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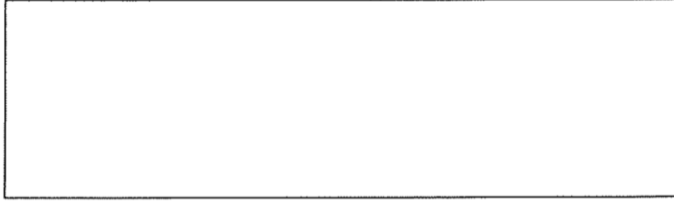
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M.Sc. Thesis Proposal: *Extending DGrowtH to DCurveR: Analysis of Luminescence and Thermal Proteome Profiling Curves*

Background: While DGrowtH provides comprehensive tools for analyzing microbial growth curves, many biological assays generate time-series or dose-response curves that require similar analytical approaches but with different underlying biology. Luminescence (lux) assays are widely used for monitoring gene expression, cell viability, and metabolic activity in real-time. Similarly, thermal proteome profiling (TPP) generates melting curves that reveal protein stability and drug-target interactions. These experimental techniques produce large-scale curve data requiring flexible modeling approaches and specialized summary statistics beyond traditional growth parameters. The ability to analyze diverse curve types within a unified framework would provide researchers with consistent tools for quantitative biology (<https://www.biorxiv.org/content/10.1101/2025.03.25.645164v2>).

Objectives: The purpose of this M.Sc. thesis project is to extend DGrowtH into a more general curve analysis package called DCurveR that can handle luminescence curves and thermal proteome profiling data. The extended framework will adapt DGrowtH's Gaussian process modeling to these new data types while developing relevant summary statistics specific to each assay type. For luminescence curves, this includes peak time, area under curve, and signal decay rates. For TPP data, this includes melting temperature (T_m), curve steepness, and stability shifts. The implementation will maintain compatibility with DGrowtH's architecture while providing assay-specific modules.

Plan and deliverables: A successful completion of the M.Sc. thesis requires the following computational and scientific advances. Implementing and evaluating curve analysis methods within DCurveR that extend beyond growth curves to luminescence and TPP data, including development of biologically relevant summary statistics for



each curve type. A write-up in thesis form and commented code on GitHub are mandatory deliverables at the end of the thesis.