



MOHAMED SATHAK A J COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Siruseri IT Park, Egattur, Chennai - 603 103

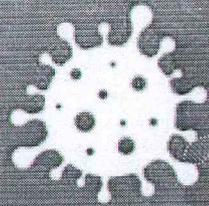
3.3.3 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years

Sl. No.	Name of the Author	Title of the book	Year of publication	ISBN/ISSN number of the proceeding	Name of the publisher
1.	E.Dhiravidachelvi	Data Science for COVID - 19 (Elsevier)	2020-2021	978-0-12-824536-1	Elsevier
2.	E.Dhiravidachelvi	Applications of Big Data in Health Care	2020-2021	978-0-820203-6	Elsevier
3.	S.Senthipandi	Machine learning	2020-2021	978-93-91373-85-6	Shanlax publications, Madurai
4.	S.Senthipandi	Computer Networks	2020-2021	978-93-91373-66-5	Shanlax publications, Madurai
5.	C.Daniel	Impact of lockdown for research scholars	2020-2021	978-93-90853-50-2	International press
6.	Dr.K.S.Srinivasan	Wireless Sensor Networks	2020-2021	978-81-954927-4-9	Unique Pub International (UPI)
7.	Dr.P.Subramanian	Wireless Sensor Networks	2020-2021	978-81-954927-4-9	Unique Pub International (UPI)
8.	Mr.D.Weslin	Wireless Sensor Networks	2020-2021	978-81-954927-4-9	Unique Pub International (UPI)

PRINCIPAL

MOHAMED SATHAK A.J.COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri IT Park
Chennai-603 103.

Series Edited by
Valentina E. Balas, Biomedical Engineering



Edited by
Utku Kose
Deepak Gupta
Victor Hugo C. de Albuquerque
Ashish Khanna

Data Science for COVID-19

Volume One: Computational Perspectives




PRINCIPAL
MOHAMED SAIFAK A.J. COLLEGE OF ENGINEERING
SUNILUR 603103,
KANCHIPURAM DT.



2.	The proposed enhanced kernel support vector machine model	615
3.	Experimental validation	621
4.	Conclusion	624
	References	624
34.	Internet of Medical Things (IoMT) with machine learning–based COVID-19 diagnosis model using chest X-ray images	627
	<i>S. Sheeba Rani, S. Selvakumar, K. Pradeep Mohan Kumar, Duong Thanh Tai and E. Dhiravida Chelvi</i>	
1.	Introduction	627
2.	The proposed model	629
3.	Performance validation	635
4.	Conclusion	639
	References	639
35.	The growth of COVID-19 in Spain. A view based on time-series forecasting methods	643
	<i>Andrés Carrión-García, José Jabaloyes and Angela Grisales</i>	
1.	Introduction	643
2.	Materials and method	644
3.	Analysis of the daily death toll	648
4.	Analysis of the relationship between deaths and intensive care unit figures	653
5.	Relationship between infected and recovered	653
6.	Conclusions and final comments	655
	Annex A. Data	655
	References	656




PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
 EGATTUR 603 103.
KANCHIPURAM DT.

Internet of Medical Things (IoMT) with machine learning–based COVID-19 diagnosis model using chest X-ray images

S. Sheeba Rani¹, S. Selvakumar², K. Pradeep Mohan Kumar²,
Duong Thanh Tai³, E. Dhiravida Chelvi⁴

¹DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING, SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY, COIMBATORE, TAMIL NADU, INDIA; ²DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY, SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI, TAMIL NADU, INDIA; ³DEPARTMENT OF RADIATION ONCOLOGY, DONG NAI HOSPITAL, BIEN HOA, VIETNAM; ⁴DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING, MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING, CHENNAI, TAMIL NADU, INDIA

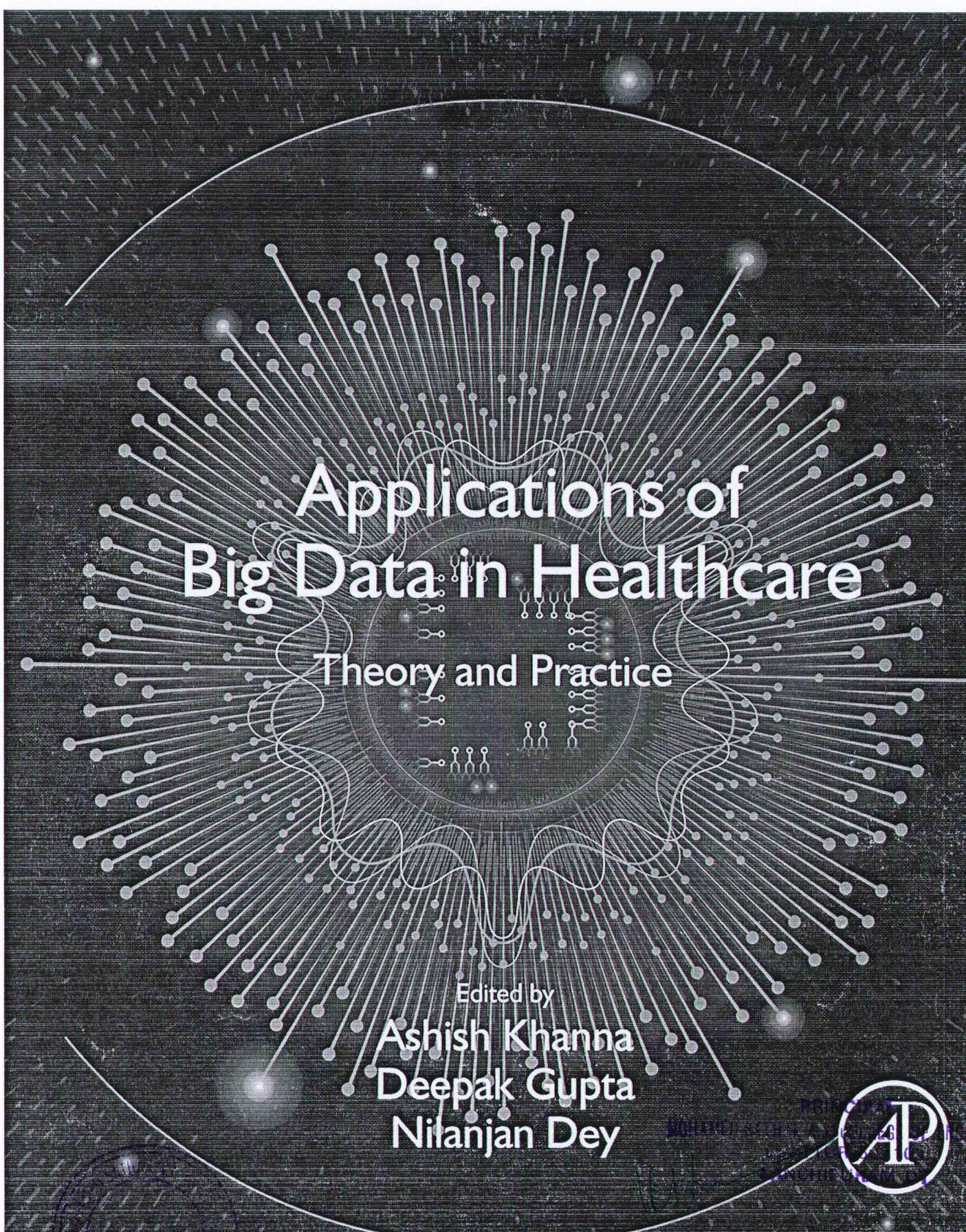
1. Introduction

The standard testing model to predict coronavirus disease 2019 (COVID-19) is carried out by real reverse-transcription polymerase chain reaction (rRT-PCR) assay, a typical molecular-based assay that requires a long time to produce the desired outcome. Although the tool has been extensively applied, it depends on a well-trained laboratory and expert physicians, and it is time-consuming [1–5]. Because the COVID-19 outbreak is unmanageable, a great number of people's lives are at the dangerous point that has resulted in the breakdown of medical applications and global panic. Testing that relies on rRT-PCR is not applicable to managing the disease because COVID-19 has many asymptomatic cases [6].

Another option for COVID-19 diagnostic models is point-of-care (POC) tools that apply the lateral flow immunoassay (LFIA) method, mainly used to predicting COVID-19 in humans [7,8]. Immunoglobulin (Ig)G and IgM antibodies over severe acute respiratory syndrome (SARS)-CoV-2 might be predicted from human serum once COVID-19 is induced. The prediction stages of such antibodies offer data on the development and phases of viral infection. Because there are many virus-confirmed cases, various POC-LFIA tools have the ability to predict IgG and IgM levels, which facilitate them as



PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
EGATTUR-603 103.
KANCHIPURAM DT.

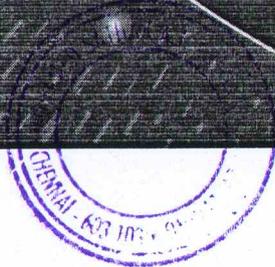


Applications of Big Data in Healthcare

Theory and Practice

Edited by

Ashish Khanna
Deepak Gupta
Nilanjan Dey



8.3.2 Feature selection	202
8.3.3 Classification using OGWOKRRG	204
8.4 Result and discussion	208
8.4.1 Classification accuracy	208
8.4.2 Sensitivity	208
8.4.3 Specificity	209
8.4.4 Performance evaluation	209
8.4.5 Comparative analysis	210
8.5 Conclusion	212
References	213
9 An analytical hierarchical process evaluation on parameters	
Apps-based Data Analytics for healthcare services	215
Monika Arora, Radhika Adholeya and Swati Sharan	
9.1 Introduction	216
9.2 Review of literature	222
9.3 Research methodology	225
9.3.1 Analytic hierarchy processing model	225
9.3.2 Analytic hierarchy processing technique	226
9.4 Proposed analytical hierarchy processing model of successful healthcare	229
9.4.1 Hospital/lab (C2)	230
9.4.2 Analytic hierarchy processing model description	231
9.5 Conclusion	236
Appendix 1	237
Big data analytics for healthcare	237
References	238
10 Firefly—Binary Cuckoo Search Technique based heart disease prediction in Big Data Analytics	241
G. Manjula, R. Gopi, S. Sheeba Rani, Shiva Shankar Reddy and E. Dhiravida Chelvi	
10.1 Introduction	242
10.2 Literature survey	244
10.3 Proposed methodology	247
10.3.1 Preprocessing	248



PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
EGATTUR-603 103,
KANCHIPURAM DT.

Firefly—Binary Cuckoo Search Technique based heart disease prediction in Big Data Analytics

G. Manjula¹, R. Gopi², S. Sheeba Rani³,
Shiva Shankar Reddy⁴ and E. Dhiravida Chelvi⁵

¹Department of Information Science & Engineering, Dayananda Sagar Academy of Technology & Management, Bengaluru, India ²Department of Computer Science and Engineering, Dhanalakshmi Srinivasan Engineering College, Perambalur, India ³Department of Electrical and Electronics Engineering, Sri Krishna College of Engineering and Technology, Coimbatore, India ⁴Department of Computer Science and Engineering, SRKR Engineering College, Bhimavaram, India ⁵Department of Electronics and Communication Engineering, Mohamed Sathak A.J. College of Engineering, Chennai, India

Abstract

Nowadays, big data analysis is being given more attention in complex healthcare settings. Fetal growth curves, the classic case of big health data, are used to predict coronary heart disease. The proposed framework introduces the idea of summarizing large big data (inputs) in multidimensional scenarios in which known data mining methods such as preprocessing, optimal selection of features and forecasts are used. The dataset contains many random and variable values and can lead to incorrect results. Therefore, when dealing with these values, the utmost care is needed to obtain the best performance. Therefore, data creation before optimal function creation is processed using bacterial foraging optimization (BFO) before sample creation. It defines a multidimensional mining approach as a whole that addresses complex healthcare environments. This work aims to predict the risk of coronary heart disease (CAD) using machine learning algorithms such as Firefly—Binary Cuckoo Search (FFBCS). We also suggest a preliminary analysis of the performance of the framework.

Keywords: Coronary heart disease; preprocessing; bacterial foraging; Firefly; Binary Cuckoo Search



Applications of Big Data in Healthcare. DOI: <https://doi.org/10.1016/B978-0-12-820203-6.00007-2>
© 2021 Elsevier Inc. All rights reserved.

PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
EGATTUR-603 103,
KANCHIPURAM DT.

MACHINE LEARNING

Authors

Dr. A. Senthilselvi

Associate Professor,

Department of Computer Science and Engineering

SRM Institute of Science and Technology

Ramapuram campus, Chennai, Tamil Nadu, India.

Dr. Balika J Chelliah

Associate Professor,

Department of Computer Science and Engineering

SRM Institute of Science and Technology

Ramapuram campus, Chennai, Tamil Nadu, India.

Mr. S. Senthil Pandi

Assistant Professor

Department of Computer Science and Engineering

Mohamed Sathak A J College of Engineering,

Chennai, Tamil Nadu, India.

SHANLAX
PUBLICATIONS

PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
EGMUTTUR-603 103.
KANCHIPURAM DT



ACKNOWLEDGEMENT

We believe that intelligence comprehension involves understanding how information is obtained, represented, and stored; how intelligent behaviour is produced and learned; how motivations, emotional state, and goals are created and used; how sensory signals are converted into symbols; how symbols are manipulated to execute reasoning, to reason about the past, and to prepare for the future; We also believe that it would be a scientific achievement on the scale of nuclear physics, relativity, and molecular genetics to understand these functions at a fundamental level. We owe our deep sense of thanks to the management of SRM Institute of Science and Technology, Ramapuram Campus for their constant support and encouragement that enabled us to publish this book on time. Special thanks are due for a number of friends and colleagues in encouraging us to start the work and publish it. We sincerely express our thanks to our family members for their support and love without whom this book wouldn't be possible. We give thanks to Almighty God for his ever-present help and grace in compiling and completing this book on "Machine Learning".

Dr. A. Senthilselvi
Dr. Balika J Chelliah
Mr. S. Senthil Pandi

Title: Machine Learning

Author's Name: Dr. A. Senthilselvi,
Dr. Balika J Chelliah &
Mr. S. Senthil Pandi,

Published by: Shanlax Publications,
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Publisher's Address: 61, 66 T.P.K. Main Road,
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Printer's Details: Shanlax Press, 66 T.P.K. Main Road,
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Edition Details (I,II,III): I

ISBN: 978-93-91373-85-6

Month & Year: October, 2021

Copyright @ Dr. A. Senthilselvi,

Pages: 269

Price: ₹300/-



PRINCIPAL
MOHAMMED SATHAK A.J. COLLEGE OF ENGINEERING
EGATTUR 603103.
KANCHIPURAM DT.

MACHINE LEARNING

CONTENTS

Unit No.	Topic	Page No.
1.	Introduction to machine learning	1-18
	1.1 Introduction	
	1.2 How machines learn	
	1.3 Applications of machine learning	
	1.4 Understanding data	
	1.5 General classes of machine learning problems	
	1.6 Different types of learning	
2	Some general concepts	19-34
	2.1 Input representation	
	2.2 Hypothesis space	
	2.3 Ordering of hypotheses	
	2.4 Version space	
	2.5 Noise	
	2.6 Learning multiple classes	
	2.7 Generalisation	
3	VC dimension and PAC Learning	35-46
	3.1 Vapnik- Chervonenkis dimension	
	3.2 Probably approximately correct learning	
	3.3 Sample Questions	
4	Dimensionality reduction	47-66
	4.1 Introduction	
	4.2 Why dimensionality reduction is useful	
	4.3 Subset selection	
	4.4 Principal component analysis	
	4.5 Sample Questions	



PRINCIPAL

MOHAMED SATHAK A.J.COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri, IT Park
Chennai-603 103.

5	Evaluation of classifiers	67-85	
	5.1 Methods of evaluation		
	5.2 Cross-validation		
	5.3 K-fold cross-validation		
	5.4 Measuring error		
	5.5 Receiver Operating Characteristic (ROC)		
	5.6 Sample Questions		
6	Bayesian classifier and ML estimation	86-101	
	6.1 Conditional probability		
	6.2 Bayes' theorem		
	6.3 Naive Bayes algorithm		
	6.4 Using numeric features with naive Bayes algorithm		
	6.5 Maximum likelihood estimation (ML estimation)		
	6.6 Sample Questions		
7	Regression	102-116	
	7.1 Definition		
	7.2 Criterion for minimisation of error		
	7.3 Simple linear regression		
	7.4 Polynomial regression		
	7.5 Multiple linear regression		
	7.6 Sample Questions		
8	Decision trees	117-155	
	8.1 Decision tree: Example		
	8.2 Two types of decision trees		
	8.3 Classification trees		
	8.4 Features election measures		
	8.5 Entropy		
	8.6 Information gain		
	8.7 Gini indices		
	8.8 Gain ratio		
	8.9 Decision tree algorithms		
	8.10 The ID3 algorithm		
	8.11 Regression trees		
	8.12 CART algorithm		
	8.13 Other decision tree algorithms		
	8.14 Issues in decision tree learning		
	8.15 Avoiding over fitting of data		
	8.16 Problem of missing attributes		
	8.17 Sample Questions		
9	Neural networks	156-184	
	9.1 Introduction		
	9.2 Biological motivation		
	9.3 Artificial neurons		
	9.4 Activation function		
	9.5 Perceptron		
	9.6 Bayesian classifier and ML estimation		
	9.7 Artificial neural networks		
	9.8 Characteristics of an ANN		
	9.9 Back propagation		
	9.10 Introduction to deep learning		
10	Sample Questions	185-205	
	10.1 Support vector machines		
	10.2 An example		
	10.3 Finite dimensional vector spaces		
	10.4 Hyper planes		
	10.5 Two-class datasets		
	10.6 Linearly separable data		
	10.7 Maximal margin hyper planes		

Ush

PRINCIPAL
PATHAK A. SCD
 Sandhi Road (OMR) Sectors 4 & 5
 Chennai-603 103

5	Evaluation of classifiers	67-85
	5.1 Methods of evaluation	
	5.2 Cross-validation	
	5.3 K-fold cross-validation	
	5.4 Measuring error	
	5.5 Receiver Operating Characteristic (ROC)	
	5.6 Sample Questions	
6	Bayesian classifier and ML estimation	86-101
	6.1 Conditional probability	
	6.2 Bayes' theorem	
	6.3 Naive Bayes algorithm	
	6.4 Using numeric features with naive Bayes algorithm	
	6.5 Maximum likelihood estimation (ML estimation)	
	6.6 Sample Questions	
7	Regression	102-116
	7.1 Definition	
	7.2 Criterion for minimisation of error	
	7.3 Simple linear regression	
	7.4 Polynomial regression	
	7.5 Multiple linear regression	
	7.6 Sample Questions	
8	Decision trees	117-155
	8.1 Decision tree: Example	
	8.2 Two types of decision trees	
	8.3 Classification trees	
	8.4 Features election measures	
	8.5 Entropy	
	8.6 Information gain	
	8.7 Gini indices	

8.8 Gain ratio
8.9 Decision tree algorithms
8.10 The ID3 algorithm
8.11 Regression trees
8.12 CART algorithm
8.13 Other decision tree algorithms
8.14 Issues in decision tree learning
8.15 Avoiding over fitting of data
8.16 Problem of missing attributes
8.17 Sample Questions

9	Neural networks	156-184
	9.1 Introduction	
	9.2 Biological motivation	
	9.3 Artificial neurons	
	9.4 Activation function	
	9.5 Perceptron	
	9.6 Bayesian classifier and ML estimation	
	9.7 Artificial neural networks	
	9.8 Characteristics of an ANN	
	9.9 Back propagation	
	9.10 Introduction to deep learning	

10	Sample Questions	185-205
	10.1 Support vector machines	
	10.2 An example	
	10.3 Finite dimensional vector spaces	
	10.4 Hyper planes	
	10.5 Two-class datasets	
	10.6 Linearly separable data	
	10.7 Maximal margin hyper planes	

Principal
 M. SATHAK A. J. COLLEGE OF ENGINEERING
 Gandhi Road (OMR), Siruseri, IT Park
 Chennai-600 095

- 11 Bayesian Learning 206-235**
11.1 Mathematical formulation of the SVM problem
11.2 Bayesian Learning
11.3 Maximum Likelihood And Least-Squared Error Hypotheses
11.4 Minimum Description Length Principle
11.5 Naive Bayes Classifier
11.6 Bayesian Belief Networks
- 12 Instance Based Learning 236-262**
12.1 The Em Algorithm
12.2 Instance Based Learning
12.3 Locally Weighted Regression
12.4 Radial Basis Functions
12.5 Case-Based Reasoning
12.6 Einforcement Learning
12.7 The Learning Task
12.8 Q Learning
12.9 Evaluating Hypotheses
12.10 Estimating Hypothesis Accuracy



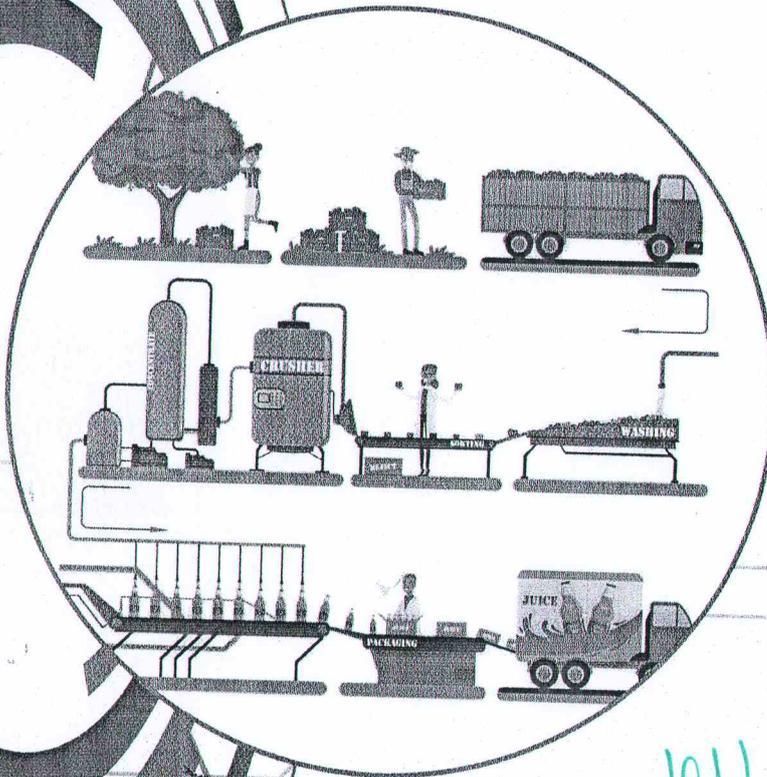
PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri, Tamil Nadu
Chennai-603 103.

5	Evaluation of classifiers	67-85
	5.1 Methods of evaluation	
	5.2 Cross-validation	
	5.3 K-fold cross-validation	
	5.4 Measuring error	
	5.5 Receiver Operating Characteristic (ROC)	
	5.6 Sample Questions	
6	Bayesian classifier and ML estimation	86-101
	6.1 Conditional probability	
	6.2 Bayes' theorem	
	6.3 Naive Bayes algorithm	
	6.4 Using numeric features with naive Bayes algorithm	
	6.5 Maximum likelihood estimation (ML estimation)	
	6.6 Sample Questions	
7	Regression	102-116
	7.1 Definition	
	7.2 Criterion for minimisation of error	
	7.3 Simple linear regression	
	7.4 Polynomial regression	
	7.5 Multiple linear regression	
	7.6 Sample Questions	
8	Decision trees	117-155
	8.1 Decision tree: Example	
	8.2 Two types of decision trees	
	8.3 Classification trees	
	8.4 Features election measures	
	8.5 Entropy	
	8.6 Information gain	
	8.7 Gini indices	



PRINCIPAL
INDRANATHAK A.J.COLLEGE OF ENGINEERING
24 Rajiv Gandhi Road (OMR), Siruseri, Chennai-603 103.

COMPUTER NETWORKS



Ashok
PRINCIPAL
MOHAMED SATHAK A.J.COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (Opp. Siruseri Jn.)
Chennai

Authors

Dr. Ashok Kumar Munnangi
Dr. Sivaram Rajeyyagari
Mr. S. Senthil Pandi

COMPUTER NETWORKS

Dr. Ashok Kumar Munnangi

Assistant Professor

*Department of Information Technology
Velagapudi Ramakrishna Siddhartha Engineering College,
Vijayawada, Andhra Pradesh, India -520007.*

Dr. Sivaram Rajeyyagari

Associate Professor

*Department of Computer Science
College of Computing and Information Technology
Shaqra University
Shaqra, Kingdom of Saudi Arabia.*

Mr. S. Senthil Pandi

Assistant Professor

*Department of Information Technology
Mohamed Sathak AJ College of Engineering
Chennai, Tamil Nadu, India*

Wsh



**SHANLAX
PUBLICATIONS**

PRINCIPAL

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
Rajiv Gandhi Road (OMR), Siruseri, Ilank
Chennai-603 103.

Title: Computer Networks

Author's Name: Dr. Ashok Kumar Munnangi
Dr. Sivaram Rajeyyagari
Mr. S. Senthil Pandi

Published by: Shanlax Publications
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Publisher's Address: 61, 66 T.P.K. Main Road,
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Printer's Details: Shanlax Press, 66 T.P.K. Main Road,
Vasantha Nagar, Madurai - 625003,
Tamil Nadu, India

Edition Details (I,II,III): I

ISBN: 978-93-91373-66-5

Copyright @ Dr. Ashok Kumar Munnangi
Dr. Sivaram Rajeyyagari
Mr. S. Senthil Pandi

Pages: 313

Price: 350/-


PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri, Tamil Nadu
Chennai-603 103.

COMPUTER NETWORKS

INDEX

Chapters	Title	Page No.
1	UNIT I DATA COMMUNICATIONS AND NETWORK MODELS	1-46
1.1	Components	
1.2	Networks	
1.3	Components and Categories	
1.4	Topologies	
1.5	Protocols and Standards	
1.6	The OSI model	
1.7	Addressing	
1.8	Transmission Media	
1.9	Guided media & unguided media	
1.10	Dial-up Modems	
1.11	EIA 232 Interfacing sequence	
1.12	Switching: Circuit switched networks	
1.13	Packet switching	
1.14	Datagram Networks	
1.15	Virtual Circuit Networks	
2	DATA-LINK LAYER & MEDIA ACCESS	47-95
2.1	Error detection and correction	
2.2	Block coding	
2.3	Linear block coding	
2.4	Cyclic codes	
2.5	Checksum	
2.6	Framing	
2.7	Flow Control and Error control	
2.8	Noiseless channel	
2.9	Noisy channel	
2.10	HDLC	
2.11	Wired LANs	
2.12	Ethernet IEEE 802.3	
2.13	IEEE 802.4 and IEEE 802.5	
2.14	Wireless LANs: IEEE 802.11	
2.15	Connecting devices	
2.16	SONET	



PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri,
Chennai-603 103.

3	NETWORK LAYER	96-118
3.1	IPv4 Addresses: Address space	
3.2	Notation	
3.3	Classful addressing	
3.4	Classless addressing	
3.5	NAT	
3.6	Internetworking	
3.7	Ipv4: datagram	
3.8	Fragmentation	
3.9	Checksum	
3.10	IPv6	
3.11	Unicast routing protocol	
3.12	Distance Vector Routing	
3.13	Link State Routing	
3.14	Multicast Routing	
4	TRANSPORT LAYER	119-134
4.1	Multiplexing	
4.2	De multiplexing	
	Connectionless versus connection	
4.3	Oriented service	
4.4	Reliable versus Unreliable	
4.5	User Datagram Protocol (UDP)	
4.6	Transmission Control Protocol (TCP)	
4.7	Congestion Control and Quality of services (QoS)	
4.8	Integrated Services	
5	APPLICATION LAYER	135-153
5.1	Domain Name Space (DNS)	
5.2	Electronic mail	
5.3	File Transfer Protocol	
5.4	Hyper Text Transfer Protocol	
5.5	World Wide Web	
5.5	Security: Principles of Cryptography	
5.7	Network security: Message Integrity	
5.8	Message Authentication	
5.9	Security in Internet: PGP	
5.10	Firewalls.	
	Question Bank	154-180



PRINCIPAL
MOHAMED SATHAK A.J.COLLEGE OF ENG
34, Rajiv Gandhi Road (OMR), Siruseri, T.N.
Chennai-603 103.

About the Editor

Dr. Daniel C.
Assistant Professor, Department of Civil Engineering, Mohamed Sathak A J College of Engineering, Chennai, India

Dr. D. S. Vijayan,
Associate Professor, Department of Civil Engineering, Aarupada Veedu Institute of Technology, VMRF, Chennai, India

We have a common intention to empower the research community and learn their impacts during the lockdown. As a faculty cum researcher, we create a common platform so that they could share their point of view, as a researcher.

About the book :

This book consists of a glimpse of many researchers' ideas towards the impact of lockdown due to the pandemic situations. The books discussed various impacts faced in the researcher's life. A collection of book chapter are presented over here has the main intention to share their personal experience during the lockdown as a researcher. Around 21 articles were contributed all over India. Notably, 7 articles were accepted and presented in this book.

Summary

The book on "Impact of Lockdown for Researchers" is a very good effort in bringing novel ideas at the time of the pandemic. The engagement with the research community leading to this wonderful outcome is laudable. As the editors of this book, we are fortunate to go through every article and found few interesting impacts of lockdown in researchers career. Congratulations and wishes to authors and publishers for bringing out this productive outcome in the most critical transition time of this pandemic.

Impact of Lockdown for Researchers

Impact of Lockdown for Researchers

Editors

Dr. C. Daniel
Dr. D. S. Vijayan

Editors
Dr. C. Daniel
Dr. D. S. Vijayan



IOR INTERNATIONAL PRESS
(Google scholar Indexed Publisher)



PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
EGATTUR-603 103.
KANCHIPURAM DT.

Impact of Lockdown for Researchers

Editors

Dr. C. Daniel

Dr. D. S. Vijayan



IOR INTERNATIONAL PRESS
(Google scholar Indexed Publisher)

Impact of Lockdown for Researchers

Editors
Dr. C. Daniel
Dr. D. S. Vijayan

About the Editor

Dr. Daniel C.

Assistant Professor, Department of Civil Engineering, Mohamed Sathak A J College of Engineering, Chennai, India

Dr. D. S. Vijayan,

Associate Professor, Department of Civil Engineering, Aarupadai Veedu Institute of Technology, VMRE, Chennai, India

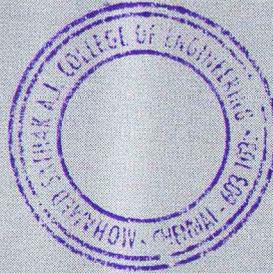
We have a common intention to empower the research community and learn their impacts during the lockdown. As a faculty cum researcher, we create a common platform so that they could share their point of view as a researcher.

About the book :

This book consists of a glimpse of many researchers' ideas towards the impact of lockdown due to the pandemic situations. The books discussed various impacts faced in the researcher's life. A collection of book chapter are presented over here has the main intention to share their personal experience during the lockdown as a researcher. Around 21 articles were contributed all over India. Notably, 7 articles were accepted and presented in this book.

Summary

The book on "Impact of Lockdown for Researchers" is a very good effort in bringing novel ideas at the time of the pandemic. The engagement with the research community leading to this wonderful outcome is laudable. As the editors of this book, we are fortunate to go through every article and found few interesting impacts of lockdown in researchers career. Congratulations and wishes to authors and publishers for bringing out this productive outcome in the most critical transition time of this pandemic.



Chapter 5

Impact of Lockdown for Research Scholars

D.S. Vijayan¹, S. Arvandan², C. Daniel^{3,4,*}

¹Associate Professor, Department of Civil Engineering, Aarupadai Veedu Institute of Technology, Chennai

²Assistant Professor, School of Architecture, Anand School of Architecture, Chennai

³Research Scholar, Department of Civil Engineering, Karunya Institute of Technology and Sciences, Coimbatore

⁴Assistant Professor, Department of Civil Engineering, Mohamed Sathak A J College of Engineering, Chennai

Email: danielckarunya@gmail.com

Abstract

This covid 19 pandemic affected many research scholar's life. Many researches not able to enter to their research lab. Their course work examination become virtual and their doctoral committee to thesis submission held in online. Many researchers undergo various challenges and this need a quick reform in future research guidelines. In this article the problems faced by the researchers is discussed and this will help the researchers to be ready for any pandemic occurs in future.

Keywords: lockdown, COVID-19, research scholars

Introduction

Research scholars during pandemic affected much without doing any kind of research, even though extension in PhD is available in many universities. Some research scholars are currently in the last year and they are undergoing many challenges in research. Many researcher scholars worried about their future. The covid 19 Lockdown also instigated encouraging changes in personal life of research scholars [1]. The impact of UG and PG students in universities is studied. An online questionnaire used to collect the information using google form [2]. In academia, there are many practical issues for the reading habits during COVID-19. On what frequency the academicians are reading, why they are reading, from where academic staff are reading and how much time they are spending to read during lockdown [3]. The new SARS-CoV-2 coronavirus gave an alarm to many universities for virtual teaching

© Author's, 2021

D.S. Vijayan et. al, *Impact of Lockdown for Research Scholars*,

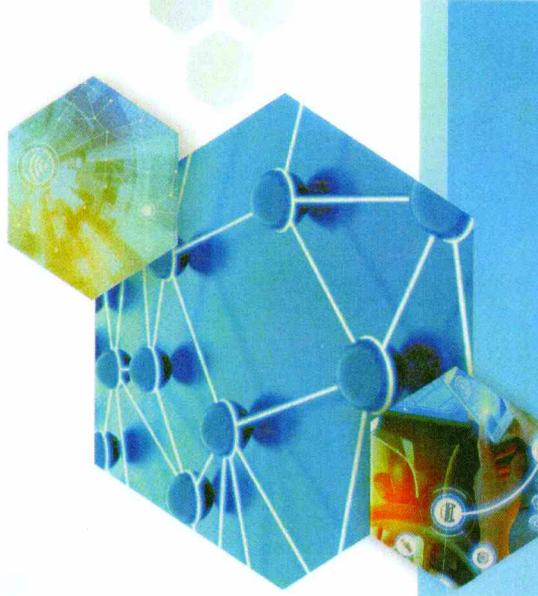
<https://doi.org/10.34256/iorip2115>

24



PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
EGATTUR - 603 103.
KANCHIPURAM DT.

WIRELESS SENSOR NETWORKS



Authors

Dr. P.Subramanian | D.Weslin | Dr.K.S.Srinivasan

CMVX

WIRELESS SENSOR NETWORKS

PRINCIPAL
MOHAMMED SATHAK A.J.COLLEGE OF ENGINEERING
3c J. Gandhi Road (OMR), Siruseri, IT Park
Chennai-603 103.

WIRELESS SENSOR NETWORKS

Authors

Dr. P.Subramanian., P.hD

Professor & Head

Dept. of CSE,

Mohammed Sathak A.J College of Engineering,

Siruseri, Chennai - 603 103.

Email: 69subbu@gmail.com

D.Weslin., MCA,M.Tech

Associate Professor,

Department of Information Technology,

Mohammed Sathak A.J College of Engineering,

Siruseri, Chennai - 603 103.

Email : weslin16@gmail.com

Dr.K.S.Srinivasan., P.hD

Principal

Mohammed Sathak A.J College of Engineering,

Siruseri, Chennai - 603 103.

Emil : principal@msajce-edu.in

Unique Pub International (UPI)
INDIA



PRINCIPAL
MOHAMED SATHAK A.J.COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri, Chennai-603 103.

Book Title : Wireless Sensor Networks
Authors : Dr. P.Subramanian., P.hD
D.Weslin., MCA,M.Tech
Dr.K.S.Srinivasan., P.hD
Book Subject : Wireless Sensor Networks
Book Category : Authors Volume
Copy Right : @ Authors
First Edition : Jan , 2022
Book Size : Demmy
Price : Rs.260/-

Published by
Unique Pub International (UPI)
INDIA
e-mail : info@uniquepubinternational.com

ISBN Supported by International ISBN Agency,
United House, North Road, London, N7 9DP, UK. Tel. + 44 207 503 6418 &
Raja Ram Mohan Roy National Agency for ISBN
Government of India, Ministry of Human Resource Development,
Department of Higher Education, New Delhi - 110066 (India)

ISBN: 978-81-954927-4-9

ISBN 978-81-954927-4-9



9 788195 492749 >

Wsh

PRINCIPAL
MOHAMED SATHAK A.J.COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri, II Phase
Chennai-603 103.

WIRELESS SENSOR NETWORKS

INDEX

CHAPTER	TITLE	PG.NO
1	WIRELESS COMMUNICATIONS	1-43
1.1	FUNDAMENTALS OF WIRELESS COMMUNICATION TECHNOLOGY	
1.2	RADIO AND TELEVISION COMMUNICATIONS	
1.3	MODULATION TECHNIQUES	
1.4	MULTIPLE ACCESS TECHNIQUES	
1.5	TYPES OF WIRELESS NETWORKS	
1.6	WIRELESS INTERNET	
1.7	TYPES OF SENSORS	
1.8	SENSOR NETWORK ARCHITECTURE	
1.9	TYPES OF SENSOR NETWORKS	
1.10	SENSOR NODE	
1.11	ADVANTAGES OF SENSOR NETWORKS	
2	WIRELESS SENSOR NETWORKS	44-109
2.1	WSN ARCHITECTURES	
2.2	BASIC TERMINOLOGIES WIRELESS SENSOR NETWORKS	
2.3	CHARACTERISTICS OF WSN	
2.4	CHALLENGES RELATED TO WSN	
2.5	DIFFERENCES BETWEEN WIRELESS ADHOC NETWORK AND WIRELESS SENSOR NETWORK	
2.6	APPLICATIONS OF WIRELESS SENSOR NETWORKS (WSNs)	
2.7	ENABLING TECHNOLOGIES FOR WIRELESS SENSOR NETWORKS	
3	MEDIUM ACCESS CONTROL	110-141
3.1	INTRODUCTION	
3.2	PROBLEMS AND PERFORMANCE REQUIREMENTS FOR MAC PROTOCOLS	
3.3	CLASSIFICATION OF MAC PROTOCOLS	



PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Srirangapatna,
Chennai-603 103.

3.4	THE IEEE 802.14 STANDARD FOR WSNS	
4	ROUTING PROTOCOLS	142-156
4.1	INTRODUCTION	
4.2	ROUTING CHALLENGES IN WSNS	
4.3	DESIGN CHALLENGES IN WSNS	
4.4	CLASSIFICATION OF ROUTING PROTOCOLS	
4.5	CATEGORIES OF ROUTING PROTOCOLS	
5	DATA GATHERING PROTOCOLS	157-177
5.1	INTRODUCTION	
5.2	TAXONOMY OF DATA COLLECTION PROTOCOLS	
5.3	MAJOR DESIGN ISSUES FOR DATA COLLECTION	
5.4	MAJOR TECHNIQUES USED FOR DATA COLLECTION	
	DESIGN ISSUES	
5.5	INFRASTRUCTURE FOR DATA PROPAGATION	
	ALGORITHMS	
5.6	VARIANTS OF DATA GATHERING ALGORITHMS	
6	WSN SECURITY	178-192
6.1	INTRODUCTION	
6.2	SECURITY IN AD HOC NETWORKS	
6.3	INTRUSION DETECTION SYSTEMS	
7	QOS IN WIRELESS SENSOR NETWORK	193-208
7.1	INTRODUCTION	
7.2	ISSUES AND CHALLENGES IN PROVIDING QOS	
	IN WIRELESS NETWORKS	
7.3	CLASSIFICATIONS OF QOS SOLUTIONS	
7.4	LAYER-WISE CLASSIFICATION OF EXISTING QOS	
	SOLUTIONS	
7.5	QOS FRAMEWORKS FOR AD HOC WIRELESS	
	NETWORKS	
7.6	INSIGNIA	

Handwritten signature in green ink

PRINCIPAL
 MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
 34, Rajiv Gandhi Road (OMR), Siruseri, Chennai-603 103.

8 ENERGY MANAGEMENT IN WIRELESS SENSOR NETWORKS 209-223

8.1 NEED FOR ENERGY MANAGEMENT IN WIRELESS SENSOR NETWORKS

8.2 CLASSIFICATION OF ENERGY MANAGEMENT SCHEMES

8.3 DISTRIBUTED TOPOLOGY CONTROL MECHANISMS

8.4 POWER-AWARE MULTI-ACCESS SIGNALING

8.5 DEVICE POWER MANAGEMENT SCHEMES

9 SENSOR NETWORK PLATFORMS AND TOOLS 224-250

9.1 INTRODUCTION

9.2 PROGRAMMING CHALLENGES

9.3 EMBEDDED OPERATING SYSTEMS IN WSN

9.4 NODE LEVEL SIMULATORS

9.5 THE NS-2 SIMULATOR AND ITS SENSOR NETWORK

EXTENSIONS

9.6 STATE CENTRIC PROGRAMMING

ACRONYMS

251-253



PRINCIPAL
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
34, Rajiv Gandhi Road (OMR), Siruseri, IT Park
Chennai-603 103.