1077-37-1905 **Jesse Berwald*** (jjberwald@wm.edu), **Tomas Gedeon** and **John Sheppard**. *Predicting Catastrophes In Dynamical Systems Using Machine Learning.*

Nonlinear dynamical systems, which include models of the Earth's climate, financial markets and complex ecosystems, often undergo abrupt transitions that lead to radically different behavior. The ability to predict such qualitative and potentially disruptive changes is an important problem with far-reaching implications. Even with robust mathematical models, predicting such critical transitions prior to their occurrence is extremely difficult. In this work we propose a machine learning method to study the parameter space of a complex system, where the dynamics is coarsely characterized using topological invariants. We show that by using a nearest neighbor algorithm to sample the parameter space in a specific manner, we are able to predict with high accuracy the locations of critical transitions in parameter space. (Received September 21, 2011)