This folder contains Python scripts to fit logistic growth curves in the manuscript “Human gut microbiota interactions shape the long-term growth dynamics and evolutionary adaptations of *Clostridioides difficile*” by Sulaiman et al.

A description of the files/subfolders is listed below:

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| **Subfolder** | **File name(s)** | **Description** |
| input\_data | - | Contains ten .csv files with raw experimental data, averaged across three experimental replicates. The two columns are time (in hours) and absolute abundance (in OD600). |
| - | customized\_fcn.py | A Python script with ODE model of logistic growth dynamics. |
| - | fit\_logistic\_growth.ipynb | A Jupyter Notebook that (1) defines the cost function, (2) optimizes the cost function for different regularization parameters, (3) plot experimental data and simulation data using the optimal regularization parameter. The plots are stored in ‘output\_data’ subfolder. |
| output\_data |  | Contains parameter optimization outputs.   1. ‘optimization\_hyper\_para.csv’ contains optimized parameters for different initial guesses and regularization parameters. 2. ‘tune\_hyperpara.pdf’ plots the optimization cost as a function of regularization parameter. This is used to pick the optimal regularization parameter. 3. ‘optimized\_parameters.csv’ contains optimized parameters for different initial guesses using the optimal regularization parameter. 4. ‘mono\_growth\_rate\_carrying\_capacity.csv’ contains the final optimized model parameters. |