

### **Methods in Molecular Biology**

#### **Editors:**

Verónica Bolón-Canedo Amparo Alonso-Betanzos

ISSN 1064-3745 Methods in Molecular Biology ISBN 978-1-4939-9441-0 https://doi.org/10.1007/978-1-4939-9442-7 ISSN 1940-6029 (electronic)

ISBN 978-1-4939-9442-7 (eBook)

© Springer Science+Business Media, LLC, part of Springer Nature 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Humana Press imprint is published by the registered company Springer Science+Business Media, LLC, part of Springer Nature.

The registered company address is: 233 Spring Street, New York, NY 10013, U.S.A.

## Contents

1	Introduction to Bioinformatics  Dilara Ayyildiz and Silvano Piazza	1
2	Protocol for DNA Microarrays on Glass Slides.  Kathleen M. Eyster	17
3	Data Warehousing with TargetMine for Omics Data Analysis	35
4	A Review of Microarray Datasets: Where to Find Them and Specific Characteristics	65
5	Statistical Analysis of Microarray Data	87
6	Feature Selection Applied to Microarray Data  Amparo Alonso-Betanzos, Verónica Bolón-Canedo,  Laura Morán-Fernández, and Borja Seijo-Pardo	123
7	Cluster Analysis of Microarray Data	153
8	Classification https://doi.org/10.1007/978-1-4939-9442-7_7 Noelia Sánchez-marono, Oscar Fontenta-Komero, and Beatriz Pérez-Sánchez	185
9	Microarray Data Normalization and Robust Detection of Rhythmic Features. Yolanda Larriba, Cristina Rueda, Miguel A. Fernández, and Shyamal D. Peddada	207
0	HPC Tools to Deal with Microarray Data.  Jorge González-Domínguez and Roberto R. Exposito	227
1	ROC Curves for the Statistical Analysis of Microarray Data	245
2	Missing-Values Imputation Algorithms for Microarray Gene Expression Data  Kohbalan Moorthy, Aws Naser Jaher, Mohd Arfian Ismail, Ferda Ernawan, Mohd Saheri Mohamad, and Safaai Deris	255
3	Computer Tools to Analyze Microarray Data	267

# Missing-Values Imputation Algorithms for Microarray Gene Expression Data

Kohbalan Moorthy, Aws Naser Jaber, Mohd Arfian Ismail, Ferda Ernawan, Mohd Saberi Mohamad, and Safaai Deris

Universiti Malaysia Pahang, Pahang, Malaysia

#### **Abstract:**

Orthosiphon stamineus (vernacular name: barbiflore, Java tea, misai kucing, kabling-gubat, kumis kucing, cat's whiskers, kidney tea, rau meo, remujung, balbas pusa, moustaches de chat, and yaa nuat maeo; synonym: Clerodendranthus spicatus, Ocimum aristatum, Orthosiphon aristatus, Orthosiphon grandiflorus, Orthosiphon spicatus, Orthosiphonis folium) has long been used in traditional medicine in East India, Indo China, South East Asia, and tropical regions of Australia where the plant is usually found. O. stamineus belongs to the Lamiaceae family and is a perennial herb. The stem is four-angled reaching a height ranging from 0.3 to 1 m, and the flowers are white or pale lilac. The flower has stamens (>2 cm) extending from the corolla tube. The leaves are about 2-4 cm wide and 4-7 cm long and have a lanceolate-like, elliptical, or rhomboid shape. The aerial parts (dried stem and leaves) are commonly brewed as a tea for a variety of purposes, from treating inflammatory disorders to ailments of the urogenital tract. This plant is commonly used in South East Asian folk medicine for diabetes, hypertension, gallstone, tonsillitis, epilepsy, rheumatoid diseases, menstrual disorder, gonorrhoea, syphilis, renal calculus, lithiasis, edema, eruptive fever, influenza, hepatitis, and jaundice. However, scientific studies on the medicinal benefits of O. stamineus do not confirm all its traditional uses. Nevertheless, O. stamineus is well known for its potent diuretic effect, which is stronger than other natural diuretics (Burkill, 1966).

**Keyword:** Synonym; Clerodendranthus Spicatus; Ocimum Aristatum; Orthosiphon Aristatus; Orthosiphon Grandiflorus; Orthosiphon Spicatus