Perspectives of the para-model control of HIV models

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ABSTRACT

The model-free control approach [1] has been designed as a robust controller to overcome difficulties of tuning classical controllers when the processes to be controlled are not "well-modeled". In this work, we present first the real-time model-free based control of the predator-prey like model that describes the evolution of the HIV-1 model [2]. The perspectives towards the model-free based optimal control of the SICA model [3] are then discussed and preliminary results are presented. The proposed feedback control $\mathcal{C}_\pi$ [2] drives biological models and shall optimize the model response according to their real-time feedbacks. The control law is:

$$\mathcal{C}_\pi : (y, y^*) \mapsto u_k = \int_0^t K_i \varepsilon_{k-1} d\tau \Bigg|_{k-1} \underbrace{\left\{ u_{k-1}^i + K_p(k_\alpha e^{-k_\beta k} - y_{k-1}) \right\}}_{u_k^i} \quad (1)$$

where: y^* is the output reference trajectory of the models to be optimized; K_p, K_I are real positive tuning gains; $\varepsilon_{k-1} = y_k^* - y_{k-1}$ is the tracking error.

References

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