STUDYING DIABETES USING GRAPH DATABASES

L. Gruia[*], S.Paşca

*Doctoral School for Electronics Telecommunications and Information Technology,
Bucharest, Romania;*
*E-mail: lucian.gruia@sdettib.pub.ro / luciancgruia@gmail.com

Diabetes (also known as Diabetes Mellitus) is a metabolic disease in which insulin production is abnormal or the cells do not respond to insulin properly. The immediate effect is the raising of the level of sugar concentration in human blood which causes a large number of affections.

There are three types of Diabetes, but only the 1st type is insulin-dependent. The most common way of treatment is based on insulin injection in patient body. Based on the measurement of the instantaneous level of sugar in blood, the patient inject the recommended dose by doctor.

There are some decisive factors which determine the structure and concentration of the dose that the patients should use: the food they eat, the speed of digestion, the moment of the day and the level of stress, age, gender, or the way the body's cells respond to insulin. Based on the statistics models and the patient's response to treatment, doctors can adapt the recommendations regarding the quantity or the frequency of the insulin injections for individual patient, but this is a reactive way of treatment. A more advanced solution is the use of a device that can take blood samples with a higher frequency than do usually a patient. Even if the device uses a local database with statistics about general behavior of patient, the solution is still a reactive one.

The objective of this research is to determine if the Insulin Algorithm can be predicted with adequate precision to make the treatment process a proactive one, and to design a software architecture capable to support a implementation of more interconnected devices which can provide blood samples and any additional information. In order to achieve this, there were used two types of DBMS for comparison: an SQL-based system and a Graph-based one. It can be observed that the last one is more efficient in analyzing the patterns of samples and predict a profile. Designing a system like this comes with challenges like: connectivity between devices, synchronizing, decision block, or distributing of the computing effort. A minimal visual description of the architecture is presented below in the image.

A proactive solution to monitor Diabetes can provide important contribution in the domain of learning more about the disease in a shorter time period.