Data Mining Approach for the Early Risk Assessment of Gestational Diabetes Mellitus

Saeed Rouhani, University of Tehran, Tehran, Islamic Republic of Iran
Maryam MirSharif, University of Tehran, Tehran, Islamic Republic of Iran

ABSTRACT

In this article, the authors proposed the method of medical diagnosis in gestational diabetes mellitus (GDM) in the initial stages of pregnancy to facilitate diagnoses and prevent the affection. Nowadays, in industrial modern world with changing lifestyle alimetal manner the incidence of complex disease has been increasingly grown. GDM is a chronic disease and one of the major health problems that is often diagnosed in middle or late period of pregnancy, when it is too late for prediction. If it is not treated, it will make serious complications and various side effects for mother and child. This article is designed for answering to the question of: “What is the best approach in timely and accurate prediction of GDM?” Thus, the artificial neural network and decision tree are proposed to reduce the amount of error and the level of accuracy in anticipating and improving the precision of prediction. The results illustrate that intelligent diagnosis systems can improve the quality of healthcare, timely prediction, prevention, and knowledge discovery in bioinformatics.

KEYWORDS
Artificial Neural Network, Data Mining, Decision Tree, GDM, Risk Assessment

INTRODUCTION

With increasingly easier access to clinical databases and healthcare medical centers, diagnostic systems are now used in a myriad of medical domains. Large volumes of medical data accumulate in healthcare clinical centers. Having access to these data centers, it is possible to extract and discover tacit knowledge behind the data through analysis of real events and results. Nowadays, in the modern industrial world with changing lifestyle alimetal manner and slake mobility the incidence of complex diseases like gestational diabetes is rapidly increasing. Recently, high rates of obesity and diabetes as well as low mobility and increasing marriage age, have resulted in increased occurrence of diabetes. Gestational diabetes mellitus is a kind of diabetes that appears for the first time during pregnancy (Ovesen, Jensen, Damm, Rasmussen, & Kesmodel, 2015). Its prevalence is reported to be 1-3% in the United States, 10.9% in Asian countries, 5.2% in Europe (Coustan, 2013) and ranges from 4-17% in all pregnancies (San, Ling, & Nguyen, 2012). GDM statistics are increasing on a daily basis, due to lifestyle changes in industrial urban areas as well as reduction of mobility and environmental factors.

DOI: 10.4018/IJKDB.2018010101

Copyright © 2018, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.
Having access to large amounts of data and database available in medical centers, it is possible to apply data mining methods. In the proposed research, after analysis, the primary data and output data of patients discovered that among the input and output data there were patients that they affect to GDM in future, but they have no initial warning symptoms or primary risk factors. Some data were unknown areas for symptoms and reasons of affection. Therefore, these exceptional cases may generate through encryption aspect of knowledge that are imperceptible for humans. However, human knowledge continues to grow and expand. If GDM is not treated or diagnosed in a timely manner, it may cause serious side effects for both the mother and the child. The diagnostic systems of the various complicate diseases like GDM are rapidly increased in recent years. Certain approaches such as expert systems, fuzzy logic, Artificial Neural Networks (ANNs), and decision-making support systems can help to improve the diagnosis and prediction of the disease. Different features of each approach can be used in diverse situations. For detection of these hide aspects of science and recognize the relationship between data simultaneously ANNs help to have a better and higher accuracy in prediction of complex disease like GDM. Complex diseases are often accompanied by unpredictable effects and are not free from false presumptions. Gestational diabetes mellitus is often diagnosed in middle or late period of pregnancy, when it is too late for prediction and the mother should be under medical treatment. In the proposed approach, the risk of GDM notices to the pregnant mother in the initial stages of pregnancy. However, it is possible by paying attention to this warning and taking a suitable food diet and necessary tendency the prevention of affection to GDM. This paper is designed to answer the question of “What is the best approach for the timely and accurate prediction of GDM?” Many data mining techniques have been developed that are applicable for many domains. For this purpose, the two most referenced, popular and basic methods of classification, the techniques of Artificial Neural Network (ANN) and Decision Tree (DT), are used to reduce the amount of error and make more accurate predictions:

- **Gestational Diabetes Mellitus:** GDM is one of the main disorders along pregnancy that is often diagnosed in middle or late pregnancy (Chu et al., 2007). There is a direct relation between performances of fetal and mother’s blood sugar, as which, by control of mother’s blood sugar it is possible to effectively avoid complication of diabetes. Gestational diabetes is a temporary form of diabetes in which the body does not produce adequate amounts of insulin to regulate sugar during pregnancy and with the onset or first recognition occurring during pregnancy (Kim, Cheng, & Beckles, 2008). Insulin is a hormone made in the pancreas. However, if gestational diabetes is not treated, it will affect the mother and child. If one suffers from gestational diabetes, her baby may be at increased risk of excessive birth weight. This can cause the baby to grow too large (macrosomia), early (preterm) birth and respiratory distress syndrome. Babies born early may experience respiratory distress syndrome, Low blood sugar (hypoglycemia), Type 2 diabetes later in life. Babies of mothers who have gestational diabetes, have a higher risk of developing obesity and type 2 diabetes later in life. Uncontrolled gestational diabetes can increase GFAP (Glia fibrillary acidic protein) in Muller cells and retinal thickness of retinal layer in rat offspring’s; therefore, uncontrolled gestational can damage the Muller cells (Larjani, 2009). Untreated gestational diabetes can result in a baby’s death either before or shortly after birth. Gestational diabetes may also increase the following risks for mother: high blood pressure, preeclampsia and future diabetes. Women with gestational diabetes, are more likely to get it again during a future pregnancy (David, Saeb, & Al Rubaean, 2013). It is also important that the baby be monitored for signs of diabetes after being born. In addition, women who have gestational diabetes have an increased risk of developing overt (Type II) diabetes later in life (Ovesen et al., 2015). There are three basic components in effectively managing gestational diabetes: monitoring blood glucose levels, adopting a healthy eating pattern, and physical activity. With well-timed alarm to the patient, self-management and self-care can provide to affection. Gestational diabetes can often initially be managed with healthy eating which is necessary for the rest of the pregnancy;
Predicting Protein Functions from Protein Interaction Networks

Animal Actin Phylogeny and RNA Secondary Structure Study
[www.igi-global.com/article/animal-actin-phylogeny-and-rna-secondary-structure-study/165549?camid=4v1a](www.igi-global.com/article/animal-actin-phylogeny-and-rna-secondary-structure-study/165549?camid=4v1a)