

Contents

- 1 Introduction** 1
 - 1.1 The Need for Sharing Electronic Medical Record Data..... 1
 - 1.2 The Threat of Patient Re-identification 2
 - 1.3 Preventing Patient Re-identification..... 4
 - 1.4 Aims and Organization of the Book..... 6
 - References 6
- 2 Overview of Patient Data Anonymization**..... 9
 - 2.1 Anonymizing Demographics 9
 - 2.1.1 Anonymization Principles 9
 - 2.1.2 Anonymization Algorithms 12
 - 2.2 Anonymizing Diagnosis Codes..... 14
 - 2.2.1 Anonymization Principles 15
 - 2.2.2 Generalization and Suppression Models..... 18
 - 2.2.3 Anonymization Algorithms 19
 - 2.3 Anonymizing Genomic Data 26
 - References 27
- 3 Re-identification of Clinical Data Through Diagnosis Information** 31
 - 3.1 Motivation 31
 - 3.2 Structure of the Datasets Used in the Attack 33
 - 3.3 Distinguishability Measure and Its Application to EMR Data..... 33
 - 3.4 Utility Measures..... 36
 - References 38
- 4 Preventing Re-identification While Supporting GWAS** 39
 - 4.1 Motivation 39
 - 4.2 Background..... 40
 - 4.2.1 Structure of the Data..... 41
 - 4.2.2 Privacy and Utility Policies 42
 - 4.2.3 Anonymization Strategy 43
 - 4.2.4 Information Loss Measure 44

4.3	Algorithms for Anonymizing Diagnosis Codes	45
4.3.1	Privacy Policy Extraction.....	45
4.3.2	Utility-Guided Anonymization of CLInical Profiles (UGACLIP)	47
4.3.3	Limitations of UGACLIP and the Clustering-Based Anonymizer (CBA)	49
	References	52
5	Case Study on Electronic Medical Records Data	55
5.1	Description of Datasets and Experimental Setup	55
5.2	The Impact of <i>Simple Suppression</i> on Preventing Data Linkage and on Data Utility	55
5.3	Utility of Anonymized Diagnosis Codes.....	57
5.3.1	Supporting GWAS Validation	58
5.3.2	Supporting Clinical Case Count Studies.....	60
	References	64
6	Conclusions and Open Research Challenges	65
6.1	Threats Beyond Patient Re-identification	66
6.2	Complex Data Sharing Scenarios	67
	References	68
	Index	71

Anonymization of Electronic Medical Records to Support
Clinical Analysis

Gkoulalas-Divanis, A.; Loukides, G.

2013, XV, 72 p. 23 illus., Softcover

ISBN: 978-1-4614-5667-4