Graduate Student Research Seminar
Spring 2022

Sequential Design Optimization of Variable Additive Manufacturing Processes Using Machine Learning

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Monday, February 14th
3:00 pm (EST) – 132 Fluor Daniel Building

Abstract

In recent years, additive manufacturing (AM) techniques have received considerable attention for its ability to fabricate a wide range of materials types with complex geometries. However, the variability in the mechanical properties of printed materials remains one of the glaring challenges facing AM technologies. In this study, we develop a sequential design method that implements machine learning techniques to integrate variability and uncertainty in the analysis and optimization of AM process parameters. The proposed approach allows for the learning from previously tested points to adaptively choose the next design sites resulting in maximum information gain. The novelty of our approach lies in its ability to use Utility Theory to define the optimization criteria, and to implement statistical tools to identify a flexible number of design sites and samples to be tested. Method performance is tested on synthetic data. This study is expected to result in a novel efficient sequential method that optimizes variable and uncertain AM processes.

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