"Gheorghe Asachi" Technical University of Iasi, Romania

Book Review

ENCYCLOPEDIA OF ENVIRONMETRICS

Edited by
Abdel H. El-Shaarawi[1], Walter W. Piegorsch[2]

[1]*National Water Research Instiute, Burlington, Ontario, Canada and Department of Mathematics and Statistics McMaster University, Hamilton, Canada and The Department of Mathematics and Actual Science, The American University in Cairo, Egypt*
[2]*BIO5 Institute, University of Arizona, Tuscon, USA*

The authors provide valuable reference sources, since 117 well structured articles are presented in the third volume. Each article cover adequate information on the subject treated: definitions, explanations of terms, calculation models, effects, description of evaluation methods, algorithms, examples etc.

The entries are from *F* to *M*:

Flood risk management, quantitative methods: discuss probabilistic methods, uncertainties, systems analysis, risk management and future extensions of flood risk management.

Floods and changing climate: seasonal forecasts and reconstruction focus on relationship between floods and climate change; are reviewed climate and physical mechanisms that control seasonal flooding risk.

Flow over complex terrain, numerical modeling of: describes include numerical modeling, the diagnostic and prognostic models.

Food web modeling - food web is a network of species connected by throphic links; the article is focused on food web analyses.

Forecasting, environmental: provides a review of models and examples.

Forest carbon cycling: includes measuring and modeling of carbon cycle.

Forest ecology: the article provides information about watersheds and water budgets, forest geomorphology and ecosystem management.

Forest-fire models: explains fire risk models, fire spread models and fire effects models.

Forest growth and yield modeling: gives a brief description of forest growth models which can be used to predict future status of forest.

Forest health monitoring: provides examples of forest monitoring programs in US and Europe.

Forest inventory: presents the purpose for conducting a forest inventory and the general procedure.

Forestry: provides information about the forestry which is a combination of biological, quantitative, managerial and social sciences.

Fractal dimensions: deals with fractal dimensions and also presents the fractal approach as an important tool in ecological studies.

Frequency curves: describes and illustrates curves.

Frontier model: discuss the model.

Fuzzy regression: is focus on the fact that the regression models can be used to investigate stochastic dependence of a variable on quantities.

Gamma function: provides description of function and an example.

Gauss-Markov theorem the article presents the theorem, also provides the extensions and limitation of this theorem.

Gaussian process: describes the process which can be used for modeling data observed over time or space or time and space.

Gaussian process, conditional and simultaneous: both types (conditional and simultaneous) of processes are described.

Gene environment interaction: presents studies on the response to an environmental exposure.

Generalized additive models: provides the algorithm of calculation and the estimations of generalized linear model.

Generalized estimating equations: discuss the equations.

Generalized extreme value distribution: provides methodology and methods.

Generalized linear mixed models: gives incorporate random effects into generalized linear model; examples of models.

Generalized linear models: presents guideline for choosing link function and variance function probability models, also are included estimation of parameters and residual analysis.

Generalized P values: contains information about comparison of two normal populations and describe the one-way ANOVA model.

Generalized regression estimators – the methodology are presented, the regression estimators can be used in survey sampling.

Genetic algorithms can be used to solve optimization problems, the article discuss the simple genetic algorithm, improving performance and evolutionary algorithms.

Genetically modified organisms: explains applications of genetically modified organisms, the basis for risk assessment and statistical approaches.

Geographic information systems (GIS), spatial statistics in – the article presents the spatial statistical methods.

Geometrics engineering – discuss the applications of geometrics, geospatial data infrastructure, contributions of geometrics engineering.

Geometric mean – presents an alternative measure of the central tendency of a given data.

Geomicrobiology and environmental biotechnology includes information about the role of microbes in geological processes.

Geostatistical methods in water resources presents - presents various examples of applications, contribution of geostatistical methods to water resources.

Geostatistics, model –based – provides the model description and examples.

Global ecology – gives a brief description.

Global environment monitoring system, water – presents the phases of global environment monitoring system, stations.

Global environmental change: includes detection technique, amplitudes estimation, optimal methods.

Global environmental epidemiology network (WHO) – presents the activities of the network.

Global warming: estimation of global average surface temperature causes of climate change, the feedback mechanisms, IPPC reports are discussed in this article.

Goodness of fit (testing) – provides methodology of the tests.

Groundwater monitoring and assessment – discuss resources and quality of groundwater.

Groundwater monitoring, detection and compliance – presents the statistical methods.

Groundwater remediation: includes the remediation treatment methods (in situ, on-site, off-site).

Habitat survey and sampling designs – the habitat variables and measurement method are described.

Hansen-Hurwitz estimator can be used in sampling strategies, the presentation of this estimator is provided.

Hazardous agents – the article include statistical aspects of inhalation toxicology, proof of hazard and discuss genetic toxicology and role of oncogenes in carcinogenesis.

Healthy worker effect is a form of selection bias; in the article are presented ways for identification and reduction of bias.

Heritability – the article describes a central concept of quantitative genetics.

Hierarchical Bayes methods – presents the methodology and the models.

Hierarchical Bayesian space-time analysis – the models are discussed in two parts.

Hierarchical model – the statistical model is presented.

Hierarchy theory, ecological – the article deals with complexity of the systems, holons at hierarchical levels, presents ordering principles and discusses emergence and ontology versus epistemology.

Historical controls – an historical database can be useful in interpreting results from experiments.

Hormesis – describes dose-response relationships.

Hostelling's T-squared statistics – the applications and properties are presented.

Hostelling's T^2 tests (robust versions of) – the tests are discussed and the rank based versions of the tests are presented.

Hydrological extremes – the article include information about selection of data, choice of distribution, parameter estimation techniques and present regional frequency analysis.

Hydrological frequency analysis – statistical distributions, parameter estimating methods, statistical model selection, nonstationary frequency analysis, multivariate hydrological frequency analysis and regional frequency analysis are discussed.

Hydrological frequency analysis, regional – include a review of new methodologies to regional estimation of hydrological phenomena.

Hydrological time series analysis – represents an overview of hydrologic time series techniques for modeling streamflow.

Hydrology, environmental – discuss the ecohydrology, environmental flows or insteam flow requirements and water quality/quantity areas.

Image analysis is used to interpret digital versions of images; a brief description of these analyses is made.

Impact assessment: assessing a local biological effect with before and after data – the intervention analysis procedure, BACI model and unmeasured uncertainty are discussed, also some examples are provided.

Impact, environmental – presents two tools environmental impact assessment and strategic environmental assessment.

Importance sampling – provides some considerations and applications.

Incomplete block designs – the method is described.

Independent component analysis – the methodology of conducting this analysis is provided.

Indicator species – discuss the problem of monitoring progress biodiversity conservation.

Influence diagrams – presents graphical models for structuring decision scenarios.

Informatics, environmental – an overview on environmental informatics is provided.

Information matrix – presents the matrix.

Inhalation toxicology – statistical perspectives (environmetrics, dosimetrics, epidemiology, risk assessment) are discussed.

Interlaboratory studies – design considerations and statistical procedures are presented and an example is provided.

Inverse prediction – deals with prediction of one set of measurements from another.

Inverted wishart distribution, generalized - generalities and particularities and also some properties are presented.

Iteratively reweighted least squares – discuss the generalized linear models, robust estimation, convergence questions, diagnostics and influence functions.

Joint action models- include information about simple independent action and simple similar action.

Joint models – the conditional models are discussed and applications are presented.

Journal of agricultural, biological and environmental statistics – the mission, history and structure of the journal are provided.

Kernel density estimation – the univariate and multivariate density are discussed.

Kriging – the model and structure of this interpolation method are given.

Kriging, asymptotic theory – the theory is presented.

Kriging for functional data – the methods for spatial prediction of functional data are discussed.

Kronecker product – the article include definitions and basic properties and an application in spatial and spatiotemporal modeling.

LAD estimation with applications in time series analysis – the asymptotic theory is presented and some aspects are discussed.

Landform monitoring – information about techniques, glaciers, volcanoes and landslides are provided.

Landscape ecology which involves generation and dynamics of pattern in ecosystems is presented.

Landscape pattern metrics – an overview about utilization and limitations of landscape pattern metrics in landscape ecology.

Lasso, the – article provide a presentation of a method for combining shrinkage estimation with model selection.

Law and environmental statistics – discus several issues regarding this area.

Least squares – include information about history, applications and extensions of the method.

Least squares, general discuss some applications of the method.

Levy process – the article include useful information about the properties, simulation and construction of the tool.

Life stage analysis – life tables, cohort analysis, key factor analysis and matrix population models are discussed.

Likelihood ratio tests – a principal method in a standard hypothesis testing framework is presented.

Line-transect sampling, new approaches – the approaches to nonparametric estimation of the detection function, mark-recapture methods, spatial models and Bayesian methods are discussed.

Linear models – the algorithm of calculation is provided.

Litter effect – historical and some modern developments are presented.

Logarithmic regression - include information about regression on log transformed data and inference and normal regression under transformation.

Logistic regression – explanation of a common method which can be used in modeling the relationship between some explanatory variables and binary response variable.

Lognormal distribution – the article provide information about distribution and its characteristics, inference about the parameters and an example.

Long range dependence – deals with strong correlation between distant observations in a time series.

Long-Term Ecological Research Program – the article include history of the network, description of program and objectives, management of the network.

Long-term environmental monitoring – types, scales, shortcomings of environmental monitoring, environmental processes and parameters, sampling and measurements are discussed.

Longitudinal studies – some examples are provided and analysis of longitudinal data is presented.

Lowest-observed-adverse – effect level (LOAEL) – description of this group is provided.

Machine learning – the article is focused on learning paradigm (regularized risk minimization) and some statistical methods are presented.

Markov chain Monte Carlo (MCMC) – the article includes general description of issues types which necessitate the use of MCMC and fundamental algorithms.

Markov chains – the sequences of random variables are presented.

Markov process – the process and the Markov random field are discussed.

Markov process, hidden – the process is described.

Markov random field models – the models and some application are presented.

Massive data, models for – the local models, methods that exploit sparce matrices, low rank models are discussed.

Matric t-distribution – the article includes moments of random matrices, matric normal distribution and student matric t distribution, marginal and conditional matric.

Matrix population models – the discreet time structured population models are described.

Cristina Ghinea
Maria Gavrilescu
Department of Environmental Engineering and Management
Faculty of Chemical Engineering and Environmental Protection
"Gheorghe Asachi" Technical University of Iasi, Romania