Abstract

This research focused on the use of case based reasoning (CBR) for treatment and management of diabetes. CBR is a field of artificial intelligence where one uses past cases as resolution for similar problems. The concept is based on dynamic memory theory where human beings solve problems by recalling encountered cases [1].

This research has applied CBR in the field of medicine for treatment and management of diabetes. Diabetes is a family of metabolic disease condition where the patient has elevated blood glucose. There is a rise on the prevalence of diabetes in Kenya with over 2 Million Kenyans suffering from the condition [2]. Damage to nerves, heart failure, kidney failure blindness and amputations are among the diabetes associated complications. Some of key challenges encountered during the management of diabetes include lack of insulin, high cost of drugs, an overworked workforce and low awareness among others.

A formative questionnaire was conducted to find out the viability of previous experience in
problem resolution and later a summative questionnaire administered to medical experts to measure the outcome of the research. A prototype was developed using JCOLIBRI framework and trained with a total of 60 cases. 40 cases were type 1 and the remaining 20 cases type 2. A test data of 20 cases was used to measure the accuracy of the system. The key variables used in test were blood glucose, HBA1C (average blood glucose over 3 months), weight and height. The diagnosis predicted by the system was compared against the one obtained by the expert and the results were as follows. When tested with the 3 parameters (Blood Glucose, Height & Weight) the system had a mean accuracy of 28% before revision (3rd Cycle of CBR) and after the first revision (3rd Cycle of CBR) the system attained a mean accuracy of 70% with the 3 parameters. When tested with 1 parameter (Blood Sugar) after revision (3rd Cycle of CBR) the system returned a mean accuracy of 90%. The accuracy was based on the difference of solution applied between an expert judgment and the system judgment. The level of blood glucose is the key factor to consider during diabetes diagnosis. The research concluded that CBR is more accurate after the revision cycle and as the number of cases increase.

References

15. Ting-Peng, L. Analogical reasoning and case-based learning in model management systems.
26. Hugh, O. and Derek, B. Models of Similarity for Case-Based Reasoning.
27. Petri, M. & Henry, T. Bayesian Case-Based Reasoning with Neural Networks.
33. Roth-Berghofer T. (2012), Building Case-based Reasoning Applications with myCBR and COLIBRI
34. Rombo, O. (2013). Diabetes And Blindness In Kenya: A chronic diseases of nutrition in transition

Index Terms

Computer Science

Biomedical
Keywords

Case Based Reasoning, jCOLIBRI Framework, Diabetes, Accuracy, Cases, Retrieve, Reuse, Revise, Retain, Insulin, Problem, Solution.