Image Recognition with Neural Networks

HON 401 Project Proposal

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**Summary**

This computer software project will detail the design and implementation process of a simple neural network that will identify an object’s presence in an image.

**Primary Research Question**

How does the structure of a neural network correlate with its seemingly universal application to abstract problems?

**Discussion**

According to John McCarthy Stanford University, artificial intelligence is “the science and engineering of making intelligent machines, especially intelligent computer programs,” (McCarthy, 2007). AI is used to solve abstract problems with complex or undefined solving algorithms. Its use pertains to many unrelated fields such as medical research, transportation, finance, and much more (Marr, 2023). AI supplies us with broad algorithms to solve these abstract problems. A neural network is a subset of artificial intelligence which replicates the anatomical structure of a human brain on a smaller scale. This method employs many interconnected objects (acting as neurons) in a multi-layer configuration to take an input and give a certain output. A neural network model can be trained by sending a set of training data backwards through the model and adjusting the mathematical equations used to connect the neurons. This broad structure provides the capability of application to many unique fields of study. But how does the internal structure of a neural network correlate with its seemingly universal application to abstract problems? This project will set out to answer just that. I will design, implement, and train a neural network to recognize an object within a random picture.

I am a triple major in Electrical Engineering, Computer Science, and Applied Mathematics. This model heavily depends on mathematical theorems and equations seen in Calculus 1, Calculus 2, Calculus 3, and Linear Algebra. It also requires a medium to make these calculations. A computer programming language can be used to automate the learning and recognition process. Finally, if the model is used for a real-time system, it requires translation and implementation onto computer hardware. This project will allow me to utilize all three fields of study to solve a problem.

According to Merriam-Webster’s Dictionary, engineering is “the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people,” (Merriam-Webster, 2023). Ultimately, engineering is about solving problems for others. Through this project, I am serving others through my knowledge in my fields of study. As neural networks can be used to solve problems in many different fields, learning how they work will help me serve more people in the future. Ultimately, this is a way of serving our God. In the Christian Worldview, a main theme is our servitude towards God and others. He sent His son Jesus Christ to die on the cross for our salvation. Jesus utilized His God-given knowledge and love for His Father to serve us in His teachings and ministries. For example, in all four gospels, we hear that Jesus turned five loaves of bread and two fish into food to satisfy and nourish five-thousand people (Matthew 14:13-21 NIV, Mark 6:30-44 NIV, Luke 9:10-17 NIV, John 6:1-14 NIV). Jesus was a phenomenal example of servitude. In the bible, there are many mentions of servitude. For example, in Hebrews, the text reads, “God is not unjust; he will not forget your work and the love you have shown him as you have helped his people and continue to help them,” (Hebrews 6:10 NIV). Although we are saved through only our faith, we are still judged by our works. Additionally, this servitude is a form of love. In John’s gospel Jesus states, “A new command I give you: Love one another. As I have loved you, so you must love one another. By this everyone will know that you are my disciples, if you love one another,” (John 13:34-35 NIV). Through loving us, Jesus has served us. Looking at this, we see that serving our neighbors is a form of loving our neighbors.

Though I am focusing on solving the problem of recognizing an object in an image, the underlying algorithm of reaching the solution can be translated to unique problems. I will make the results of this project public and share it with others. This will ensure future developments of my findings by others. Finally, I will utilize this God-given opportunity to gain further knowledge in the field to solve problems and serve others in the future.

**Works Cited**

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