Character Recognition with Neural Networks
TJHSST Senior Research Project Proposal
Computer Systems Lab 2009-2010

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Abstract

This project explores the implementation and testing of neural network libraries in the Python programming language. It goes in depth about design and creation of the network, basic methods for training the network based on the error of the output, and was to use these networks to solve problem. It documents the problems encountered while researching and developing this network, and limitations of the network in its current state. It uses the case study of handwriting character recognition to demonstrate principals and methods behind these neural networks, and goes on to attempt to create a general method for recognizing characters.
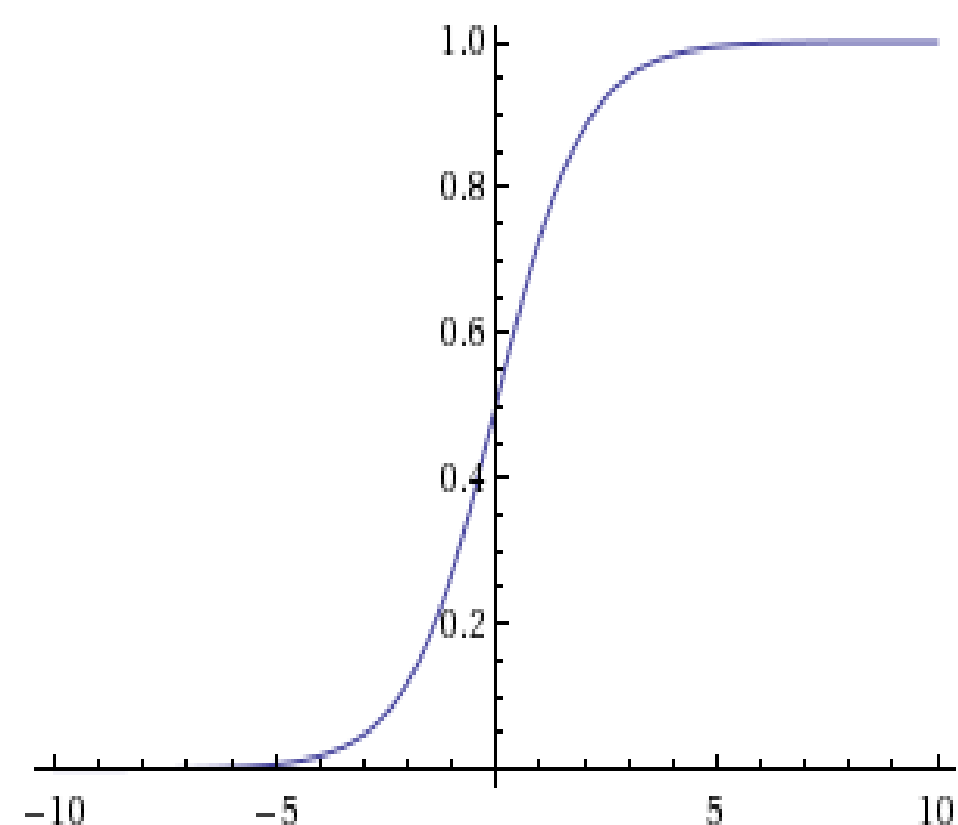
Fig 2. The Activation Function

Background and Introduction

Neural networks are one of the oldest examples of machine learning, and one of the most popular today. The design mimics actual neurons, and it helps solve many problems. Using neural networks as opposed to complex, multivariate calculus (bordering on thousands of variables) helps the computer work efficiently, and it helps the user to design and test the network more effectively. Using knowledge of neural networks gained from smaller, sample problems, such as the binary operator XOR, neural networks can be used to solve a wide range of problems. Because of the way networks are designed, with multiple inputs, it lends itself well to identifying things based on several variables at one time.

Fig 1. Examples of Handwriting.

Discussion

This project will be used on any number of problems. The initial problem to be confronted with this project is to identify any number of characters from a given library based on pictures of handwriting and other samples, including ASCII art. After this initial problem is confronted, other topics will be explored, including creating heuristics for board states of board games such as Othello, Checkers, and Tetris. These heuristics will be applied in game to create an artificial intelligence client that will attempt to play either another computer or human player. There are still many topics to be explored in regards to neural networks, and there are many problems that can be solved using neural networks.

Results and Conclusions

Conclude Something already