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Artificial Intelligence Seminars

Predicting zeros of the Riemann-zeta function using machine learning models

Speaker   Dr. Huan Qin
Assistant Professor
Department of Mathematics and Statistics
San Diego State University-Imperial Valley Campus

Where   GMCS-405

When   10:30am-11:30am, Friday, October 25th, 2019

Speaker

Huan Qin is currently an Assistant Professor of Mathematics at San Diego State University-Imperial Valley Campus. In 2017, she earned her Ph.D. in Mathematics and M.S. in Statistics from the University of Iowa. Her research interests in mathematics include analytic number theory, automorphic forms, the subconvexity problem for L-functions, and resonance sums. She is also interested in studies related to machine learning regressions, time series predictions, statistical computing, and statistical consulting.

Abstract

The Riemann-zeta function is one of the most celebrated number theory objects and has been extensively studied for almost 200 years. Of particular interest is the conjecture (Riemann Hypothesis) that all non-trivial zeros of the Riemann-zeta function lie on the critical line: $Re(s) = ½$. In this study, we explore the possibilities of using machine learning models to locate the non-trivial zeros. The problem of predicting complex-valued zeros is reformulated as a real-valued time series prediction task. The initial pool of features is selected via a theoretical study of the relationship between Riemann-Siegel Z function and the Riemann-zeta function. We compare prediction performance of three architectures: Multilayer Perceptron, Recurrent Neural Network, and Support Vector Regression.

Host: Dr. Xiaobai Liu
Student Organizer: Patrick Perrine
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