**Abstract**

Several programs were written to aid in the analysis of data from fluctuation assays as described in Chapter 2. All programs were written in Matlab and the code is available online (http://murraylab.mcb.harvard.edu/fluctuation/). A summary and description of each program is provided below.

***findMLm***

Input: *data* from fluctuation assay.
Output: most likely value of *m* given the data.
Command: findMLm(*data*)

This program requires the following programs to run:
scoreData, generateLD.

***findMLmTwoParam***

Input: *data* from fluctuation assay.
Output: most likely values of *m* and *d* given the *data*.
Command: findMLmTwoParameter(*data*)

This program requires the following programs to run:
scoreDataTwoParam, generateLD, generatePO, generateTwoParam.

***scoreData***

Input: *data* from fluctuation assay and *m*.
Output: -log probability of observing the *data* given *m*.
Command: scoreData(*data*, *m*)

This program requires the following program to run:
generateLD.

***scoreDataTwoParam***

Input: *data* from fluctuation assay, *m*, and *d*.
Output: -log probability of observing *data* given *m* and *d*.
Command: scoreDataTwoParam(*data*, *m*, *d*)

This program requires the following programs to run:
generateLD, generatePO, generateTwoParam.

***generateLD***

Input: *m*, and *max*.
Output: The Luria-Delbrück distribution from 0 to *max* with parameter *m*.
Command: generateLD(*m*, *max*)

***generatePO***

Input: *lambda*, and *max*.
Output: The Poisson distribution from 0 to *max* with parameter *lambda*.
Command: generatePO(*lambda*, *max*)

***generateTwoParam***

Input: *m*, *d*, and *max*.
Output: The combined Luria-Delbrück and Poisson distribution from 0 to *max* with parameters *m* and *lambda* = *m* x *d*.
Command: generateTwoParam(*m*, *d*, *max*)

This program requires the following programs to run:
generateLD, generatePO.

***sampleLD***

Input: *m*, number of *samples*.
Output: Random variables from the Luria-Delbrück distribution with parameter *m*.
Command: sampleLD(*m*, *samples*)

This program requires the following program to run:
generateLD.

***sampleTwoParam***

Input: *m*, number of *samples*.
Output: Random variables from a combined Luria-Delbrück and Poisson distribution with parameters *m* and *lambda* = *m* x *d*.
Command: sampleTwoParam(*m*, *d*, *samples*)

This program requires the following programs to run:
generateLD, generatePO, generateTwoParam.

***SSDScoreLD***

Input: *data* from fluctuation assay.
Output: sum of the squared differences between the cumulative distribution of the data and the cumulative Luria-Delbrück distribution with parameter *m* determined from the data.
Command: SSDScore(*data*)

This program requires the following programs to run:
findMLm, scoreData, generateLD.

***SSDScoreTwoParam***

Input: *data* from fluctuation assay.
Output: sum of the squared differences between the cumulative distribution of the data and the cumulative combined Luria-Delbrück and Poisson distribution with parameters *m* and *lambda* = *m* x *d* determined from the data.
Command: SSDScoreTwoParam(*data*)

This program requires the following programs to run:
findMLmTwoParam, scoreDataTwoParam, generateLD, generatePO, generateTwoParam.