

Quest for Research Excellence On Computing, Mathematics and Statistics

Editors

Kor Liew Kee

Kamarul Ariffin Mansor

Asmahani Nayan

Shahida Farhan Zakaria

Zanariah Idrus

Quest for Research Excellence on Computing, Mathematics and Statistics

Chapters in Book

The 2nd International Conference on Computing, Mathematics
and Statistics (iCMS2015)

Editors:

Kor Liew Lee
Kamarul Ariffin Mansor
Asmahani Nayan
Shahida Farhan Zakaria
Zanariah Idrus



Quest for Research Excellence on Computing, Mathematics and Statistics

Chapters in Book

The 2nd International Conference on Computing, Mathematics and Statistics
(iCMS2015)

4-5 November 2015
Langkawi Lagoon Resort
Langkawi Island, Kedah
Malaysia

Copyright © 2015 Universiti Teknologi MARA Cawangan Kedah

All rights reserved, except for educational purposes with no commercial interests. No part of this publication may be reproduced, copied, stored in any retrieval system or transmitted in any form or any means, electronic or mechanical including photocopying, recording or otherwise, without prior permission from the Rector, Universiti Teknologi MARA Cawangan Kedah, Kampus Merbok, 08400 Merbok, Kedah, Malaysia.

The views and opinions and technical recommendations expressed by the contributors are entirely their own and do not necessarily reflect the views of the editors, the Faculty or the University.

Publication by
Faculty of Computer & Mathematical Sciences
UiTM Kedah

ISBN 978-967-0314-26-6

Content

International Scientific Committee

Preface

CHAPTER 1 1

Towards Ameliorating the Problem of Packet Dropping in IDS using P System Model on GPU

Rufai Kazeem Idowu, Ravie Chandren M., and Zulaiha Ali Othman

CHAPTER 2 11

Analyses of Software Testing Problems in Small and Medium Software Enterprises (SME's) and a Proposed Framework on Exploratory Testing

Murugan Thangiah and Shuib Basri

CHAPTER 3 25

Senior Citizen and Online Form: Hybrid Guideline Form Design

Zanariah Idrus, Nor Hafizah Abdul Razak, and Noor Hasnita Abdul Talib

CHAPTER 4 35

Research Paradigms in Computing Disciplines: A Review

Nor Hafizah Abdul Razak, Noor Hasnita Abdul Talib, and Jasmin Ilyani Ahmad

CHAPTER 5 41

Dijkstra's Algorithm In Product Searching System (Prosearch)

Nur Hasni Nasrudin, Siti Hajar Nasaruddin, Syarifah Syafiqah Wafa Syed Abdul Halim and Rosida Ahmad Junid

CHAPTER 6 49

Developing Waqf Land Computing: A Preliminary Study On The Used Of Web-based Applications And Spatial Database

Siti Nurbaya Ismail, Zanariah Idrus, Nor Hafizah Abdul Razak

| | |
|--|------------|
| CHAPTER 7 | 59 |
| Implementation Of CORDIC Algorithm In Vectoring Mode | |
| <i>Anis Shahida Mokhtar, Abdullah bin Mohd Fadzullah</i> | |
| CHAPTER 8 | 71 |
| A Description of Projective Contractions in the Orlicz-Kantorovich Lattice | |
| <i>Inomjon Ganiev and M. Azram</i> | |
| CHAPTER 9 | 83 |
| The Geometry of the Accessible Sets of Vector Fields | |
| <i>A.Y.Narmanov, and I. Ganiev</i> | |
| CHAPTER 10 | 89 |
| Existence Result of Third Order Functional Random Integro-Differential Inclusion | |
| <i>D. S. Palimkar</i> | |
| CHAPTER 11 | 105 |
| Fourth Order Random Differential Equation | |
| <i>D. S. Palimkar and P.R. Shinde</i> | |
| CHAPTER 12 | 115 |
| New Concept of e - I -open and e - I -Continuous Functions | |
| <i>W.F. Al-omeri, M.S. Md. Noorani, and A. AL-Omari</i> | |
| CHAPTER 13 | 123 |
| Visualization of Constrained Data by Rational Cubic Ball Function | |
| <i>Wan Zafira Ezza Wan Zakaria, and JamaludinMd Ali</i> | |
| CHAPTER 14 | 133 |
| Octupole Vibrations in Even–Even Isotopes of Dy | |
| <i>A.A. Okhunov, G.I. Turaeva, and M. Jahangir Alam</i> | |
| CHAPTER 15 | 141 |
| Characterization of p -Groups with a Maximal Irredundant 10-Covering | |
| <i>Rawdah Adawiyah Tarmizi and Hajar Sulaiman</i> | |

| | |
|--|------------|
| CHAPTER 16 | 149 |
| Sensitivity Index of HIV-1 model Parameters with Vertical transmission | |
| <i>Amiru Sule, Mamman Mamuda, Abdullahi Mohammed Baba, Jibril Lawal, and I.G. Usman</i> | |
| CHAPTER 17 | 163 |
| Derivation of Four-Point Explicit Block Methods for Direct Solution of Initial Value Problems of Third Order Ordinary Differential Equations | |
| <i>Z. Omar, J. O. Kuboye, and Y.A. Abdullah</i> | |
| CHAPTER 18 | 175 |
| Absolute Translativity of Generalized Nörlund Mean | |
| <i>Amjed Zraiqat</i> | |
| CHAPTER 19 | 189 |
| Type I Error of the Modified Wilcoxon Signed Rank Test under Leptokurtic Distribution | |
| <i>Nor Aishah Ahad, Sharipah Soaad Syed Yahaya, Suhaida Abdullah, Lim Yai Fung and Zahayu Md Yusof</i> | |
| CHAPTER 20 | 199 |
| The Combined EWMA-CUSUM Control Chart with Autocorrelation | |
| <i>Abbas Umar Farouk, and Ismail Bin Mohamad</i> | |
| CHAPTER 21 | 213 |
| Estimating Philippine Dealing System Treasury (PDST) Reference Rate Yield Curves using a State-Space Representation of the Nelson-Siegel Model | |
| <i>Len Patrick Dominic M. Garces, and Ma. Eleanor R. Reserva</i> | |
| CHAPTER 22 | 225 |
| A Structural Equation Model Analyzing the Relationship Model on Perception Students toward Mathematics | |
| <i>Siti Fairus Mokhtar</i> | |

CHAPTER 23.....233

Partial Least Squares Based Financial Distressed Classifying Model of Small Construction Firms

Amirah-Hazwani Abdul Rahim, Ida-Normaya M. Nasir, Abd-Razak Ahmad, and Nurazlina Abdul Rashid

CHAPTER 24.....245

Logit Bankruptcy Model of Industrial Product Firms

Asmahani Nayan, Siti-Shuhada Ishak, and Abd-Razak Ahmad

CHAPTER 25.....255

Data Mining in Predicting Firms Failure: A Comparative Study Using Artificial Neural Networks and Classification and Regression Tree

Norashikin Nasaruddin, Wan-Siti-Esah Che-Hussain, Asmahani Nayan, and Abd-Razak Ahmad

CHAPTER 26.....265

Risks of Divorce: Comparison between Cox and Parametric Models

Sanizah Ahmad, Norin Rahayu Shamsuddin, Nur Niswah Naslina Azid @ Maarof, and Hasfariza Farizad

CHAPTER 27.....277

Reliability and Construct Validity of DASS 21 using Malay Version: A Pilot Study

Kartini Kasim, Norin Rahayu Shamsuddin, Wan Zulkipli Wan Salleh, Kardina Kamaruddin, and Norazan Mohamed Ramli

CHAPTER 28.....285

Outlier Detection in Time Series Model

Nurul Sima Mohamad Shariff, Nor Aishah Hamzah, and Karmila Hanim Kamil

CHAPTER 29.....297

ROAD Algorithm for Control Charts

Gejza Dohnal

| | |
|---|------------|
| CHAPTER 30 | 311 |
| Learning Numerals for Down Syndrome by applying Cognitive Principles in 3D Walkthrough | |
| <i>Nor Intan Shafini Nasaruddin, Khairul Nurmazianna Ismail, and Aleena Puspita A.Halim</i> | |
| CHAPTER 31 | 329 |
| Predicting Currency Crisis: An Analysis on Early Warning System from Different Perspective | |
| <i>Nor Azuana Ramli</i> | |
| CHAPTER 32 | 341 |
| Using Analytic Hierarchy Process to Rank Takaful Companies based on Health Takaful Product | |
| <i>Noor Hafizah Zainal Aznam, Shahida Farhan Zakaria, and Wan Asma 'a Wan Abu Bakar</i> | |
| CHAPTER 33 | 349 |
| Service Discovery Mechanism for Service Continuity in Heterogeneous Network | |
| <i>Shaifizat Mansor, Nor Shahniza Kamal Basha, Siti Rafidah Muhamat Dawam, Noor Rasidah Ali, and Shamsul Jamel Elias</i> | |
| CHAPTER 34 | 361 |
| Ranking Islamic Corporate Social Responsibility Activities under Product Development Theme using Analytic Hierarchy Process | |
| <i>Shahida Farhan Zakaria, Wan-Asma ' Wan-Abu-Bakar, Roshima Said, Sharifah Nazura Syed-Noh, and Abd-Razak Ahmad</i> | |
| CHAPTER 35 | 369 |
| A Fuzzy Rule Base System For Mango Ripeness Classification | |
| <i>Ab Razak Mansor, Mahmod Othman, Noor Rasidah Ali , Khairul Adilah Ahmad, and Samsul Jamel Elias</i> | |

CHAPTER 36.....381

**Technology Assistance for Kids with Learning Disabilities:
Challenges and Opportunities**

*Suhailah Mohd Yusof, Noor Hasnita Abdul Talib, and Jasmin Ilyani
Ahmad*

CHAPTER 9

The Geometry of the Accessible Sets of Vector Fields

A.Y.Narmanov, and I. Ganiev

Abstract. In this paper it is studied geometry of accessible sets of family of vector fields. It is proved that sets of 0- accessible sets are smooth submanifolds of an orbit. It is also proved that on the any manifold there is a system of vector fields consisting of three vector fields, such that each set of 0- accessible sets coincide with the manifold.

Keywords: manifold; vector field; orbit; 0- accessible sets

A.Y.Narmanov (✉)
National University of Uzbekistan,
e-mail: narmanov@yandex.ru

I. Ganiev
International Islamic University Malaysia
e-mail: inam@iiu.edu.my

1 Introduction

The study of the geometry of the accessible set is one of the main objectives of quality control theory and is closely related to the geometry of the orbits of vector fields. Study of the structure of the accessible set and orbit systems of smooth vector fields are objectives of many mathematicians because of its importance in optimal control theory, dynamical systems, in geometry and in foliation theory [1-6].

2 Main Results

Let M – smooth manifold of dimension n , $V(M)$ – the set of all smooth vector fields defined on M . We denote by $[X, Y]$ Lie bracket of vector fields $X, Y \in V(M)$. With respect to the Lie bracket of the set $V(M)$ is an algebra Lee. Smoothness in this paper is smooth of class C^∞ .

Consider the set $D \subset V(M)$, through $A(D)$ denote smallest Lie subalgebra containing the set D . Family D may contain a finite and an infinite number of smooth vector fields.

For a point $x \in M$ denote by $t \rightarrow X^t(x)$ the integral curve of the vector field X , passing through the point x at $t=0$. The map $t \rightarrow X^t(x)$ defined in a certain region $I(x) \subset \mathbb{R}$, which generally depends on the field X , and from starting point x .

In the future, everywhere in the formulas of the form $X^t(x)$, we assume that $t \in I(x)$. If for all points $x \in M$ domain $I(x)$ of the curve $t \rightarrow X^t(x)$ coincides with the real axis, then vector field X is called a complete vector field. In this case flow of X generates a dynamical system.

Definition 1. Orbit $L(x)$ family D of vector fields, passing through the point x defined as the set of points y from M , for which there exist real numbers t_1, t_2, \dots, t_k and vector fields X_1, X_2, \dots, X_k from D (where k – is an arbitrary natural number) such that

$$y = X_k^{t_k} (X_{k-1}^{t_{k-1}} (\dots (X_1^{t_1} (x)) \dots)).$$

Definition 2. Point

$$y = X_k^{t_k}(X_{k-1}^{t_{k-1}}(\dots(X_1^{t_1}(x))\dots)) \in L(x)$$

called T – accessible from the point $x \in M$, if $\sum_i t_i = T$.

We denote by $A_x(T)$ the set of T – accessible points from the point $x \in M$.

In [Sussmann. H. ., 1973,] it is proved that every orbit of the family of vector fields with the topology Sussmann has a differential structure, with respect to which it is a smooth manifold smoothly immersed in M .

The following theorem shows that the set $A_x(T)$ has a differential structure of a smooth manifold.

Theorem 1. Set $A_x(T)$ for each $x \in M$ for each T is immersed submanifold of orbit codimension one or zero.

Theorem 2. Let M - smooth connected manifold of dimension $n \geq 2$. There exist a system D , consisting of three vector fields, such that $A_x(0) = M$ for each point $x \in M$.

In the event that the Euler characteristic of M is non-zero, there is a stronger statement.

Theorem 3. Let M - be a smooth compact connected manifold of dimension Euler characteristic which is different from zero. There is a system D on M consisting of two vector fields such that $A_x(0) = M$ for each point $x \in M$.

The following example shows that the on the compact connected manifold M with zero Euler characteristic can also be a system consisting of two vector fields such that $A_x(0) = M$ for each point $x \in M$.

Let the three-dimensional sphere $S^3 \subset R^4$ is given by $x^2 + y^2 + z^2 + w^2 = 1$, where x, y, z, w – the Cartesian coordinates in R^4 .

Let's consider a system on S^3 , consisting of two on the vector fields:

$$X = -y \frac{\partial}{\partial x} + x \frac{\partial}{\partial y} - \frac{\partial}{\partial z} + z \frac{\partial}{\partial w}, Y = -z \frac{\partial}{\partial x} + x \frac{\partial}{\partial z}$$

It is easy to verify that these fields are vector fields Killing, ie. local diffeomorphisms $x \rightarrow X^t(x)$, $x \rightarrow Y^t(x)$ for every t are isometries sphere of S^3 .

Lie bracket $[X, Y]$ of vector fields X, Y is as follows:

$$[X, Y] = -w \frac{\partial}{\partial x} - z \frac{\partial}{\partial y} + y \frac{\partial}{\partial z} + x \frac{\partial}{\partial w}$$

At the point $p(1, 0, 0, 0) \in S^3$ the vectors $X(p), Y(p), [X, Y](p)$ are linearly independent, subspace $A_p(D) = \{X(p) : X \in A(D)\}$ is three-dimensional. Therefore, the orbit is three-dimensional. Due to the fact that they are the Killing vector fields, the orbit is a closed set [Narmanov.A.Y., Saitova S, 2014]. On the other hand, by virtue of the maximality of dimension of the orbit it is an open set. Consequently, the orbit is coincident with S^3 .

Now consider the sets $A_q(0)$ for $q \in S^3$. If the sets A_q are submanifolds of codimension one, owing to the fact that X, Y -are Killing vector fields, they generate two-dimensional Riemannian foliation on $[3]$. Recall that the foliation is called the Riemannian if every geodesic orthogonal to foliation at some point, it is orthogonal to foliation at all points [3]. How should follow from the results of [Thurston W, 1976], on the three-dimensional sphere doesn't exist two-dimensional Riemannian foliation. Consequently, the set $A_q(0)$ is coincident with S^3 .

In the following example sets $A_q(0)$ are submanifolds of orbits $L(p)$ codimension one. Let $M = R^3$, D - the family consists of following two Killing vector fields

$$X = -y \frac{\partial}{\partial x} + x \frac{\partial}{\partial y}, Y = \frac{\partial}{\partial z}.$$

In this case, for each point $p(x, y, z) \in M$, such that $x^2 + y^2 > 0$ the orbit $L(p)$ is a cylinder, and the set $A_q(0)$ for each point $q \in L(p)$ is a spiral line, tangent field vector field of which is $Z = -y \frac{\partial}{\partial x} + x \frac{\partial}{\partial y} - \frac{\partial}{\partial z}$. For points of the axis OZ of orbit $L(p)$ and sets $A_q(0)$ coincides with the axis OZ .

Acknowledgements.

The second author (I.G.) acknowledges the MOHE Grant FRGS13-071-0312.

References

1. Azamov A., Narmanov A.Ya. On the limit sets of orbits of systems of vector fields. (Russian) Differ. Uravn. 40 (2004), no. 2, 257-260, translation in Differ. Equ. 40 (2004), no. 2, 271–275.
2. Levitt N and Sussmann H. On controllability by means of two vector fields, SIAM J. Control, 13, no. 6, November, 1975.
3. Narmanov. A. Y., Kasimov O. On the geometry singular riemannian foliations. Uzbek Math. Journal, 2011, no 3, pp. 113-121.
4. Narmanov.A.Y.,Saitova S. On the geometry of orbits of Killing vector fields. (Russian) Differ. Uravn. 50 (2014), no. 12, 1582-1589, translation in Differ. Equ. 50 (2014), no. 12, 1-8.
5. Stefan P. Accessible sets, orbits, and foliations with singularities. Proc. London Mathematical Society. 1974, v. 29, p. 694-713.
6. Sussmann. H. Orbits of family of vector fields and integrability of systems with singularities. Bull. Amer. Math. Soc., 1973, 79, p. 197-199.
7. Thurston W. Existence of codimension one foliations, Ann. of Math. 104, 1976, 249-268.



ISBN 978-967-0314-35-6



9 789670 314356