Nasir Ganikhodjaev
Farrukh Mukhamedov
Pah Chin Hee

VOLUME 1

$$x' = 2xy$$
$$y' = 2xz$$

INVESTIGATIONS ON PURE MATHEMATICS, FINANCE MATHEMATICS AND OPTICS

Proceedings of the Department of Computational and Theoretical Sciences Kulliyyah of Science, IIUM

$$\varphi_1(x, y, z) = z$$

$$x' = x^2 + y^2 + z^2 + 2yz$$

الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيورسيتي إسلام انتارابغسا ملايسيا

Investigations on Pure Mathematics, Finance Mathematics and Optics

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IIUM Press

Published by.
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Nasir Ganikhodjaev, Farrukh Mukhamedov & Pah Chin Hee Investigations on Pure Mathematics, Finance Mathematics and Optics

ISBN: 978-967-418-198-7

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by
IIUM PRINTING SDN.BHD.
No 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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ANALYSIS OF DATA USING MULTILEVEL MODELLING WITH MLwiN

Nurhafizah Saidin
Assist. Prof. Dr. Nik Ruzni Nik Idris

Abstract. *Multilevel models are statistical models that analyze a hierarchical or clustered data simultaneously. It is different from the standard multiple regression analysis which is a single level analysis. With multilevel analysis, we could assess variation between the different parameters that vary at more than one level. It is used mainly in the social sciences such as in sociology, education, psychology, economics, medical and biomedical sciences. In this project, a multilevel model is fitted into data on students' performance at the Kulliyyah level (i.e. the CGPA). The results are compared with estimates obtained using the regression model using ordinary least squared method. The data will be hierarchically structured into two levels, namely students at level 1 and departments at level 2. We will consider contribution of other variables such as gender, the first year CGPA and the ratio of student and lecturer. We assume that the conventional regression does not perform well in estimating standard errors of coefficients, since the correlated responses yield smaller standard errors of coefficients. Consequently, there is a higher possibility of obtaining falsely significant results. It is found that the assumption is true and the best model to describe the performance of students is a random intercept model with the first year CGPA and gender as the explanatory variables.*

1 Introduction

1.1 Collection of Data

The data will be hierarchically structured into two levels, namely students at level 1 and departments at level 2. The students involved in this study were the fourth year students which had entered the university during the first and second semester of the 2007/2008 session. All of the students are from three departments within Kulliyyah of Science; which are Biomedical Science (BSBM), Biotechnology (BSBT) and Computational and Theoretical Science (BSMS). Further details of each of the students will also be included in this project, which are the gender and the Cumulative Grade Points Average (CGPA) during their year one and year four level of studies. Additional information on the number of lecturers within each Kulliyyah is also included. Below is the demographic table which describes the data in detail:

Table 1.1: Demographic table of the data

Department / Analysis	BSBT	BSBM	BSMS	TOTAL
Number of total student	315	527	383	1225
Percentage of total student (%)	26	43	31	
Number of lecturer	11	11	14	36
Percentage of lecturer (%)	31	31	39	