CHAPTER-5
ASSOCIATION RULES

INTRODUCTION

When using association rules, one must remember that these are not casual relationships. They do not represent and relationship inherent in the actual data as is the case with functional dependencies, or in the real world. There is probably no relationship between bread pretzels that causes them to be purchased together. Furthermore, these is not guarantee that this association will apply in the future. However, association rules are heavily used in the retail sector in creating effective advertising, marketing and inventory control. The association task for data mining is the job of finding which attributes “go together”. Most prevalent in the business world, where the market basket analysis, the Task of association seeks to uncover rules for quantifying the relationship between two or more attributes. Association rules are of the from “if antecedent, then consequent,” together with a measure of the support and confidence associated with rule. For example, a particular supermarket many find that of the 1000 customers shopping on a Thursday night, 200 bought diapers, and of those 200 who bought diapers, 50 bought bear, Thus, the association rule would be “If buy diapers, then
by beer” with a support of $200/100 = 200\%$ and a confidence of $50/200 = 25\%$. Example of association tasks in business and research include:

1. Investigating the proportion of subscribers to a company’s cell phone plan that respond positively to an offer of a service upgrade.
2. Examining the proportion of children whose parents read to them who are themselves good readers.
3. Predicting degradation in telecommunications networks.
4. Finding out which items in a supermarket are purchased together and which items are never purchased together.
5. Determining the proportion of cases in which a new drug will exhibit dangerous side effects.

THE ASSOCIATION RULE MINING PROCESS

The general KDD process (Hamalainen, W. et al.) [12] have the next step: collecting data, preprocessing, applying the actual data mining tasks and post-processing. We particularize these steps for association rule mining in the privacy domain.
• Collecting Data
• Data pre-processing
• Applying the mining algorithms
• Data post-processing

DRAWBACKS AND SOLUTIONS

In the association rule mining area, most of the research efforts went in the first place to improving the algorithmic performance (Ceglar, A. et al.) [13] and in the second place into reducing the output set by allowing the possibility to express constraints on the desired results. Over the past decade a variety of algorithms that address these issues through the refinement of search strategies, pruning techniques and data structures have been developed. While most algorithms focus on the explicit discovery of all rules that satisfy minimal support and confidence constraints for a given dataset, increasing consideration is being given to specialized algorithms that attempt to improve processing time or facilitate user interpretation by reducing the result set size and by incorporating domain knowledge (Goethals B. et al.) [14]. There are also other specific problems related to the application of association rule mining from e-learning data. When trying to solve these problems, one should consider the purpose of the association models and the data they come from.