Innovation Lab

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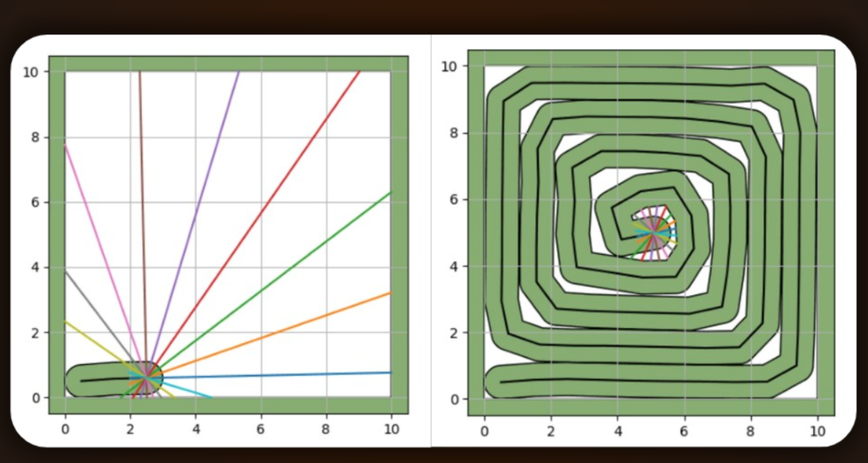
RL Slicer

Reinforcement Learning - Path planning for additive manufacturing

Project Description

Current 3D printing relies on simple algorithms to determine path planning, which may lead to low-quality parts.
Our framework integrates Reinforcement Learning AI to enhance the process, attempting to produce higher quality models with greater precision.

Example of model performance monitoring using Tensorboard



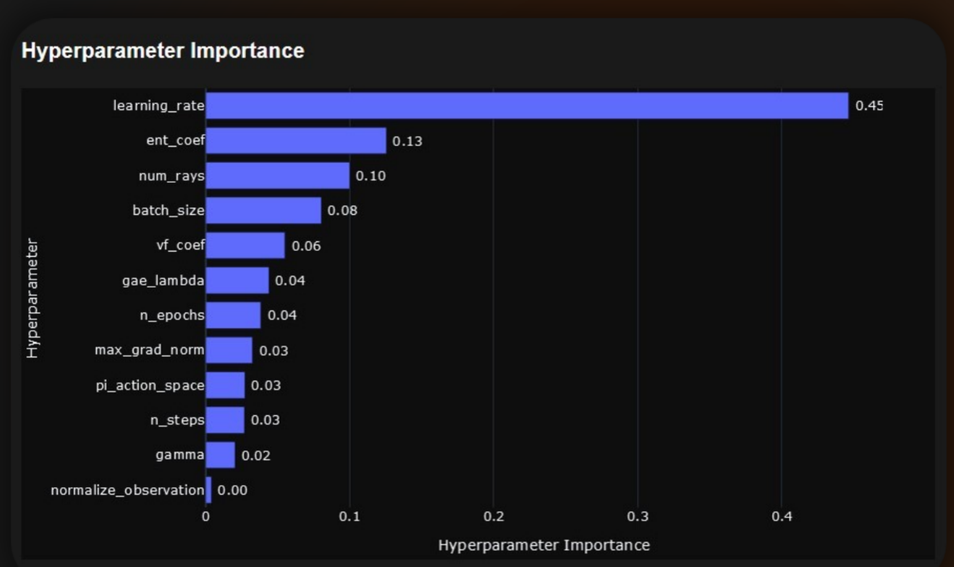
Raycasts in action (left) and resulting path (right)

How it works

RL Slicer simulates a 3D printer nozzle and the 3D model it fills. By using a technique called raycasting, the nozzle can locate itself within the model. This raycast data is then used to train the nozzle's movements based on the environment.
These models can then be deployed to find a suitable path for a given polygon.

Monitoring and Optimization

Frameworks like Optuna and Tensorboard were used to monitor and optimize the models as much as possible.
As a result, our model is able to fill 89% of a polygon.



Hyperparameter Optimization using Optuna

Faculty of Computer Science
“Practical Software Engineering” Summer 2024
Prof. Dr. Gerd Beneken, Prof. Dr. Wolfgang Mühlbauer

Advanced Additive