MODELING OF GLUCOSE CONCENTRATION DYNAMICS FOR PREDICTIVE CONTROL OF INSULIN ADMINISTRATION

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Abstract

The compartmental models, as Hovorka's one, are usually exact but complicated. Thus, they are not suitable for direct usage in nonlinear predictive controllers because of complexity of the resulting controller and numerical problems that may occur. Thus, simplified nonlinear (neural and fuzzy) models are developed in this paper for the future use in the predictive algorithms. Training and structure selection issues are discussed in the context of neural models. The heuristic, easy to obtain, Takagi-Sugeno fuzzy model composed of the control plant step responses is also designed. It is shown that in case of the considered biological process both nonlinear models have significantly better approximation abilities than linear ones.

Keywords: insulin administration, neural networks, fuzzy models