

Contents

- 1 Introduction to Learning 1**
 - 1.1 Introduction 1
 - 1.2 Framework and Terminology 2
 - 1.3 Learner Design 3
 - 1.4 Performance Evaluation 6
 - 1.5 From Static Toward Dynamic Environments 8
- 2 Learning in Dynamic Environments 11**
 - 2.1 Introduction 11
 - 2.2 Concept Drift Framework 12
 - 2.2.1 Incremental Learning 12
 - 2.2.2 Adaptive Learning 14
 - 2.3 Causes and Kinds of a Concept Drift 16
 - 2.4 Concept Drift Description 23
 - 2.4.1 Drift Speed 23
 - 2.4.2 Drift Severity 25
 - 2.4.3 Drift Influence Zones 26
 - 2.4.4 Drift Occurrence Frequency and Recurrence 28
 - 2.4.5 Drift Predictability 30
 - 2.5 Drift Concept in Real-World Applications 30
- 3 Handling Concept Drift 33**
 - 3.1 Introduction 33
 - 3.2 General Learning Scheme to Handle Concept Drift 34
 - 3.3 General Classification of Methods to Handle Concept Drift 35
 - 3.4 Informed Methods to Handle Concept Drift 36
 - 3.4.1 Methods Based on Supervised Drift
 - Monitoring Indicators 37
 - 3.4.2 Methods Based on Unsupervised Drift
 - Monitoring Indicators 39
 - 3.5 Drift Handling by Single Learner 41

3.6	Drift Handling by Ensemble Learners	42
3.6.1	Ensemble’s Training Set Management	43
3.6.2	Ensemble’s Structure Management	46
3.6.3	Ensemble’s Final Decision Management	46
3.7	Drift Handling by Sequential Data Processing	50
3.8	Window-Based Processing to Handle Concept Drift	52
3.9	Blind Methods to Handle Concept Drift	55
3.10	Drift Handling Evaluation	58
4	Summary and Final Comments	61
4.1	Summary of Chap. 1	61
4.2	Summary of Chap. 2	63
4.3	Summary of Chap. 3	65
4.4	Future Research Directions	67
	References	71

Learning from Data Streams in Dynamic Environments

Sayed-Mouchaweh, M.

2016, VIII, 75 p. 44 illus., 43 illus. in color., Softcover

ISBN: 978-3-319-25665-8