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The Technical University of Denmark, Lawrence Berkeley National Laboratory, and TeselaGen Biotechnology demonstrate the use of Artificial Intelligence and Synthetic Biology to Optimize Productivity of Yeast used as a Cellular Factory for Industrially Relevant Products

COPENHAGEN and SAN FRANCISCO – (September 28, 2020) A collaboration between the Technical University of Denmark, Lawrence Berkeley National Laboratory, and TeselaGen Biotechnology, Inc. has shown that mechanistic and machine learning models can complement each other and can be combined to enable accurate genotype-to-phenotype predictions, and increase the productivity of important bioproducts produced by industrial organisms. The collaboration has published their results in Nature Communications.

"By combining genome-scale modeling to pinpoint engineering targets, with efficient library construction of metabolic pathway designs, and high-throughput screening, we have trained diverse machine learning algorithms. In collaboration with the Berkeley Lab and TeselaGen, here at DTU we then used these machine learning models to generate new design recommendations. This approach enabled us to successfully forward engineer the aromatic amino acid metabolism in yeast, with the new recommended designs ultimately improving titer and productivity by up to 74% and 43%, respectively, compared to the best designs used for algorithm training," said Michael Krogh Jensen, PhD, Co-Principal Investigator at The Novo Nordisk Foundation Center for Biosustainability.

Hector Garcia Martin, PhD, Quantitative Metabolic Modeling Director at the Joint BioEnergy Institute and Staff Scientist at Lawrence Berkeley National Laboratory said, "Our collaboration with DTU and TeselaGen has shown how advanced analytics and machine learning can effectively guide bioengineering to optimize the production of biochemical compounds. The combination of machine learning, synthetic biology, and automation stands to revolutionize bioengineering and allow for applications we cannot even imagine now."

"Berkeley Lab and DTU have been great partners during the development of our platform, and we are now we are well-positioned to close the design-build-test-learn loop in a commercial setting with the use of our advanced enterprise platform," said Eduardo Abeliuk, PhD, CEO of TeselaGen.

"Bio-based product development at a fraction of the traditional cost is the goal, and machine learning is becoming an essential tool for both understanding and engineering living systems," added Michael Fero, PhD, COO of TeselaGen.

The Technical University of Denmark - DTU - has licensed TeselaGen's cloud-based platform to increase its capabilities and speed up the design-build-test-learn processes across R&D efforts led by Dr. Michael Krogh Jensen's group.

Link to Publication: https://www.nature.com/articles/s41467-020-17910-1

About DTU

The Novo Nordisk Foundation Center for Biosustainability (DTU Biosustain) at the Technical University of Denmark is focused on developing new knowledge and technologies to help facilitate the transformation from the existing oil-based chemical industry to a more sustainable bio-based society in which chemicals are produced biologically.

About TeselaGen

TeselaGen is building an artificial intelligence-powered enterprise platform for designing, building, testing, and optimizing biological systems. TeselaGen's cloud-based platform bridges the gap between good ideas and the realization of valuable products like vaccines, biologic medicines, and sustainably sourced chemicals. TeselaGen is privately held and is based in the software hub of San Francisco, CA. The company has received early recognition in the form of four US National Science Foundation funding awards, a US Department of Energy funding award, CORFO awards, and a Bio-IT World Best Practices Award. TeselaGen uses its proprietary Synthetic Evolution® technology for efficient rapid prototyping and editing of recombinant molecules.

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