

1154-92-1442

Rithika Narayan* (rithikanarayan2019@gmail.com), Department of Mathematics, Elwood John Glenn High School, 478 Elwood Rd, Elwood, NY 11731. *A Mixed Lattice Approach for Determination of the Areas of Cellular and Subcellular Structures*. Preliminary report.

Determination of even subtle changes in cellular / subcellular dimensions inform a number of disease processes. Hypertrophy of cardiomyocytes informs ventricular remodeling, glomerular expansion precedes glomerular scarring and an increasing cystic index is prognosticative of worsening polycystic kidney disease. The majority of shapes occurring in biology are not defined. Many of these structures are often irregular and curvilinear in nature and accurate determination of their areas is challenging. Absent set formulas to define the area of curvilinear irregular planar regions, the method of counting unit squares is used. Nonetheless, infinitesimally small that the unit square may be this method still underestimates the area of this region and can therefore misrepresent subtle changes. Developed herein is a mixed unit lattice approach that represents an improvement over the unit square method in approximating the area bounded by an irregular curvilinear planar region. In test cases comprising glomeruli and renal cysts, this method outperformed the conventional unit squares method. This work forms the foundation for refining the method used by most software today for estimating the area of irregular curvilinear cellular and subcellular structures. (Received September 15, 2019)