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### **Predicting the blood glucose level for diabetic patients: mathematical modeling**

S S N Perera<sup>\*</sup> and M M G D Manamperi

*Department of Mathematics, University of Colombo, Colombo 03.*

Good control of blood glucose levels significantly reduces the diabetes patients' risk of developing complications. If it is desirable to be able to make an accurate prediction, so that control actions can be taken before the glucose level goes beyond the ideal bounds. There are a number of factors that affect the blood glucose level, such as carbohydrate intake, level of exercise, level of stress, etc. In addition, there are a number of internal processes, such as absorption and production of glucose by the liver and renal excretion through urine. Therefore predicting the blood glucose level is important but is a complicated process.

In this research we attempt to predict blood glucose levels using the artificial neural network. The goal of this research is to construct an artificial neural network by combining principal component analysis and multilayer feed forward neural network that predicts the blood glucose levels reasonably for the morning and evening, using a number of factors affecting the blood glucose level, as inputs. For time intervals in the morning and evening, the corresponding root mean square error between actual data and predicted data is 1.1991 mmol/l and 0.039 mmol/l. Comparisons of the diagnostic accuracy with other neural network models that use the same dataset are made. The comparison results showed overall improved accuracy, which indicates the effectiveness of this proposed model.