

Research Theme: Computational Biology; Functional Genomics
Research Project Title: Identification of metabolic master regulators
Principal Investigator/Supervisor: Asst. Prof. Marek Mutwil
Co-supervisor/ Collaborator(s) (if any):
<p style="text-align: center;">Project Description</p> <p>a) Background: We propose to elucidate the gene regulatory networks that control metabolism in the kingdom of plants, which will allow us to control the levels of specific plant metabolites in our crops and model plants. Plants produce metabolites that contribute to our food (e.g., sugar, starch, proteins), health (e.g., vitamins, anti-oxidants, drugs), and materials (e.g., lignocellulose, fibers). A constant challenge for our ability to manipulate metabolite levels and produce them in commercially profitable amounts is our lack of knowledge of the regulatory networks controlling the underlying biosynthetic pathways.</p> <p>b) Proposed work: We aim to identify transcription factors that control the activity of a whole pathway comprising several enzymes, by constructing regulatory networks for hundreds of plant species. Identifying these 'master regulators' presents an attractive, underutilized opportunity to easily engineer plant metabolism. To achieve this, we will infer gene regulatory networks (GRNs) of plant metabolism by applying an ensemble of unsupervised machine learning approaches for GRN inference for more than 120 plant species. These GRNs will enable wet-lab researchers to identify and modify transcription factors controlling specialized metabolism, and thus allow the increase of health-promoting metabolites in our crops.</p> <p>c) Preferred skills: Python programming or other programming language, strong interest in computational biology</p>
<p style="text-align: center;">Supervisor contact: If you have questions regarding this project, please email the Principal Investigator: mutwil@ntu.edu.sg</p>
<p style="text-align: center;">SBS contact and how to apply: Associate Chair-Biological Sciences (Graduate Studies) : AC-SBS-GS@ntu.edu.sg Please apply at the following: Application portal: https://venus.wis.ntu.edu.sg/GOAL/OnlineApplicationModule/frmOnlineApplication.ASPX</p>