Chapter 25
Concept of Association Rule of Data Mining Assists Mitigating the Increasing Obesity

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ABSTRACT

Association rule of data mining is known to encompass a wide set of intelligent techniques that intent to unveil and analyze correlations and associations between items in a set. Market basket analysis is one such, possibly the most popular technique in business domain that is used to analyze combinations of items that often are listed together in various transactions. In this paper, the author strives to expand applicability of the same concept to human health under purview of health informatics. The present growing rate of obesity has raised alarming concept to the communities globally. It entails several chronic diseases that may be fatal eventually. This work aims to aid in the ongoing efforts to alleviate the obesity, primarily caused by lack of physical exercise. Concept of association rule of data mining may help regulating mild exercise by associating it with a daily activity, sleeping at night. Mild but regular short exercise just before sleep may help ameliorating individual's health.

1. INTRODUCTION

Association rules have been discussed quite extensively in the data mining literature and issues related to the efficient generation of such rules from large complex dataset have been addressed. Primarily, the objective of the association rule of data mining is to discover the intrigue relationships among the items in complex, and large structured or unstructured multidimensional datasets. Generally, association rules are the data mining strategies that uncover the relationship of two entities in a dataset that assists in better learning about that data, specifically in customer buying patterns in numerous business domains. Let us consider two hypothetical examples to illustrate the concept. In a supermarket, in the entire day processing, there may be several transactions committed. Each transaction consists of the name of the items purchased. If bread, milk, and cheese, for example, together are the common items in most of

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the transactions, then this set {bread, milk, cheese} is termed as frequent set. So, a frequent set *F* can be defined as the set of items (zero or more) bought together in atleast in *T* transactions, a user-defined threshold. Then, it is most likely that these three items should be kept close inside the business venue, presumably, resulting in product sale increase. This concept has attained significant success in data warehouse (Data warehouse, 2013), but due to its effectiveness, is exploited in various other applications, including public health. In this paper, the use of the association rule concept is focused on its potential application to the recent public health concerns of obesity and implications of physical activity.

Obesity is generally defined as an excessively high amount of body fat or adipose tissue in relation to lean tissue. Today, the increasing prevalence rate of obesity is critically alarming and requires immediate attention as more than 35 percent of adults are obese. In 1997, the World Health Organization declared obesity as a global epidemic with far-reaching public health implications (WHO, 2001). An adult is considered obese, if his or her body mass index (body weight in kilograms divided by square of height in meters) is 30 or higher. A number of risk factors contribute to obesity, which include, but are not limited to, the lack of physical activity, unhealthy diet, sedentary lifestyle, and the environmental factors. In turn, the health burden of the obesity increases the number of fatal and non-fatal diseases, including diabetes, coronary heart disease, stroke, cancer, osteoarthritis, etc. The impairment of the quality of life in man or women is increased by the presence of eating disorders, anxiety and/or depression and the body shape. The incidence of psychological conditions increases due to the concerns about burning of the excess fat to regain normal weight. In an effort to control the obesity epidemic, the health care professionals, public health experts, and the dietitians have proposed guidelines, implemented strategies and action plans, but none of them are completely generic enough to suite for physically dysmorphic population due to individual's constraints. The relevant literature related to obesity control, suggest that never stop eating, eat small meals but do not overeat (Paul et al. 2013; Zelman, 2013), increase water intake (Orlando Sentinel, 2013), reduce carbohydrate intake (Mercola, 2011), exercises such as cardio (Livestrong.com, 2013), bariatric surgery (MedlinePlus, 2013), supplement diet plan, and etc. (Physicians' Select, 2013). The list is not limited, but each pattern has their pros and cons, and this study is not intended to explore them. The population with dysmorphic body shape often wishes to shed the excess body fat in a shorter span time. For morbidly obese people, the mild regular running has produced optimistic results due to severe pain in lower legs developed in the process to support the body. From the ancient times, practicing yoga (Mehta, 2013) for a prolonged but continuous time period has cited significant improvement in human health and many studies have documented its effectiveness. It is believed to have originated in ancient India, but was brought to the Western world in late 19th century, where it gained popularity in 1980s and accepted in mainstream physical health exercising system (Shaw, 2010). A survey conducted in the United States, reveals not only muscle but also mental health improvements for that cohort, which practiced yoga for a considerable length of time. Participation in any form of physical activity or exercise tends to decline with age and with the change of behavior in general population, consequently a 50 percent dropout within six months of initiation of physical activity (Hausenblas et al., 1997). According to the human heart study at Franklin Institute (The Human Heart, 2013) the hardest part of an exercise routine is getting started and establishing a regular pattern; our work addresses similar issues using the concept of data mining to regulate the physical activity and exercise.

In this paper, we adopt the use of the concept of association rule data mining to regulate exercise patterns associated with physical activity as a strategy towards the prevention and control of obesity in adults. To illustrate the concept, let us consider that exercise and sleep events are two items in the frequent set. Analogous to the business domain, where the association rule suggests keeping the associated items