The exposition, throughout, is crisp and to the point. There is a healthy balance between theoretical analysis, the study of error propagation and complexity, and practical experimentation. Each chapter is provided with a superb collection of exercises—many supplied with solution sketches—and with historical notes and bibliographies. For future editions, however, the authors may wish to pay more attention to the correct spelling of names.

W. G.

29[68T99, 65D07, 65D10].—ANDREW BLAKE & ANDREW ZISSERMAN, *Visual Reconstruction*, The MIT Press Series in Artificial Intelligence, The MIT Press, Cambridge, Mass., 1987, ix+225 pp., 23 $\frac{1}{2}$ cm. Price $25.00.

This book appears in a series on artificial intelligence, and seems to be aimed primarily at computer scientists. However, mathematicians interested in computer vision will certainly want to look at it, and it may be of some peripheral interest to numerical analysts and approximation theorists interested in optimization and/or splines.

The subject is *visual reconstruction*, which is defined by the authors to be the process of reducing visual data to stable descriptions. The visual data may be thought of as coming from photoreceptors, spatio-temporal filters, or from depth maps obtained by stereopsis or optic rangefinders. Stability in this setting refers to the desire that the representation should be invariant to certain distortions such as sampling grain, optical blurring, optical distortion and sensor noise, rotation and translation, perspective distortions, and variation in photometric conditions.

The bulk of the book is devoted to the use of certain variational methods (called here weak strings, weak rods, and weak plates) for detecting edges (discontinuities in value or slope) of functions and surfaces. The methods are a form of penalized least squares, where the penalty includes a measure of smoothness of the function (typically an integral of a derivative) which is reminiscent of spline theory. These problems are analyzed using variational methods, and solved by discretizing them and applying an appropriate optimization method. The optimization method discussed here is referred to as the *graduated non-convexity algorithm*, and is designed to work on the nonconvex problems arising here. Convergence properties and the optimality of the algorithm are discussed.

The book includes about 150 references, mostly in the computer science literature. The authors seem to assume that the reader is familiar with much of this literature; results are often referred to without explanation. Readers not familiar with such things as "pontilliste depth map", "hyperacuity", "cyclopean space", or "data-fusion machine" may find the going hard. The authors have elected to "avoid undue mathematical detail", and despite several appendices, I expect that most mathematicians will not be fully satisfied.

L. L. S.