

**NEW BOOKS**

**John C. Russ: Computer-Assisted Microscopy (The Measurement and Analysis of Images), Plenum Press, 1992, 453 pages, 75 USD**

Since its first edition in 1990 this book has become a classical textbook in the field of video microscopy. It is intended for general users of image analysis systems and gives the readers deeper understanding of various image analysis operations. The book starts with a short chapter on image acquisition. After the images have been acquired and stored in the computer memory they need to be processed. About half of Russ' book is dedicated to the image processing techniques - they transform the acquired image into a new, different image. The simplest are point operations that assign to every picture element (pixel) a new value calculated from the original one by a prescribed rule. These operations are usually implemented by 'look up tables'. Furthermore, the text discusses commonly used spatial domain operations which deal with a pixel and its neighbours, as well as frequency domain operations that are most often applied to extract periodic features of an image. One of the main tasks in image processing is to distinguish the measured objects from their surroundings. A short chapter describes the segmentation of edges and lines using 3x3 operators or other methods including manual outlining. In the chapter about discrimination and thresholding J.C. Russ discusses methods for converting gray scale images into binary ones. As the values of the measured stereological parameters usually depend on the threshold settings, the choice of the appropriate automatic method is very important. The discussion on image processing is terminated by a chapter on binary image editing.

On a processed image various measurements can be performed. For instance, the lengths, breadths, reference areas or boundary curvatures of observed features may be determined. Of interest are also various shape parameters, including those obtained by the harmonic analysis of the outlines. A clearly written chapter on stereological interpretation of the measured data follows, illustrated with the examples of global and feature specific measurements. A general reader will find the basic information about object recognition and measurements of surface images, including shape extraction from texture and a short discussion on fractal surfaces very illuminating. Three-dimensional objects are most conveniently represented and viewed stereoscopically, and J.C.Russ explains not only the basic principles of stereo vision but includes also topics such as random dot stereograms. The book also touches measurements on three-dimensional objects by serial sectioning, and it concludes with an interesting chapter on the performance of human vision.

This is a well written book covering the whole field of microscope image analysis. As such it is a valuable addition to the bookshelf of everybody engaged in computer-assisted microscopy.

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