Fast 3D Cytometry for Information in Tissue Engineering

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Technology description

The present invention provides a system and method of performing three-dimensional image segmentation, which may be performed in real time, along with a system and method for controlling autofocus based on surface tracking within a confocal imaging scan. The invention is particularly well suited for use in tissue engineering, wherein the imaging objects are cellular structures.

The applications for the present system varry, ranging from molecular biology to whole organ level studies. One aspect of the invention is a method of controlling the autofocusing of a microscope having a focus mechanism, comprising:
(a) establishing an initial focal range for volume scanning of a sample by a microscope;
(b) detecting a surface of the sample in response to registered optical characteristics; and
(c) mapping of images from a set of optical planes in response to the location of the surface of the sample.
The sample preferably comprises a cellular tissue sample and the surfaces being detected are either an upper or lower surface of the sample. The reflected optical characteristics being registered comprise the optical power of high spatial frequency components.

The surface detection can provide for limiting the collection of image data to objects within a cellular tissue sample imaged with microscope, comprising:
(a) establishing an initial focal range for volume scanning of a sample by a microscope;
(b) detecting a surface of said sample in response to registered optical characteristics; and
(c) selecting images for storage that lie within said cellular tissue sample as determined in response to the positional relationship of the positions of said images with said detected surface. An apparatus comprising a computer element and programming for executing the above steps can be created according to the present invention, or the method may be incorporated within other systems or hardware.

Additional Information

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