IDENTIFICATION OF DIABETES SYSTEM VIA NEURAL NETWORK MODEL

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ABSTRACT

In this article, a new strategy to spot polygenic disorder system has been given, what's say that focuses on the matter of polygenic disorder system identification Multi-layer perceptron via neural network that is an appropriate tool for modeling linear dynamic system. A lot of ever the advantage of suggestion procedure is easy technique and time length for identification is brief. The identification of dynamic systems is the technique of developing a mathematical illustration of a system victimization experimental knowledge. So as to try some theoretical analysis on real system a way of identification is required. It is shown within the simulation part, that the neural network strategies determine polygenic disorder system properly.

KEYWORDS: Identification, Multi-Layer Perceptron, Artificial Neural Network, Polygenic Disorder System

The population of earth is growing and aging. A number of the foremost health challenges, like many varieties of cancers and infectious diseases, polygenic disorder and neurodegenerative diseases square measure challenges that plenty of researches have done to alleviate the aspect effects and ideally cure such diseases. Polygenic disorder may be a major reason for concern and its prevalence is increasing within the world. World health organization anticipates that the whole number of diabetic patients square measure quickly exaggerated(Klonoff and Schwartz 2000, Hu, Fu et al. 2008, Nathan, Buse et al. 2009,Bhavsar, Emerson et al. 2010). Nowadays, scientists and engineers square measure performing on this downside. Therefore, one demand isto assist them to research on finding an appropriate model. Model should be a description of the dynamic system.It's attainable to model systems in step with a group of information collected throughout a sensible experiment(Farrell and Polycarpou 2006).

Neural networks which is simulating the human neural system through formula is a powerful knowledge modeling tool that is ready to capture and represent advanced input/output relationships.

Identification of systems may be found in various applications and these strategies became terribly effective tools of identification of plants (Liu, Kadirkamanathan et al. 1998, Becerikli, Konar et al. 2003,Adeli and Panakkat 2009).Data on the native system and also the perform approximation is sensitive to the coaching data(Parlos, Menon et al. 2001). Neural networks square measure greatly used for approximating functions as a result of its simplicity and quicker convergence(Eberhart and Dobbins 1990, Skapura 1996, Mooij, Trolle et al. 2010).

In this paper, identification of polygenic disorder system is completed by multi-layer perceptron neural network. the remainder of this paper is organized as follows.

Section two presents the mathematical model. In section three we tend to introduce preliminaries regarding artificial neural network and system identification that square measure followed by careful description. The conclusion is proposed in section four.

MATERIALS AND METHODS

Mathematical Model

In this paper, we tend to use the easy lyric model of Ackerman et al (Ackerman, Gatewood et al.)that represents the interactions between the aldohexose concentration, hormone concentration , and also the epinephrin as follows:

\[ g = -ag -bh +fe +u_1 \]  
\[ h = cg -dh +ke +u_1, \]  
\[ e = -lg -mh +ne +u_1. \]

Where a, b, c, d , f, k, l, m and nare square measure constants and g,h and e are aldohexos concentration ,hormone concentration and epinephrin respectively. Epinephrin may be a separated variable with the idea that there's an indoor rate at that the blood sugar concentration is being exaggerated within the model of...
blood sugar restrictive system (Heinmets 1969, Kwach, Ongati et al. 2011) mentioned above equations. A simplified model of the system regulation blood sugar concentration is reviewed. The model that predict the damped wave response to associate in nursing oral aldohexose load, lumps the big range of kinetic parameters a far smaller range which might at least partially, characterize the human aldohexose restrictive system. The predictions supported the model square measure compared with measurements of blood-glucose and blood hormone concentrations throughout the oral glucose-tolerance check varied different conditions square measure simulated and their implications square measure mentioned in term of mathematical model used (Ackerman, Gatewood et al. 1965).

Artificial Neural Network

In the gift paper, the rear propagation neural network is employed. It's the sigmoid activation performs within the hidden layer and linear activation function in output with adequate range of neurons within the hidden. A typical three-layer back propagation neural network with the input layer, hidden layer and output layer is appropriate for identify systems. In this neural network, the weights square measure updated as follows:

\[ W_{yh}(t) + \Delta W_{yh} = W_{yh}(t) + \Delta W_{yh} \]  
\[ \Delta W_{yh} = -\gamma \frac{\partial E}{\partial W_{yh}} \]  
\[ W_{hy}(t + \Delta t) = W_{hy}(t) + \Delta W_{hy} \]  
\[ \Delta W_{hy} = -\gamma \frac{\partial E}{\partial W_{hy}} \]  

Where, \( W_{yh} \) is that the weight between output layer and hidden layer, and \( W_{hy} \) is the weigh between hidden layer and input layer, the constant is the learnig rate and \( E \) is that the error is obtained as follows:

\[ E = 0.5(y - y_i)^2 \]  

Where \( y \) is that the output of the neural network and \( y_i \) is the desired output.

RESULTS

The results of identification of system (1-3) with parameter values (Kwach, Ongati et al. 2011): \( a=2.92, b=4.34, f=1.24, c=0.208, d=0.78, k=0.14, l=2.94, m=0.98, n=0.53 \) is define in this section. For system (1-3), the mentioned neural network is employed and also the feedback is taken from hidden layer. The output of the neural network model and also the plant for a curved signal uniformly (figure,1.a), is shown in (figure,1.b). The error of system identification is additionally shown in (figure,1.c) and indicate the potency of the given neural network.

DISCUSSION

In this work, a neural network with feedback from hidden layer, is employed for identification of polygenic disorder system with assumption on lack of data regarding diabetes dynamics. We've got shown that a neural network with backpropagation will determine polygenic disorder system accurately. The advantage of
the predicted technique may be a straightforward technique and time length for identification is brief. The results of simulation shown the potency of presented technique.

REFERENCES


