Thesis Portfolio

Optimizing the Biosynthesis of Therapeutic Compounds in *E. coli* using Computational Modeling

(Technical Report)

Aging as a Disease in the United States

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

With older individuals forming an ever-increasing segment of the population, aging is coming to the forefront of discussions from a health care, political, and societal perspective. The desire to increase the number of healthy years within someone's life is central to biomedical research, but the aging issue goes beyond purely physiological factors. Within this thesis, aging is analyzed through Actor-Network Theory to gain an understanding of the social construction of aging within the United States. Through this framework, relevant actants and their relationships within the field of aging are considered to gain an improved understanding of how to successfully handle aging in the United States.

The gastrointestinal (GI) microbiome represents a diverse set of organisms that play a critical role in human health by contributing to immune system modulation, metabolic function, and other important activities. GI microbiome alteration has been linked to the pathogenesis of multiple GI diseases, including playing a role in the pathogenesis of inflammatory bowel disease. Genome-scale metabolic network reconstructions (GENREs) are a powerful computational tool for mathematically modeling the metabolic processes within a cell at a systems-level. Within the technical thesis, we developed a novel data-driven GENRE curation pipeline for determining the optimal biosynthesis of therapeutic compounds with reduced uncertainty in network structure and increased curation efficiency. The technical and STS theses are not related.