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Characterizing Students' Engineering Design Strategies Using Energy3D

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Characterizing Students' Engineering Design Strategies Using Energy3D

The goals of this study are to characterize design actions that students performed when solving a design challenge, and to create a machine learning model to help future students make better engineering design choices. We analyze data from an introductory engineering course where students used Energy3D, an open source computer-aided design software, to design a zero-energy home (i.e. a home that consumes no net energy over a period of a year). Student design actions within the software were recorded into text files. Using a sample of over 300 students, we first identify patterns in the data to assess how students in the course approached the design task and what paths they followed to complete the project. Using students' early actions within the software, we use the *scikit-learn* machine learning library to train a model that can predict if a particular student will successfully design a zero-energy home. Such a model can help future students since future versions of the software can have built-in helpful pop-up notices for students who may struggle with the design task.