**Abstract:**

*The abstract should be between four and seven sentences long. Introduce the problem you are studying. Describe what you did. Summarize your results --- what did you discover, what is the main take-away message?) Basically, you're trying to sell your paper to the reader, so be brief and to the point.* ***Do not*** *include any citations in the abstract.*

Often described as “the second-best way to solve any problem,” Genetic Programming (GP) relies on Darwinian principles of natural selection to produce models of a system. In this experiment, we apply GP to the problem of Symbolic Regression – that is, we attempt to find the function used to generate given datasets.

To accomplish this, we randomly generate a population of symbol trees, each representing a different equation. We then evaluate the “fitness” of each tree and select the fittest individuals to generate the next generation of trees. In doing this, we see RESULTSRESULTSRESULTS. From these results CONCLUSIONCONCLUION.

**Intro:**

*In this section, you should introduce the reader to the problem you are attempting to solve. For example, for the first project: describe the 15-puzzle, and why it's interesting as an A.I. problem. You should also cite and briefly describe other related papers that have tackled this problem in the past --- things that came up during the course of your research. In the AAAI style, citations look like\cite{aima} (see the comments in the source file \texttt{intro.tex} to see how this citation was produced). Conclude by summarizing how the remainder of the paper is organized.*

Genetic programming, inspired by Darwinian evolution, uses the principles of natural selection, mutation, and reproduction, to explore a problem space. In this case, we use GP to perform Symbolic Regression and find the function used to generate a dataset. The genetic programming approach is often thought of as a double-edged sword. On one hand, it can be adapted to solve almost any type of problem. On the other hand, it is a fairly uninformed solution method. It uses relatively little information about the problem to solve it, relying instead on guided randomness to deliver a suitable result. This randomness means the path taken to arrive at the solution is hidden to the user. GP may give a supremely accurate result, but yields no insight into why that result works, raising an important question: If you have the answer without knowing why it’s right, have you really learned anything?

In the case of Symbolic Regression, how we arrive at a solution or why we chose certain steps is not as important as the function we produce. According to Koza, GP lends itself well to Symbolic Regression because it is error-driven learning (SOURCE 1). It also finds unorthodox ways of discovering mathematical identities, which allows the use of a very limited set of operations to generate a wide range of functions.

SUMMARIZE THE REMAINDER OF THE PAPER, GODDAMMIT

**Background:**

*Describe any background information that the reader would need to know to understand your work. You do not have to explain algorithms or ideas that we have seen in class. Rather, use this section to describe techniques that you found elsewhere in the course of your research, that you have decided to bring to bear on the problem at hand. Don't go overboard here --- if what you're doing is quite detailed, it's often more helpful to give a sketch of the big ideas of the approaches that you will be using. You can then say something like ``the reader is referred to X for a more in-depth description of...'', and include a citation.*

*Alternately, you may have designed a novel approach for the problem --- your own algorithm or heuristic, say. A description of these would also be placed in this section (use subsections to better organize the content in this case).*

**Experiments:**

*In this section, you should describe your experimental setup. What were the questions you were trying to answer? What was the experimental setup (number of trials, parameter settings, etc.)? What were you measuring? You should justify these choices when necessary. The accepted wisdom is that there should be enough detail in this section that I could reproduce your work* ***exactly*** *if I were so motivated.*

**Results:**

*Present the results of your experiments. Simply presenting the data is insufficient! You need to analyze your results. What did you discover? What is interesting about your results? Were the results what you expected? Use appropriate visualizations. Prefer graphs and charts to tables as they are easier to read (though tables are often more compact, and can be a better choice if you're squeezed for space). Always include information that conveys the uncertainty in your measurements: mean statistics should be plotted with error bars, or reported in tables with a range. The 95%-confidence interval is a commonly reported statistic.*

**Conclusion:**

*In this section, briefly summarize your paper --- what problem did you start out to study, and what did you find? What is the key result / take-away message? It's also traditional to suggest one or two avenues for further work, but this is optional.*

**References:**

**Genetic Programming: On the Programming of Computers by Means of Natural ...**

 By John R. Koza