Project Summary

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Computational mechanics has met with considerable success in analyzing discrete dynamics over finite alphabets. In particular, the epsilon-machine provides an enlightening way to view these systems, allowing us to quantify their intrinsic complexity. Unfortunately there is no obvious way to extend this tool to operate over the real numbers, where most experimental data lives. Working with Jim Crutchfield, I hope to find ways to incorporate continuous alphabets in the existing theory. Starting with a dynamical system in a partitioned continuous space, we will observe how new computational mechanical constructions behave as the partition size tends to zero. Specifically, a generalization of the epsilon-machine will allow us to define many quantities of interest geometrically and topologically, thereby avoiding many of the difficulties that plague the current finite state automata formulation.