NICOLAS NULL, TYLER KIBLER & ELIZABETH LOWE, Dept. Of Computer Science and Information Systems, WVU Institute of Technology, Beckley, WV, 25801. Using Machine Learning to Predict Classes of Astronomical Data

Machine learning in a nutshell is training a machine using tons of data. The machine will then create a model that it can use to predict future outputs to data that it has not seen before. This can be accomplished using many different approaches. Some are geography based plotting inputs in space and grouping them to predict their outputs. Other machine learning algorithms create complex neural networks which predict the outputs. There are so many ways to solve this problem, and the resulting performance of the model depends on what method and parameters chosen to train it.

During our research this semester, we have been working with data on the astronomical object called a pulsar. Pulsars are very far away and are typically discovered by radio telescopes rather than optical telescopes. This means scientists must manually go through all the data received by radio waves to see if they have found a pulsar. Our goal is to train a machine to do that sorting for us. We accomplished this by using a dataset with over 17,000 datapoints that were a mix of pulsar and non-pulsar data. We trained many different machine learning models such as logistic regression, artificial neural networks, K-means, Decision tree (maximizing each one's parameters) to come up with a model that is over 90% accurate at identifying if a given set of inputs is a pulsar or not. The project is supported by First2 Network and XSEDE Empower grant.