1158-14-263   **Margaret H Regan*** (`mregan9@nd.edu`), **Jonathan D Hauenstein**, **Tingting Tang**, **Edgar A Bernal** and **Dhagash Mehta**. *Machine learning the discriminant locus.*

Parameterized polynomial systems arise in many problems in science and engineering. The number of real solutions to these systems change as the parameters are varied with the boundaries forming the discriminant locus. Using techniques in numerical algebraic geometry, sample points perturbed from the discriminant locus are collected and labeled with the number of real solutions. These data sets are used as testing and training data for a machine learning algorithm that determines classification boundaries, where the classes are the different number of real solutions. We explore nearest neighbor and deep learning algorithms applied to various examples. In addition, we use the learned boundaries to perform parameter homotopy continuation to find the real solutions by tracking only real solution paths. Examples will be discussed to show the speed-up this technique provides. (Received March 02, 2020)