

ART: a machine learning Automated Recommendation Tool for synthetic biology

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Project Goals: Establish the scientific knowledge and new technologies to transform the maximum amount of carbon available in bioenergy crops into biofuels and bioproducts.

Traditional synthetic biology approaches involve ad-hoc non systematic engineering practices, which lead to long development times. Here, we present the Automated Recommendation Tool (ART), a tool that leverages machine learning and probabilistic modeling techniques to guide synthetic biology in a systematic fashion. Using sampling-based optimization, ART [1] provides a set of recommended strains to be built in the next engineering cycle, alongside probabilistic predictions of their production levels. We demonstrate the capabilities of ART on a tryptophan producing strain and are able to improve production by 17% compared to best designs used for algorithm training and 106% compared to the initial strain [2].

References

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2. Zhang J, Petersen SD, Radivojevic T, Ramirez A, Pérez A, et al. (2019) Predictive engineering and optimization of tryptophan metabolism in yeast through a combination of mechanistic and machine learning models. BioRxiv. doi:10.1101/858464.

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