



Mario Giovanni C. A. Cimino

# Clustering in non-metric spaces

From the Euclidean to the  
conceptual similarity

Clustering algorithms partition a collection of objects into a certain number of clusters (groups, subsets, or categories). Object clustering algorithms generally partition a data set based on a dissimilarity measure expressed in terms of some distance. When the data distribution is irregular, for instance in image segmentation and pattern recognition where the nature of dissimilarity is conceptual rather than metric, distance functions may fail to drive correctly the clustering algorithm. Thus, the dissimilarity measure should be adapted to the specific data set. The purpose of this book is to present the main ideas concerning the application of the machine learning paradigm to the discovering of the dissimilarity between objects. Readers involved in similarity modeling will view how computational intelligence techniques, such as fuzzy systems, neural networks and evolutionary computation, can be a powerful vehicle for capturing conceptual relationships among objects. The application of such methods is also discussed in detail, with a series of experiments.



**Mario Giovanni C. A. Cimino**

Mario Giovanni C.A. Cimino, PhD, University of Pisa, Italy. His main fields of study are Mobile Information Systems, Business Process Analysis and Computational Intelligence. As a Research Fellow, he is with the Computational Intelligence Group, Department of Information Engineering, University of Pisa.



978-3-639-18749-6

Please export an up-to-date reference from <http://www.iet.unipi.it/m.cimino/pub>

### **Impressum/Imprint (nur für Deutschland/ only for Germany)**

Bibliografische Information der Deutschen Nationalbibliothek: Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über <http://dnb.d-nb.de> abrufbar.

Alle in diesem Buch genannten Marken und Produktnamen unterliegen warenzeichen-, marken- oder patentrechtlichem Schutz bzw. sind Warenzeichen oder eingetragene Warenzeichen der jeweiligen Inhaber. Die Wiedergabe von Marken, Produktnamen, Gebrauchsnamen, Handelsnamen, Warenbezeichnungen u.s.w. in diesem Werk berechtigt auch ohne besondere Kennzeichnung nicht zu der Annahme, dass solche Namen im Sinne der Warenzeichen- und Markenschutzgesetzgebung als frei zu betrachten wären und daher von jedermann benutzt werden dürften.

Coverbild: [www.purestockx.com](http://www.purestockx.com)

Verlag: VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG  
Dudweiler Landstr. 99, 66123 Saarbrücken, Deutschland  
Telefon +49 681 9100-698, Telefax +49 681 9100-988, Email: [info@vdm-verlag.de](mailto:info@vdm-verlag.de)  
Zugl.: Pisa, University of Pisa, PhD Thesis, 2007

Herstellung in Deutschland:  
Schaltungsdienst Lange o.H.G., Berlin  
Books on Demand GmbH, Norderstedt  
Reha GmbH, Saarbrücken  
Amazon Distribution GmbH, Leipzig  
**ISBN: 978-3-639-18749-6**

### **Imprint (only for USA, GB)**

Bibliographic information published by the Deutsche Nationalbibliothek: The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

Any brand names and product names mentioned in this book are subject to trademark, brand or patent protection and are trademarks or registered trademarks of their respective holders. The use of brand names, product names, common names, trade names, product descriptions etc. even without a particular marking in this works is in no way to be construed to mean that such names may be regarded as unrestricted in respect of trademark and brand protection legislation and could thus be used by anyone.

Cover image: [www.purestockx.com](http://www.purestockx.com)

Publisher:  
VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG  
Dudweiler Landstr. 99, 66123 Saarbrücken, Germany  
Phone +49 681 9100-698, Fax +49 681 9100-988, Email: [info@vdm-publishing.com](mailto:info@vdm-publishing.com)

Copyright © 2009 by the author and VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG and licensors

All rights reserved. Saarbrücken 2009

Printed in the U.S.A.  
Printed in the U.K. by (see last page)  
**ISBN: 978-3-639-18749-6**