1145-11-200 **Jennifer Noelle Kampe*** (jenniferkampe@gmail.com) and **Artem Vysogorets**. *Predicting Zeros of the Riemann Zeta Function Using Machine Learning: A Comparative Analysis.* Preliminary report.

In this study, we evaluate the predictive performance of Neural Network Regression in locating non-trivial zeros of the Riemann zeta-function relative to Support Vector Machines Regression. We provide a brief summary of the fundamental properties of the zeta-function and use the analysis therein to identify relevant features and reformulate the given regression problem as a time-series prediction problem. Next, we provide a basic introduction to the architecture and use of Neural Networks. Model design is implemented as a six stage process including: (i) input selection, (ii) data splitting, (iii) model architecture selection, (iv) model structure selection, (v) model calibration, and (vi) model validation. The range of zeta-function zeros used is 1001 to 100,000. Model training is performed on data with 99,000 observations for each of the 50 feature variables selected. Multilayer Perceptron and Recurrent Neural Network architectures are chosen and implemented in the R programming language. Finally, the replicative and predictive accuracies of the two neural networks are evaluated against those of a Support Vector Machine Regression.

Keywords: Riemann Zeta zeros, Riemann Hypothesis, recurrent neural network, SVR, machine learning prediction. (Received August 18, 2018)