

**UNIVERSITI TEKNOLOGI MARA**

**EXCAVATING CLUSTERS OF STAR  
COORDINATE VISUALIZATION  
THROUGH DIMENSION  
MANIPULATION**

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## ABSTRACT

Recent advancement in high-performance technologies has resulted in collections of high dimensional data. High dimensional data consist of large number of data records and attributes. It is challenging when it comes to extracting high dimensional data into meaningful information. Cluster analysis is used as a method to provide useful summary so that it can be understood more straightforwardly. The summary obtained, however is difficult to interpret from raw data. In order to understand the clusters results, it is visualized in a low dimensional plane. There are many available visualization techniques that can handle high dimensional data. One of it is geometric projection technique. Examples of geometric projection techniques are; Scatterplot (SP), Parallel Coordinate (PC) and Star Coordinate (SC) visualization techniques. However, for this study, only SC visualization technique was explored in further details. SC can display high dimensional data into a limited space. SC performs by plotting data dimensions in a circular arrangement. Through this method, it assists users to view the data pattern as a whole in a single space. Nevertheless, mapping high dimensional data could produce clutter and overlap. Consequently, SC provides interactive features through dimensions manipulation to search for hidden information. There are dimensions arrangement and scaling. Excavating clusters which are also known as digging clusters can help novice users to determine the correlations among data dimensions. Without prior knowledge of relationship between data dimensions, novice users will be blindly searching for clusters. This is due to clusters appearance that depends on data dimension position and length. Hence, users need to identify the arrangement of data dimensions and which data dimensions contribute to the cluster appearance. Therefore, the study into manipulating interactive features of SC technique draws attention to be investigated. This thesis proposes a method to identify the preferable dimensions position and scaling axis that can help novice users to understand the distribution of plotted data in SC environment. It supports discovering clusters, interpreting the relationship patterns between data dimension. This method covers three parts; dimension arrangement (equal angle), dimensions angle (based 360 degrees) and dimension scaling (equal angle and based 360 degrees). Initially, the arrangement of dimension was measured using Pearson Correlation (PR); meanwhile, the obtained correlation value was converted into based 360 degrees; lastly, the dimension scaling applied Manhattan Distance (MD) to determine the contribution of each data dimension towards cluster performance. The proposed method has successfully produced clusters. It is positively supporting novice users with limited knowledge in using SC technique to further manipulate interactive features during their analysis.

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## TABLE OF CONTENT

	<b>Page</b>
<b>CONFIRMATION BY PANEL OF EXAMINERS</b>	<b>ii</b>
<b>AUTHOR'S DECLARATION</b>	<b>iii</b>
<b>ABSTRACT</b>	<b>iv</b>
<b>ACKNOWLEDGEMENT</b>	<b>v</b>
<b>TABLE OF CONTENT</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>x</b>
<b>LIST OF FIGURES</b>	<b>xiii</b>
<b>LIST OF SYMBOLS</b>	<b>xvii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xviii</b>
<b>CHAPTER ONE: INTRODUCTION</b>	<b>1</b>
1.1 Introduction	1
1.2 Research Background	1
1.3 Motivation	5
1.4 Research Problem Statement	6
1.5 Research Questions	9
1.6 Research Objectives	9
1.7 Research Objectives Outline	10
1.8 Research Scopes	11
1.9 Significance of Study	11
1.10 Research Limitation	12
1.11 Research Report Organization	13
1.12 Chapter Summary	13
<b>CHAPTER TWO: LITERATURE REVIEW</b>	<b>15</b>
2.1 Introduction	15
2.2 High Dimensional Data	15
2.2.1 Data Type	16
2.2.2 Data Quality	18

2.2.3	Data Normalization	19
2.3	Clusters Analysis	22
2.3.1	Distance Measure between Records	23
2.3.2	Correlation Measure between Attributes	27
2.4	Visualization Techniques for High Dimensional Data	31
2.5	Geometric Projection High Dimensional Data Visualization Technique	37
2.5.1	Scatterplot (SP) Visualization Technique	37
2.5.2	Parallel Coordinate (PC) Visualization Technique	38
2.5.3	Star Coordinate (SC) Visualization Technique	39
2.5.4	Comparison of SP, PC and SC Visualization Techniques	40
2.6	SC Interactive Feature	44
2.6.1	Dimension Arrangement	44
2.6.2	Determining Dimension Angle	46
2.6.3	Dimension Scaling	47
2.7	Evaluation Performance Method in Visualization and Clustering	48
2.7.1	Evaluating User Evaluation	48
2.7.2	Evaluating Visualization Quality	50
2.8	Chapter Summary	51
 <b>CHAPTER THREE: RESEARCH METHODOLOGY</b>		<b>52</b>
3.1	Introduction	52
3.2	Research Conceptual Model	52
3.3	Research Methodology Framework	54
3.4	Phase 1: Research Preparation	55
3.4.1	Problem Assessment and Research Study	56
3.4.2	Data Collection	56
3.5	Phase 2: Preliminary Study	57
3.5.1	Interactive Features in SC	57
3.5.2	Dimension Arrangement	58
3.5.3	Dimension Scaling	59
3.6	Phase 3: Experimental Design	59
3.7	Phase 4: Analysis and Evaluation	60
3.8	Chapter Summary	61