

Microarray

Daniel P. Berrar,Werner Dubitzky,Martin Granzow

Microarray Innovations Gary Hardiman, 2009-04-02 In recent years, high-density DNA microarrays have revolutionized biomedical research and drug discovery efforts by the pharmaceutical industry. Their efficacy in identifying and prioritizing drug targets based on their ability to confirm a large number of gene expression measurements in parallel has become a key element in drug discovery. *Microarray Innovations: Technology and Experimentation* examines the incredibly powerful nature of array technology and the ways in which it can be applied to understanding the genomic basis of disease. Explores a myriad of applications in use today This volume explores recent innovations in the microarray field and tracks the evolution of the major platforms currently used. The international panel of contributors presents a survey of the past five years' research and advancements in microarray methods and applications and their usage in drug discovery and biomedical research. The contributions discuss improvements in automation (array fabrication and hybridization), new substrates for printing arrays, platform comparisons and contrasts, experimental design, and data normalization and mining schemes. They also review epigenomic array studies, electronic microarrays, comparative genomic hybridization, microRNA arrays, and mutational analyzes. In addition, the book provides coverage of important clinical diagnostic arrays, protein arrays, and neuroscience applications. Examines improved methodologies As microarrays have evolved steadily over time from archetypical in-house complementary DNA (cDNA) arrays to robust commercial oligonucleotide platforms, there has been a migration to higher density biochips with increasing content and better analytical methodologies. This compendium summarizes the vast advances that have been made in this technology, highlighting the supreme advantages of microarray-based approaches in the field of biomedical research. Daniel E. Levy, editor of the Drug Discovery Series, is the founder of DEL BioPharma, a consulting service for drug discovery programs. He also maintains a blog that explores organic chemistry.

A Beginner's Guide to Microarrays Eric M. Blalock, 2011-06-27 A Beginner's Guide to Microarrays addresses two audiences - the core facility manager who produces, hybridizes, and scans arrays, and the basic research scientist who will be performing the analysis and interpreting the results. User friendly coverage and detailed protocols are provided for the technical steps and procedures involved in many facets of microarray technology, including: -Cleaning and coating glass slides, -Designing oligonucleotide probes, -Constructing arrays for the detection and quantification of different bacterial species, -Preparing spotting solutions, -Troubleshooting spotting problems, -Setting up and running a core facility, -Normalizing background signal and controlling for systematic variance, -Designing experiments for maximum effect, -Analyzing data with statistical procedures, -Clustering data with machine-learning protocols.

DNA Microarrays Mark Schena, 2007-10-01 DNA Microarrays: Methods Express covers the very latest in DNA microarray technology, with a clear focus on how these techniques can be used in the lab to gain the very best results. The authors are from some of the leading laboratories in the field and write with real authority on the latest methodology. Every chapter provides detailed step-by-step protocols with valuable hints and tips for success, as well as giving typical experimental results and selected literature citations. This book is a 'must have' manual for researchers in all fields of biology, medicine and agriculture.

Exploration and Analysis of DNA Microarray and Protein Array Data Dhammika Amaratunga, Javier Cabrera, 2009-09-25 A cutting-edge guide to the analysis of DNA microarray data Genomics is one of the major scientific revolutions of this century, and the use of microarrays to rapidly analyze numerous DNA samples has enabled scientists to make sense of mountains of genomic data through statistical analysis. Today, microarrays are being used in biomedical research to study such vital areas as a drug's therapeutic value—or toxicity—and cancer-spreading patterns of gene activity. *Exploration and Analysis of DNA Microarray and Protein Array Data* answers the need for a comprehensive, cutting-edge overview of this important and emerging field. The authors, seasoned researchers with extensive experience in both industry and academia, effectively outline all phases of this revolutionary analytical technique, from the preprocessing to the analysis stage. Highlights of the text include: A review of basic molecular biology, followed by an introduction to microarrays and their preparation Chapters on processing scanned images and preprocessing microarray data Methods for identifying differentially expressed genes in comparative microarray experiments Discussions of gene and sample clustering and class prediction Extension of analysis methods to protein array data Numerous exercises for self-study as well as data sets and a useful collection of computational tools on the authors' Web site make this important text a valuable resource for both students and professionals in the field.

Guide to Analysis of DNA Microarray Data Steen Knudsen, 2005-03-04 Written for biologists and medical researchers who don't have any special training in data analysis and statistics, *Guide to Analysis of DNA Microarray Data*, Second Edition begins where DNA array equipment leaves off: the image produced by the microarray. The text deals with the questions that arise starting at this point, providing an introduction to microarray technology, then moving onto image analysis, data analysis, cluster analysis, and beyond. With all chapters rewritten, updated, and expanded to include the latest generation of technology and methods, *Guide to Analysis of DNA Microarray Data*, Second Edition offers practitioners reliable information using concrete examples and a clear, comprehensible style. This Second Edition features entirely new chapters on: * Image analysis * Experiment design * Automated analysis, integrated analysis, and systems biology * Interpretation of results Intended for readers seeking practical applications, this text covers a broad spectrum of proven approaches in this rapidly growing technology. Additional features include further readings suggestions for each chapter, as well as a thorough review of available analysis software.

Analyzing Microarray Gene Expression Data Geoffrey J. McLachlan, Kim-Anh Do, Christophe Ambroise, 2005-02-18 A multi-discipline, hands-on guide to microarray analysis of biological processes *Analyzing Microarray Gene Expression Data* provides a comprehensive review of available methodologies for the analysis of data derived from the latest DNA microarray technologies. Designed for biostatisticians entering the field of microarray analysis as well as biologists seeking to more effectively analyze their own experimental data, the text features a unique interdisciplinary approach and a combined academic and practical perspective that offers readers the most complete and applied coverage of the subject matter to date. Following a basic overview of the biological and technical principles behind microarray experimentation, the text provides a look at some of the most effective tools and procedures for achieving optimum reliability and reproducibility of research results, including: An in-depth account of the detection of genes that are differentially expressed across a number of classes of tissues Extensive coverage of both cluster analysis and discriminant analysis of microarray data and the growing applications of both methodologies A model-based approach to cluster analysis, with emphasis on the use of

the EMMIX-GENE procedure for the clustering of tissue samples The latest data cleaning and normalization procedures The uses of microarray expression data for providing important prognostic information on the outcome of disease

DNA Microarrays and Related Genomics Techniques David B. Allison, Grier P. Page, T. Mark Beasley, Jode W. Edwards, 2005-11-14 Considered highly exotic tools as recently as the late 1990s, microarrays are now ubiquitous in biological research. Traditional statistical approaches to design and analysis were not developed to handle the high-dimensional, small sample problems posed by microarrays. In just a few short years the number of statistical papers providing approaches

Microarray Technology Through Applications Francesco Falciani, 2007-06-11 Microarray Technology Through Applications provides the reader with an understanding, from an applications perspective, of the diverse range of concepts required to master the experimental and data analysis aspects of microarray technology. The first chapter is a concise introduction to the technology and provides the theoretical background required to understand the subsequent sections. The following chapters are a series of case studies representative of the most general and important applications of microarray technology, including CGH, analysis of gene expression, SNP arrays and protein arrays. The case studies are written by experts in the field and describe prototypic projects, indicating how to generalize the approach to similar studies. There are detailed step-by-step protocols describing the specific experimental and data analysis protocols mentioned in the case study section. There is also information on printing glass DNA microarray slides and data interpretation. Colour figures and data sets are provided on the website at <http://www.garlandscience.com/9780415378536>

Microarray Image Analysis Karl Fraser, Zidong Wang, Xiaohui Liu, 2010-01-25 To harness the high-throughput potential of DNA microarray technology, it is crucial that the analysis stages of the process are decoupled from the requirements of operator assistance. Microarray Image Analysis: An Algorithmic Approach presents an automatic system for microarray image processing to make this decoupling a reality. The proposed system integrates and extends traditional analytical-based methods and custom-designed novel algorithms. The book first explores a new technique that takes advantage of a multiview approach to image analysis and addresses the challenges of applying powerful traditional techniques, such as clustering, to full-scale microarray experiments. It then presents an effective feature identification approach, an innovative technique that renders highly detailed surface models, a new approach to subgrid detection, a novel technique for the background removal process, and a useful technique for removing noise. The authors also develop an expectation-maximization (EM) algorithm for modeling gene regulatory networks from gene expression time series data. The final chapter describes the overall benefits of these techniques in the biological and computer sciences and reviews future research topics. This book systematically brings together the fields of image processing, data analysis, and molecular biology to advance the state of the art in this important area. Although the text focuses on improving the processes involved in the analysis of microarray image data, the methods discussed can be applied to a broad range of medical and computer vision analysis areas.

DNA Microarrays Ulrike Nuber, 2007-02-08 DNA Microarrays introduces all up-to-date microarray platforms and their various applications. It is written for scientists who are entering the field of DNA microarrays as well as those already familiar with the technology, but interested in new applications and methods.

Microarray Biochip Technology Mark Schena, 2000 Technology standards for microarray research (M. Schena, R. W. Davis). Microfluidic technologies and instrumentation for printing DNA microarrays (Don Rose). Novel microarray printing and detection technologies (M. L. Mace Júnior, J. Montagu, Stanley D. Rose, G. McGuinness). A systems approach to fabricating and analyzing DNA microarrays (J. Worley, K. Bechtol, S. Penn, D. Roach, D. Hanzel, M. Trounstein, D. B.). The flow-thru chip: a three-dimensional biochip platform (A. Stell, M. Torres, J. Hartwell, Yong-Yi Yu, Nan Ting, G. Hoke, H. Yang). Large-scale genomic analysis using Affymetrix GeneChip probe arrays (J. A. Warrington, S. Dee, M. Trulson). Technology and applications of gene expression microarrays (E. Everts, P. Starink, R. Gupta, D. Watson). Information processing issues and solutions associated with microarray technology (Y.-X. Zhou, P. Kalocsai, J.-Y. Chen, S. Shams). Microarray tools, kits, reagents, and services (T. Martinsky, P. Haje). Micromax: a highly sensitive system for differential gene expression on microarrays (K. Adler, J. Broadbent, R. Garlick, R. Joseph, A. Khimani, A. Mikulskis, P. Rapiejko, J. Killian). Production of microarrays on porous substrates using noncontact piezoelectric dispensing (D. Englert). Arrayed primer extension on the DNA chip: method and applications (N. Tonisson, A. Kurg, E. Löhmussaar, A. Metspalu). Overview of a microarray scanner: design essentials for an integrated acquisition and analysis platform (T. Basarsky, D. Verdnik, J. Ye Zhai, D. Wellis). Selected supplier list. Index.

Exploration and Analysis of DNA Microarray and Other High-Dimensional Data Dhammika Amaratunga, Javier Cabrera, Ziv Shkedy, 2014-01-27 Praise for the First Edition “...extremely well written...a comprehensive and up-to-date overview of this important field.” –Journal of Environmental Quality Exploration and Analysis of DNA Microarray and Other High-Dimensional Data, Second Edition provides comprehensive coverage of recent advancements in microarray data analysis. A cutting-edge guide, the Second Edition demonstrates various methodologies for analyzing data in biomedical research and offers an overview of the modern techniques used in microarray technology to study patterns of gene activity. The new edition answers the need for an efficient outline of all phases of this revolutionary analytical technique, from preprocessing to the analysis stage. Utilizing research and experience from highly-qualified authors in fields of data analysis, Exploration and Analysis of DNA Microarray and Other High-Dimensional Data, Second Edition features: A new chapter on the interpretation of findings that includes a discussion of signatures and material on gene set analysis, including network analysis New topics of coverage including ABC clustering, biclustering, partial least squares, penalized methods, ensemble methods, and enriched ensemble methods Updated exercises to deepen knowledge of the presented material and provide readers with resources for further study The book is an ideal reference for scientists in biomedical and genomics research fields who analyze DNA microarrays and protein array data, as well as statisticians and bioinformatics practitioners. Exploration and Analysis of DNA Microarray and Other High-Dimensional Data, Second Edition is also a useful text for graduate-level courses on statistics, computational biology, and bioinformatics.

Microarray Data Analysis Michael J. Korenberg, 2008-02-03 In this new volume, renowned authors contribute fascinating, cutting-edge insights into microarray data analysis. Information on an array of topics is included in this innovative book including in-depth insights into presentations of genomic signal processing. Also detailed is the use of tiling arrays for large genomes analysis. The protocols follow the successful Methods in Molecular Biology™ series format, offering step-by-

step instructions, an introduction outlining the principles behind the technique, lists of the necessary equipment and reagents, and tips on troubleshooting and avoiding pitfalls.

Microarrays Hans-Joachim Müller,Thomas Röder,Thomas Roeder,2006 Microarray technology allows us to answer many questions about gene expression and drug-target screening by employing high-throughput screening. This book dedicates itself to microarrays with clear and understandable explanations and an overview of the presently available hardware, biochips and software. Separate chapters cover the different requirements for DNA and protein chips as well as spotters and scanners.

A Practical Approach to Microarray Data Analysis Daniel P. Berrar,Werner Dubitzky,Martin Granzow,2007-05-08 In the past several years, DNA microarray technology has attracted tremendous interest in both the scientific community and in industry. With its ability to simultaneously measure the activity and interactions of thousands of genes, this modern technology promises unprecedented new insights into mechanisms of living systems. Currently, the primary applications of microarrays include gene discovery, disease diagnosis and prognosis, drug discovery (pharmacogenomics), and toxicological research (toxicogenomics). Typical scientific tasks addressed by microarray experiments include the identification of coexpressed genes, discovery of sample or gene groups with similar expression patterns, identification of genes whose expression patterns are highly differentiating with respect to a set of discerned biological entities (e.g., tumor types), and the study of gene activity patterns under various stress conditions (e.g., chemical treatment). More recently, the discovery, modeling, and simulation of regulatory gene networks, and the mapping of expression data to metabolic pathways and chromosome locations have been added to the list of scientific tasks that are being tackled by microarray technology. Each scientific task corresponds to one or more so-called data analysis tasks. Different types of scientific questions require different sets of data analytical techniques. Broadly speaking, there are two classes of elementary data analysis tasks, predictive modeling and pattern-detection. Predictive modeling tasks are concerned with learning a classification or estimation function, whereas pattern-detection methods screen the available data for interesting, previously unknown regularities or relationships.

Microarray Analysis Mark Schena,2002-11-11 This authoritative text begins with an introduction to basic microarray technology. The author then provides clear explanations of the conceptual and theoretical basis of this technology, followed by thorough and multi-disciplinary coverage of modern and emerging applications. The coverage includes chapters on microarray informatics, gene expression profiling, genetic diagnostics, and novel microarray technologies.

A Biologist's Guide to Analysis of DNA Microarray Data Steen Knudsen,2011-09-23 A great introductory book that details reliable approaches to problems met in standard microarray data analyses. It provides examples of established approaches such as cluster analysis, function prediction, and principle component analysis. Discover real examples to illustrate the key concepts of data analysis. Written for those without any advanced background in math, statistics, or computer sciences, this book is essential for anyone interested in harnessing the immense potential of microarrays in biology and medicine.

DNA Microarray Technology and Data Analysis in Cancer Research Shaoguang Li,2008 DNA microarray technology has become a useful technique in gene expression analysis for the development of new diagnostic tools and for the identification of disease genes and therapeutic targets for human cancers. Appropriate control for DNA microarray experiment and reliable analysis of the array data are key to performing the assay and utilizing the data correctly. The most difficult challenge has been the lack of a powerful method to analyze the data for all genes (more than 30,000 genes) simultaneously and to use the microarray data in a decision-making process. In this book, the authors describe DNA microarray technology and data analysis by pointing out current advantages and disadvantages of the technique and available analytical methods. Crucially, new ideas and analytical methods based on the authors' own experience in DNA microarray study and analysis are introduced. It is believed that this new way of interpreting and analyzing microarray data will bring us closer to success in decision-making using the information obtained through the DNA microarray technology.

Microarray Image and Data Analysis Luis Rueda,2018-09-03 Microarray Image and Data Analysis: Theory and Practice is a compilation of the latest and greatest microarray image and data analysis methods from the multidisciplinary international research community. Delivering a detailed discussion of the biological aspects and applications of microarrays, the book: Describes the key stages of image processing, gridding, segmentation, compression, quantification, and normalization Features cutting-edge approaches to clustering, biclustering, and the reconstruction of regulatory networks Covers different types of microarrays such as DNA, protein, tissue, and low- and high-density oligonucleotide arrays Examines the current state of various microarray technologies, including their availability and affordability Explains how data generated by microarray experiments are analyzed to obtain meaningful biological conclusions An essential reference for academia and industry, Microarray Image and Data Analysis: Theory and Practice provides readers with valuable tools and techniques that extend to a wide range of biological studies and microarray platforms.

Microarray Gene Expression Data Analysis Helen Causton,John Quackenbush,Alvis Brazma,2009-04-01 This guide covers aspects of designing microarray experiments and analysing the data generated, including information on some of the tools that are available from non-commercial sources. Concepts and principles underpinning gene expression analysis are emphasised and wherever possible, the mathematics has been simplified. The guide is intended for use by graduates and researchers in bioinformatics and the life sciences and is also suitable for statisticians who are interested in the approaches currently used to study gene expression. Microarrays are an automated way of carrying out thousands of experiments at once, and allows scientists to obtain huge amounts of information very quickly Short, concise text on this difficult topic area Clear illustrations throughout Written by well-known teachers in the subject Provides insight into how to analyse the data produced from microarrays

Unveiling the Power of Verbal Artistry: An Emotional Sojourn through **Microarray**

In some sort of inundated with screens and the cacophony of immediate conversation, the profound power and psychological resonance of verbal artistry usually fade in to obscurity, eclipsed by the constant assault of sound and distractions. Yet, set within the musical pages of **Microarray**, a fascinating work of literary splendor that impulses with organic feelings, lies an unforgettable journey waiting to be embarked upon. Published with a virtuoso wordsmith, that magical opus guides readers on an emotional odyssey, softly exposing the latent potential and profound influence embedded within the complicated internet of language. Within the heart-wrenching expanse with this evocative examination, we will embark upon an introspective exploration of the book is key subjects, dissect their charming writing fashion, and immerse ourselves in the indelible impression it leaves upon the depths of readers souls.

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Microarray Introduction

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