**Research Project Proposal by Aryan Deorah**

**Objective**

The object of this project is to determine the effect that different gun laws have on different categories of gun violence. This project will determine which laws reduce gun violence the most. This will be accomplished through creating a machine modeling system to measure the effects of gun laws on gun violence. If this does not work, it can still be accomplished through various statistical tests. Hopefully, this research will provide data for lawmakers to view when making gun laws and therefore making the world a safer place.

**Justification**

The gun violence epidemic has grasped America for decades, and for the first time since the 1980’s firearm death rates are steadily increasing. In 1996, congress banned any government funding for gun violence research, leaving it up to private institutions to conduct this relevant research. Gun violence claimed over 32,000 lives in the U.S. in 2015, translating into a death rate of 11.3 per 100,000. This death rate increased to 11.8 per 100,000 in 2016. Room for improvement is shown by the fact that there is great variation in gun violence from state to state. Though there is considerable research and statistical tests on the effect of gun laws on gun violence, there is limited research focusing in on state and local laws. In addition to this, machine learning has had limited application to gun violence, making this project unique. This project will be practical because all it requires is coding and accessible data.

**Description**

Firstly, a machine learning system will be coded in Python with multiple layers of inputs and outputs, as well as neurons, which represent calculations the inputs will go through. Then, the gun violence death rates will be compiled into matrices by jurisdiction and type of gun violence, such as homicide. Next, the gun laws in states and municipalities will be categorized by the type of law and compiled into binary matrices. The gun laws and gun violence death rates in a given jurisdiction are the independent variable, meaning inputs, and the effect the gun laws will have on the gun violence will be the dependent variable, meaning outputs. The input matrices will then be entered into a supervised machine learning system. Before the data can be processed, the system will be trained by comparing its outputs to expected outputs and self-correcting until the system’s outputs are accurate. This will create an accurate model in which the original inputs will be inputted, and reasonable predictable outputs will be outputted.

**Limitations**

As with any project, this project will have limitations. Firstly, the person conducting the research has limited code experience, so coding the machine learning system will take much time. Secondly, the expected outputs may be inaccurate and are limited, which will reduce the overall accuracy of the system. Because of the limited amount of expected outputs, infeasibly large amounts of data may be required to create the system. In addition to that, if the expected outputs are invalid, then an unsupervised system may have to be used, and there is limited knowledge on unsupervised machine learning. Extra code and large amounts of data will be required to create an unsupervised machine learning system, which will be highly inaccurate and therefore could be inconclusive. Finally, since the gun laws are not quantifiable, the binary matrices may not be able to accurately represent the gun laws in the machine learning system.

**Research Project Feasibility Study by Aryan Deorah**

**Currently Available Resources**

Personnel:

* Me
* Adult mentor

Equipment:

* Computer
* Python software

Supplies: N/A

Knowledge/Skills:

* Knowledge of linear algebra and some calculus
* Background knowledge on gun violence and its effects in America
* Background knowledge on machine learning
* Ability to find data and research on gun violence
* Ability to run statistical tests

**Additional Resources Required**

Personnel:

* Expert in the field

Equipment:

* Python training courses
* Machine learning training courses

Supplies: N/A

Knowledge/Skills:

* Ability to code in Python
* Ability to code machine learning systems
* Ability to organize and “clean” data

Proposed Budget: Approximately $100.00 for the courses

**Risk Assessment**

* There are no safety risks with this project

**Alternative for Proposed Objective**

* A simpler, statistics-based math modeling approach will be used
* Instead of machine learning, various statistical tests will be conducted on the data to find more basic correlations between gun laws and gun violence