
Concepts in Geostatistics

Edited by Richard B. McCammon
Springer-Verlag, New York,
 168 p. 1975.
 \$12.00 (paperback)

Reviewed by P. J. Lee
Home Oil Company Limited
 304 - 6th Avenue S.W.
 Calgary, Alberta T2P 0R4

This is an outgrowth of a short course for geology professors. Chapter 1 begins with an excellent discussion on the statistical behaviours of sample mean and variance when sample size is not fixed in advance but could be determined during the course of experiment by criteria depending on the observations as they occur. The sum of two independent random variables with uniform densities on the interval 0 to 1 has the triangular density. This concept, rather unusual, should be kept in mind when one deals with multivariate analysis. Spatial probability of a dyke and particle size distribution within a thin section are discussed in the light of geometric probability.

Chapter 2 describes the concepts of R- and Q-mode factor analysis used in geology. It presents a detailed numerical procedure and its meaning for each computation step. There is a problem in estimating the factor model (2.4.10); the notion of principal component can be used, and there is a maximum likelihood solution. The concepts of principal component and factor models should not be blurred, even though the principal component solution is adapted. The problem of the determination of the number of factors fit to the model is ignored by using special data sets. The factor model (2.4.10) does not have the resemblance to a classical regression model (Kendall and Stuart, 1966, p. 306). The F 's are random variables rather than fixed quantities as regressors. Statistical assumptions required are not discussed.

In Chapter 3, the effect of a moving average on residual variation has not been discussed. It is not made clear under what kind of situations a moving average could appropriately be applied. In practical aspect, we may question whether it is safe to eliminate the trends by a moving average. One example

states that minor fluctuations are completely removed (p. 77) by using Spencer's 21-term formula. Kendall and Stuart (1966, p. 375) have demonstrated that the formula does not give the expected result.

Chapter 4 gives an excellent introductory treatment on Markov process. If the underlying random variables that generate the process are not geometrically or exponentially distributed, the process cannot be dealt with directly as a Markov process. It suggests that instead of considering the process at the full set of time points, one considers the behaviour at a suitably select sub-set of time points, so chosen that the resulting process is an embedded Markov process.

Chapter 5 describes simple ratio correlation of two ratios. It states that if the denominators of the ratios are constant, then the ratio correlation will be as usual. On the other hand, if the denominators are random variables, then the ratios behave quite differently.

Chapter 6 gives a brief historical review of statistical and computer applications in university environments. It raises a question - what kind of mathematical technique will be developed in 1980s? The explanation regarding the difference between equation (2.4.4) and the sample variance S^2 of p. 2 also raises a question - when would be an appropriate time to present the formal concept as follows: equation (2.4.4) is a maximum likelihood estimator, whereas S^2 is an unbiased estimator for random samples from infinite population?

The final chapter presents a problem set in geostatistics suitable for classroom use. Typographical errors occur on p. 9, 10, 25, 26, 30, 33, 49 and 158.

Geostatistics is a fascinating subject, yet frustrating. This book will be of value to mathematical statistics students wishing to learn the problems and limitations of statistics applied to geologic problems.

Reference

Kendall, M. G. and A. Stuart, 1966, *The Advanced Theory of Statistics*: Charles Griffin and Co. Ltd., London, v. 3, 552 p.

MS received August 14, 1975.

100 Ways to Save Energy and Money in the Home

Office of Energy Conservation
 Energy, Mines and Resources
Information Canada, 159 p., 1975.
 Free.

Reviewed by M. A. Middleton
 90 St. Margaret's Rd.
 Ancaster, Ontario L9G 2K9

The Department of Energy, Mines and Resources has managed to come up with an even hundred suggestions to justify the title of its generally useful (and free) publication. That the task must have been a strain is evident, in that the actual number of sensible suggestions is somewhat less. Those likely to be implemented by the average energy-conscious thrifty Joe or Jane are fewer still. As a result, whether intentionally or no, *100 Ways* is entertaining as well as useful.

More than half the book deals with home heating, insulation, and ventilation: how to get more out of a heating system, to add insulation to an older home, to choose an air conditioner (if you must have one). Heating is the largest item in the household energy budget, and savings from good furnace maintenance and added insulation can go as high as 30 per cent of your present fuel bill, even before the thermostat is turned down to 68°F. Drawings, charts and how-to instructions seem clear. After furnaces come hot-water tanks, the second most expensive consumer of energy. The government does not suggest that you take a bath with a friend. Instead it suggests that you take no baths at all - showers are more economical than baths. There are instructions for insulating your tank and hot-water pipes, and a helpful section with diagram on repairing a leaky faucet.

Most of the remaining suggestions expand the oft-repeated idea that "every little bit helps". Fluorescent lights are more efficient than incandescent, electric kettles and frypans more efficient than the stove, solid state TV more economical than tube. Every housewife should own a pressure cooker. Electric razor owners are using less hot water and therefore less electricity than those who lather up. A dimmer switch in the dining room

sounds like an excellent idea. But would our neighbours understand that we are being energy-conscious when we eschew air-conditioning and cool off instead in our child's wading pool? Who in Ottawa had the bright (fluorescent) idea of urging Canadians to eat lighter-coloured toast? What to make of the suggestion to let hot water in sinks and tubs cool before pulling the plug, to "heat the house rather than the sewers"? I suppose it is possible that in a house where the temperature is 68°, the family might be happy to stand around a hot sink or even tub if a member was so much a wastrel as to take a hot bath. Most housewives I have talked to would rather see the dirty water, no matter how hot, down the sewer as soon as possible.

This would have been a better book had it simply republished articles from *Consumer Reports*, *Better Homes and Gardens*, *Woman's Day* and so on. Such magazines have been explaining clearly for years how to save energy and money, while making the reader feel moderately intelligent and conscientious. The tone of *100 Ways* is frequently that of a fatherly principal exhorting Grade 10 students to keep the school clean. And not as high as Grade 10 at times - surely anyone supposed capable of following instructions for putting in insulation should not be supposed to need a glossary in which "energy shortage" and "blackout" are defined.

Being the grateful owner of a dishwasher, I am a little irritated at EMR's implication that these machines are little more than a boon to lazy teenagers and maybe housewives who wish to escape kitchen work. They are also a boon to those who are busy or tired. As for their being energy wastrels, I delight to take issue with EMR. According to *Consumer Reports*, most people use almost as much hot water in hand-washing dishes as a dishwasher uses; if the dishwasher is turned off before the drying cycle begins, than a dishwasher run once a day uses about half the 350 kwh of a black-and-white TV (excluding the hot water). When it comes to saving energy, I suspect most dishwasher owners would rather take cool showers and eat lighter toast. Would the people at EMR do as much to keep their electric typewriters?

If you would like a copy of this book, write to: 100 Ways, Box 3500, Station C, Ottawa, Ontario, K1Y 4G1. There is

enough useful information in it to repay the cost of paper and postage. And after you've fixed up the furnace, caulked your windows, and installed your dimmer switches, then gather the family around a cooling sink and discuss suggestions you might send in to EMR for saving energy, for future publication. My suggestion, though it saves no fuel, is that EMR drop "100" from the title and remove a few suggestions from the book. The government has no place in the humour business.

MS received September 2, 1975.

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