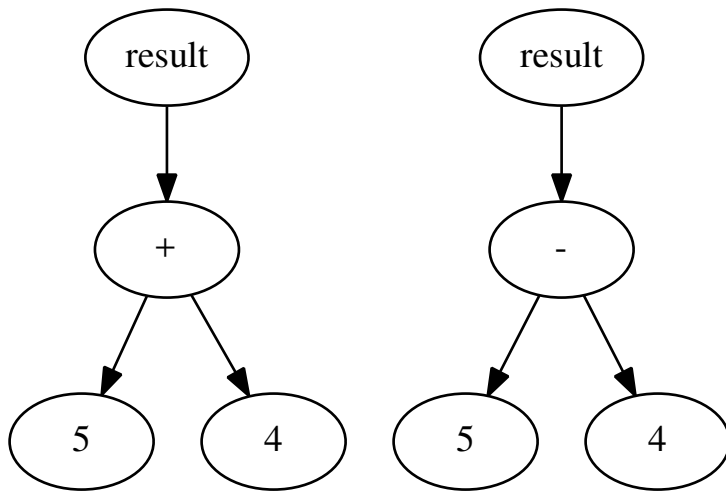
To improve this sentence don't use *weasel words*. I don't know what *very similar* means to you. Neither a compiler nor interpreter *view* code. Neither are (yet) sentient beings.

The best piece of writing advice I can give is:

Mean exactly what you write and write exactly what you mean.