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Graphical User Interface on Analysis of Mechanics and Dynamics of Biopolymers in Living Cells

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ABSTRACT

The mechanical properties of cells depend on the qualities of filamentous-actin (f-actin for short), among other cytoskeletal polymers. The ability to quickly determine f-actin qualities in a sample will help cellular biologists with cytoskeletal protein research. The goal of this project is to create a Matlab program which would allow researchers to determine, with limited manual input, the average filament length and persistence lengths of selected filaments. Through the graphical user interface, the user loads the image stack and can optimize the tracking result by altering several expectations of the program such as the expected contrast between the filament and background. The interface prompts users to select filaments of interest and gives the option of modifying the tracking solution by shortening it as well as retracking with a different contrast. The details of the filament tracking software can be found on the abstract, *The Analysis of Mechanics and Dynamics of Biopolymers in Living Cells* [1]. The program will calculate basic statistics, mean and standard deviation, on the elongation and persistence lengths of all selected filaments and save them to a text file. Using this relatively automated program, researchers will be able to analyze a higher percentage of their data at a much lower cost to their time. Additional work would include further increasing how automatic this program is by eliminating the need for the user to select filaments of interest, allowing the program to track over many frames and by increasing the accuracy of the tracking program.

KEYWORDS

Bioinformatics, Filament image analysis, Biopolymer mechanics, filament tracking software interface

REFERENCES

[1] S. Agrawal and P. Russel, "The Analysis of Mechanics and Dynamics of Biopolymers in Living Cells", *Purdue University E-Pubs.*(August, 2014)