

2

Fundamental Models in Machine Learning and Deep Learning

Tatwadarshi P. Nagarhalli
Vidyavardhini's College of Engineering and Technology

Ashwini M. Save and Narendra M. Shekokar
D. J. Sanghvi College of Engineering

CONTENTS

2.1	Introduction.....	13
2.2	Classification of Machine Learning Models.....	15
2.2.1	Supervised Learning	15
2.2.2	Unsupervised Learning	15
2.2.3	Semi-Supervised Learning.....	16
2.2.4	Reinforcement Learning.....	16
2.3	Fundamental Supervised Learning Models.....	17
2.3.1	Regression.....	17
2.3.2	Classification	19
2.3.2.1	Logistic Regression.....	19
2.3.2.2	Support Vector Machines	20
2.3.3	Classification–Regression.....	20
2.3.3.1	Decision Tree	21
2.3.3.2	Random Forest	22
2.3.3.3	Artificial Neural Network.....	22
2.3.4	Implementation Code Snippet for Classification and Classification–Regression Techniques	24
2.4	Fundamental Unsupervised Learning Models.....	25
2.4.1	k-means Clustering	25
2.4.2	Apriori Algorithm	26
2.5	Fundamental Deep Learning Models	27
2.5.1	Autoencoder.....	28
2.5.2	Recurrent Neural Network	29
2.5.3	Convolutional Neural Network.....	31
	References.....	33

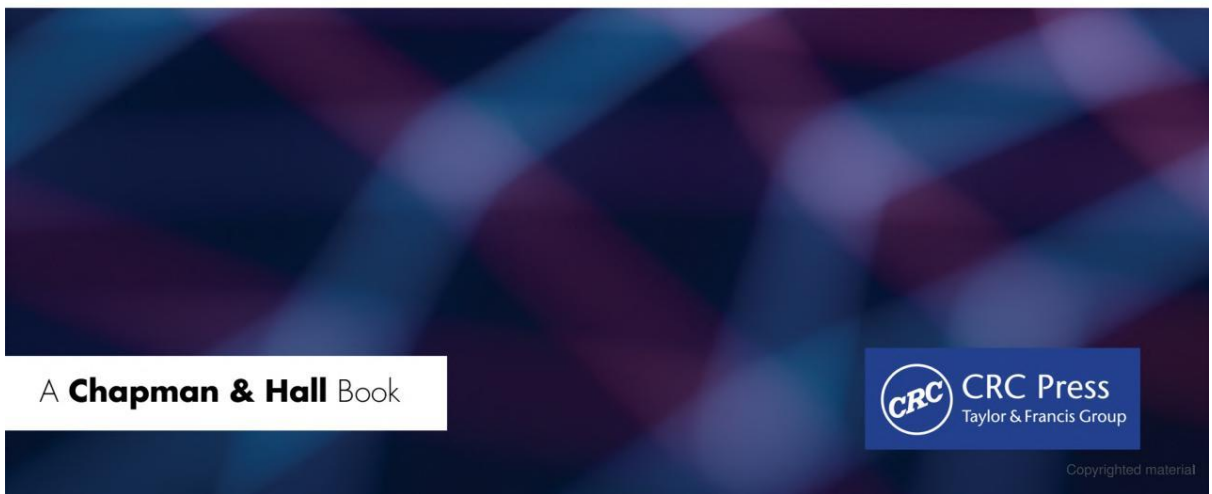
2.1 Introduction

The resurgence of AI has revolutionised the whole of the computing industry, which in turn has revolutionised almost all the possible sectors of industry. AI is the ability of the machines to think and learn in order to solve a problem by making smart decisions [1]. AI has given birth and rise to many new subfields and area of studies like ML, robotics, computer vision, natural language understanding and expert systems [2].



DESIGN OF INTELLIGENT APPLICATIONS USING MACHINE LEARNING AND DEEP LEARNING TECHNIQUES

Edited by
Ramchandra S. Mangrulkar, Antonis Michalas,
Narendra M. Shekokar, Meera Narvekar
and Pallavi V. Chavan



A **Chapman & Hall** Book

 **CRC Press**
Taylor & Francis Group

Copyrighted material

MATLAB® is a trademark of The MathWorks, Inc. and is used with permission. The MathWorks does not warrant the accuracy of the text or exercises in this book. This book's use or discussion of MATLAB® software or related products does not constitute endorsement or sponsorship by The MathWorks of a particular pedagogical approach or particular use of the MATLAB® software.

First edition published 2021

by CRC Press

6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742

and by CRC Press

2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

© 2022 selection and editorial matter, Ramchandra S. Mangrulkar, Antonis Michalas, Narendra M. Shekokar, Meera Narvekar, and Pallavi V. Chavan; individual chapters, the contributors

CRC Press is an imprint of Taylor & Francis Group, LLC

Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged, please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, access www.copyright.com or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. For works that are not available on CCC, please contact mpkbookspermissions@tandf.co.uk

Trademark notice: Product or corporate names may be trademarks or registered trademarks and are used only for identification and explanation without intent to infringe.

ISBN: 978-0-367-67979-8 (hbk)

ISBN: 978-0-367-67989-7 (pbk)

ISBN: 978-1-003-13368-1 (ebk)

Typeset in Times

by codeMantra