Syllabus of Spring Semester, 2018

Course Title	MULTIVARIATE STATISTICS (I)	Course Code	ST27517	Section	032
Department	Statistics	Level	3	Credit - Theory - Practice	3.0 - 3.0 - 0.0
Class Hours & Classroom	Tue. 10:30(75) 313-104,Thu. 10:30(75) 313-104				
Lecturer	CHOI,YONG-SEOK	Office	R208	Office Hours	14:00-15:00, TUE /THU
		Telephone		E-mail	
Methodology of Instruction	With practice times, we will be experienced in results' interpretations and visualizations of multivariate data analysis using the R.				
Evaluation and Grading	Total Score = Attendance(10%) + Reports(10%) + Exam(50%) + Term Project(30%) * Students with disabilities can request an extension of the exam hour, and they can take exams by getting writing assistance or by using a computer.				
Prerequisites	- Matrix Algebra (I), (II) - R				
Course Objectives	In Multivariate Statistics (I) with R, our aim is to learn some statistical analysis and visualization techniques : Principal Component Analysis (PCA), Factor Analysis (FA), Cluster Analysis (CA) for multivariate data which are measuring the various social present situations by many variables and observations. Recently, multivariate statistics provides some absolute and essential techniques for data mining. In this lecture, we have a good chance to raise our understanding multivariate data and to study some powerful analysis techniques. With practice, we will be experienced in results' interpretations of data analysis. Also Beam projector help to understand all process and interpretations for data analysis. Next semester, Multivariate Statistics (II) with R will give some statistical analysis and visualization techniques : Discrimination Analysis and Classification Tree (DACT), Multidimensional Scaling (MDS), Correspondence Analysis (CRA), Biplots.				
Course Description	Lecture 1. Multivariate Data Analysis 1.1. Multivariate data analysis 1.2 Types of multivariate analysis techniques 1.3 Introduction and visualization of multivariate data 1.4 Matrix representation and descriptive statistics of multivariate data 1.5 Distances and Correlation of multivariate data 1.6 Multivariate normal distribution and its useful property 1.8 Test of multivariate normality Lecture 2. Principal Component Analysis (PCA) 2.1 Comprehension of PCA 2.2 Concepts of pc 2.3 Algebraic inducement of pc 2.4 Selection and explanation of pc 2.5 Algebraic inducement of sample pc 2.6 Visualizations of PCA 2.7 R for PCA Lecture 3. Factor Analysis (FA) 3.1 Comprehension of FA 3.2 Conseptof common factor 3.3 Factor model 3.4 Estimation of factor model 3.5 Factor rotation and factor loadings plot 3.6 Application of factor scores 3.7 Visualizations of FA 3.8 R for FA * Students with disabilities can negotiate with the Disabled Student's Academic Support Center regarding course materials and assignments.				

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	Lecture 5. Cluster Analysis (CA) 5.1 Comprehension of CA 5.2 Similarity measures 5.3 Hierarchical clustering methods 5.4 Non-hierachical clustering methods 5.5 Numbers of Clusters 5.6 CA based on the statistical models 5.7 R for CA * Students with disabilities can negotiate with the Disabled Student's Academic Support Center regarding course materials and assignments.
Textbooks and References	
Required Textbooks	Choi, Y.S.(2018). Multivariate Data Analysis with R, Kyungmoon, Seoul.
References	[1] Anderson, T.W.(1984). An Introduction to Multivariate Statistical Analysis (2nd ed.), John Wiley, New York. [2] Chatfield, C. and Collins, A. J. (1980). Introducton to Multivariate Analysis, Chapman and Hall, London. [3] Choi, Y.S. and Shin, S.M.(2013). Understanding of Biplot Analysis using R, Free Academy, Seoul. [4] Choi, Y.S.(2014). Understanding Statistics with R, Kyobo, Seoul. [5] Choi, Y.S.(2014). Walk in Multidimensional Scaling, Free Academy, Seoul. [6] Dillon, W. R. and M. Goldstein (1984). Multivariate Analysis -Methods and Applications-, John Wiley & Sons, New York. [7] Jobson, J. D. (1992). Applied Multivariate Data Analysis, Springer-Verlag, New York. [8] Johnson, R. A. and Wichern, D. W. (2002). Applied Multivariate Statistical Analysis, 5th Edition, Prentice Hall Inc, London. [9] Rencher, A. V. (1995). Methods of Multivariate Aanlysis. John Wiley & Sons, Inc., New York. [10] Srivastava, M.S. (2002). Methods of Multivariate Statistics, Wiley-Interscience, John Wiley & Sons, Inc., USA.

Weekly Schedule of Classes		
Week No.	Course Material	Assignments and Other Notes
Week 1	[Orientation and Education on Academic Misbehavior(e.g. Cheating, Plagiarism) and Safety Education on Experiment and Practice] Lecture 1. Multivariate Data Analysis 1.1. Multivariate data analysis 1.2 Types of multivariate analysis techniques	Home Works will be given in your Practice Time, Submit your Home Work after 1 week.
Week 2	1.2 Types of multivariate analysis techniques 1.3 Introduction and visualization of multivariate data	
Week 3	1.5 Distances and Correlation of multivariate data 1.6 Multivariate normal distribution and its useful property	
Week 4	1.8 Test of multivariate normality Lecture 2. Principal Component Analysis (PCA) 2.1 Comprehension of PCA	
Week 5	2.2 Concepts of pc 2.3 Algebraic inducement of pc	
Week 6	2.4 Selection and explanation of pc 2.5 Algebraic inducement of sample pc	
Week 7	2.6 Visualizations of PCA 2.7 R for PCA	
Week 8	Lecture 3. Factor Analysis (FA) 3.1 Comprehension of FA 3.2 Conseptof common factor	
Week 9	3.3 Factor model 3.4 Estimation of factor model	
Week10	3.5 Factor rotation and factor loadings plot 3.6 Application of factor scores	
Week11	3.7 Visualizations of FA 3.8 R for FA	
Week12	Lecture 5. Cluster Analysis (CA) 5.1 Comprehension of CA 5.2 Similarity measures	
Week13	5.3 Hierarchical clustering methods	Prepare your Data for Term Project
Week14	5.4 Non-hierachical clustering methods	
Week15	5.5 Numbers of Clusters 5.6 CA based on the statistical models 5.7 R for CA	
Week16	Final Examination	Submit your Term Project
Attachment		