# Notes on Turing Computability of Neural Nets

Discussion on Hava T. Siegelmann and Eduardo Sontag’s research

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## Introductory Notes

The arguments in Hava T. Siegelmann’s paper rely on the notion of *threshold (binary valued) neuron* introduced by [McCulloch and Pits in 1943](https://github.com/dimitarpg13/deep_learning_and_neural_networks/blob/main/literature/articles/A_Logical_Caclculus_of_the_Ideas_Immanent_in_Nervous_Activity_McCulloch_and_Pitts_1943.pdf) and a network composed by the latter.

**Discussion of RNN** in Hava T. Siegelmann’s [paper from 1991](https://github.com/dimitarpg13/deep_learning_and_neural_networks/blob/main/literature/articles/computability/TuringComputabilityWithNeuralNets_Siegelman1991.pdf).

A recursive net is an arbitrary interconnection of synchronously evolving processors. One of the processors serves as an *output node* of the neural net. There is an external input signal that feeds into every processor.

## Literature

[Turing Computability with Neural Nets, Hava T. Siegelmann, Eduardo Sontag, 1991](https://github.com/dimitarpg13/deep_learning_and_neural_networks/blob/main/literature/articles/computability/TuringComputabilityWithNeuralNets_Siegelman1991.pdf)

[On the computational power of Neural Nets, Hava T. Siegelmann, 1992 (earlier version)](https://github.com/dimitarpg13/deep_learning_and_neural_networks/blob/main/literature/articles/computability/OnTheComputationalPowerOfNeuralNets_1992_Siegelmann.pdf)

[On The Computation Power of Neural Nets, Hava T. Siegelmann, Eduardo Sontag, 1995](https://github.com/dimitarpg13/deep_learning_and_neural_networks/blob/main/literature/articles/computability/OnTheComputationalPowerOfNeuralNets_1995_Siegelmann_JComSysSci.pdf)

[Computation beyond Turing limit, Hava T. Siegelmann, 1995](https://github.com/dimitarpg13/deep_learning_and_neural_networks/blob/main/literature/articles/computability/ComputationBeyondtheTuringLimit_1995_Siegelmann_Science.pdf)

[Neural Networks and Analog Computation beyond Turing limit, 1999](https://github.com/dimitarpg13/deep_learning_and_neural_networks/blob/main/literature/articles/computability/NeuralNetworksandAnalogComputationBeyondTheTuringLimit.pdf)