The Premises of Applying Computational Algorithms to Enhance Microbiological Studies Through Stimulation of Laplacian of Gaussian (LoG) Kernels

Meadows, Audrey (School: Martin Luther King High School)

Experimentation in physical sciences is susceptible to human and technical errors. However, recent advancements in computational fields have provided applicable mechanisms to the areas of physical sciences. By manipulating the strengths of computer programming, this study focuses on developing an algorithm, in the Python interface, that specializes in ‘blob detection’ through integration of Laplacian of Gaussian kernels. The algorithm is designed to use edge detection software to study and count populations of microscopic organisms in order to enhance microbiological studies. Samples will first be magnified using a basic compound microscope then categorized into one of four tiers based upon its population density, visibility, degree of abnormality, and complexity. Individual categories will then be uploaded to the program for analysis. The basis of this algorithm was motivated by ‘galaxy recognition’ programming used in the Hubble eXtreme Deep Field algorithm designed by the National Aeronautics and Space Administration. Upon further development, this algorithm has the potential to revolutionize the scientific industry by fusing areas of physical sciences with those of computer science. A key portion of this study focused upon improving laboratory safety by limiting biohazardous exposure and decreasing technical error. However, with slight adjustments, the algorithm can be directed to focus on more specific issues plaguing the scientific industry. As such, this algorithm could have the ability to trace and observe bacterial growth patterns by analyzing bacteria samples. With minor modification, the algorithm would be able to estimate the distance between bacterial colonies in a sample in order to create a general average for bacterial growth to apply to a larger medium.

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