Knowledge discovery and data mining are rapidly evolving areas of research that are at the intersections of several disciplines, including distributed systems, databases, artificial intelligence, visualization, statistics, high performance and parallel computing. People in business, science, medicine, academia and government collect raw data and there are several commercial packages which process the given data to offer general as well as specific purpose knowledge discovery. An important knowledge discovery and data mining goal is to “Turn Data into Knowledge”.

Data mining is about solving problems by analyzing data already present in databases. Data mining is defined as the process of discovering patterns from large scale data repositories. To accomplish data mining task, there is always the requirement of efficient exploratory techniques.

There are various data mining techniques like association rules, correlations, sequential patterns, classification, clustering and many more. Every technique has its own significance which depends upon the application area and problems for which they are deployed. In this research work, the objectives, as designed in the synopsis are achieved through association rule mining methodology. The supermarket transaction data problem was the original motivation for association rules mining. The supermarket transaction data problem is related to examine the customer’s buying behavior. Association rules describe, how often items have been purchased together. For example, an association rules “cooldrink=> chips (80%)” states that 80% of the customers who bought cooldrink also bought chips. Such rules can be useful for decisions concerning store layout, product pricing and promotions etc.

Considering the multidimensional application of data mining and association rules mining algorithms, it was decided to carry out the research on this approach and it was entitled “Design of an Improved Multiple Level Association Rules Algorithm for Mining Frequent Patterns”. The research would focus on various techniques outside and inside association rules algorithms and augment their functioning and behavior by introducing certain knowledge component so as to harness best out of the operation.

Extensive literature survey and research has been done throughout the present research work. The documentation and results of the research work has been putted down in the thesis, which is organized into various chapters, as per the different aspects of association rules mining algorithms. List of paper published in the form of publication in various
National/ International Journal/ Conference/ Seminar etc are also included for the reference. The chapter wise organization of the thesis is as follows:

**Chapter 1** relates to the introduction of data mining, different models and various functionalities of data mining. This chapter also explains the single level and multiple level association rules with their application in multiple domains.

**Chapter 2** covers the literature review related to association rules mining algorithms. The chapter is organized into sub-sections detailing various literature reviewed regarding different aspects of multiple level association rule mining. As the main focus of our research is mining multiple level association rules; it is prerequisite to have a look at what is association rules mining. So, this chapter firstly explores some basic concepts which are helpful in carrying out research work directly or indirectly. After that single-level association rules mining approaches are explained. Subsequently this chapter presents an overview of pertinent literature and research of multiple levels association rules mining methods. Last segment comprises the study of miscellaneous research papers used to carrying out the research work.

**Chapter 3** defines the problem statement of the research and identifies various objectives to be accomplished throughout the research. The chapter provides the significance of study and details about the research methodology used to achieve these objectives. This chapter also discuss about the source of datasets used and type of input files required.

**Chapter 4** gives a comprehensive survey and study of some problems about various existing methods. These existing methods have some issues and challenges in this field. The heated discussion about shortcoming of evolutionary algorithms leads to some improvements. This chapter also provides an introduction about concept hierarchy and types of concept hierarchies. After that this chapter investigates the requirement of concept hierarchies in multiple level association rules mining and other data warehousing and data mining applications. A case study of an efficient encoding scheme of concept hierarchy is described.

**Chapter 5** describes the traditional algorithms for mining association rules at multiple levels of abstraction. Accordingly two well established algorithms MLT2_L1 and Level Wise Filtered Table (LWFT) algorithm are presented in this chapter to find multiple level frequent itemsets. The main focus of this chapter is to identify the basic working of MLT2_L1 and Level Wise Filtered Table (LWFT) algorithms. At last, critically examines the weakness of MLT2_L1 and LWFT algorithm.

**Chapter 6** introduces the two new proposed algorithms i.e. TransTrie and MLTransTrie, which are designed for discovery of association rules. TransTrie Algorithm is projected to
generate the frequent patterns only at single level of abstraction. On the other hand, MLTransTrie Algorithm is proposed to find the frequent patterns at multiple levels of abstraction. The workings of proposed algorithms are demonstrated with the help of an example database.

Chapter 7 focuses on the results of the proposed algorithm, MLTransTrie. To study the performance of this proposed algorithm, different support threshold were used and tested using real world datasets. To prove the competence of proposed algorithm a comparative analysis is performed with well-known evolutionary algorithms.

Finally, comes the wrapping up of the research work carried out in previous chapters and making inferences. Chapter 8 points out the detailed conclusion of the research work carried throughout the doctoral work and discussion on future scope of present research work.

In the end, Bibliography of different references is maintained as per Harvard Referencing mechanism and is appended at the end. Finally this is followed by implementation code of algorithm in java version JDK-7 along with dataset used in this research work in the form of Appendix.