Geostatistical Software Library and User's Guide

by **Clayton V. Deutsch and André G**. Journel.

Review by **Christopher G. Kendall**

This book will be an important text to most of geostatisticians, including graduate students and experts in the field of practical geostatistics. The guts of this volume are the two high-density IBM disks which come with it and contain 37 programs which can be run in both UNIX and DOS environments but are not machine specific. The programs are aimed at three major areas of geostatistics: quantifying spatial variability (variograms), generalized linear regression techniques (kriging), and stochastic simulation. In all there are some 80 source files included with the distribution diskettes. The programs are not execuable but require to be compiled before running them. A machine with a fortran compiler is required. The intent of the authors is to make this suite of programs accessible to anyone who wants to use them. The source code of these programs has been assembled, developed, tested, and tried at Stanford University over a period of some 12 years. Though this library of programs is not intended as a commercial product it represents a gold mine to those who need a jump start into the field of geostatistics.

The text of the book is a guide to the programs, providing a general description of them. It is certainly not a theoretical text book on statistics, but is focused on explaining how the programs on the disks work. These programs are aimed at mapping the spatial distribution of one or more attributes, with the intent of predicting the distribution of these attributes away from areas where they are well known, into areas of poor data. The authors, and students they worked with, have tried to provide a uniform style to the software. This users' guide is written to be understood by all, aiming at clarity of style rather than the description of rococo theories. The intent of authors is that these programs can be used as stand alones or can be broken into segments that can then be tied into one's own custom developed software.

This book is a professionally assembled manual to the attached programs. There are numerous notes and explanations of the different software, with many examples. The execution of each program is discussed along with their parameter files and the nature of data sets needed to run them. There is also the provision of problem data sets to test the programs so they can be better understood. Though this book was not proposed as a text book, it does contain data sets which can be run with the programs, questions that can be asked with them, and contains results from running these programs, suggesting that this book can be used as a laboratory text. Don't let this put you off. These exercises and examples are useful, particularly if you plan to use these programs and need to develop some familiarity with them before you incorporate them into solving your own problems.

Though this book is only 340 pages long, it represents many years of work and provides an insight into the geostatistics that can only be gained through the practical application of the software that is provided with this book. Deutsch, Journel and their students have provided an invaluable service to the geological community by publishing this work. Though the authors disclaim any responsibility for the software and its inherent problems, I am sure that their phones are going to be ringing off the hook for years to come by people asking for help. Clearly the authors have come to recognize that beyond being a creative act, the purpose of writing software is that someone will use it. It is great to have this volume on my shelves and I am sure that those who have interest in geostatistics will not regret purchasing it either.

1 Geostatistical Concepts: A Review II.1.1 The Random Function Concept II. 1.2 Inference and Stationarity 11.1.3 Variogram 11.1.4 Kriging 11.1.5 Stochastic Simulation 11.2 GSLIB Conventions 11.2.1 Computer Requirements 11.2.2 Data Files 11.2.3 Grid Definition 11.2.4 Program Execution and Parameter Files 11.2.5 Machine Precision 11.3 Variogram Model Specification 11.3.1 A Straightforward 2D Example.Â 241 253 266 271 283 296 B Software Installation B.I Installation B.2 Troubleshooting 325 325 327 C Programming Conventions C.I General C.2 Dictionary of Variable Names C.3 Reference Lists of Parameter Codes 329 329 330 336 D Alphabetical Listing of Programs 339 E List of Acronyms and Notations E.I Acronyms E.2 Common Notation 341 341 342. Deutsch, C. V. and Journel, A. G. (1992), GSLIB: Geostatistical Software Library and Userâ€™s Guide, New York: Oxford University Press. Goovaerts, P. (1997), Geostatistics for Natural Resources Evaluation, New York: Oxford University Press. Hohn, M. (1988), Geostatistics and Petroleum Geology, New York: Van Nostrand Reinhold. Isaaks, E. H. and Srivastava, R. M. (1988), â€œSpatial Continuity Measures for Probabilistic and Deterministic Geostatistics,â€ Mathematical Geology, 20, 313â€“341. Journel, A. G. (1985), â€œThe Deterministic Side of Geostatistics,â€ Mathematical Geology, 17, 1â€“15. Journel, A. G. a The package consists of the GSLIB user's guide and FORTRAN source code on two diskettes.Â GSLIB is addressed to the reasonably advanced practitioner or researcher who needs powerful, flexible, and documented programs that are not confined to user-friendly menus. It offers the most advanced methods in the field, including indicator kriging and several forms of conditional simulations, all developed in three-dimensions, and can be run in any kind of computer. The package consists of the GSLIB user's guide and FORTRAN source code on two diskettes.