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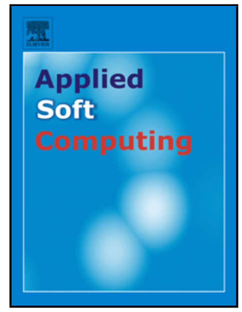

Title: Design of Bio-Inspired Heuristic Technique Integrated with Interior-Point Algorithm to Analyze the Dynamics of Heartbeat Model

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<AT>Design of Bio-Inspired Heuristic Technique Integrated with Interior-Point Algorithm to Analyze the Dynamics of Heartbeat Model

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<ABS-Head><ABS-HEAD>Graphical abstract

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<ABS-HEAD>Highlights► ► <ST>Design</ST> *of biological inspired heuristics to analyze the dynamics of heartbeat model* ► *The strength of ANNs, GA, and IPAs is exploited to solve the Heartbeat dynamic system* ► *Design: scheme is tested effectively on variants of problems by taking different values for perturbation factor, tension factor in the muscle fiber and length of the muscle fiber in the diastolic state* ► *Comparison from reference solution established the correctness of the proposed scheme* ► <ST>Results</ST> *of performance indices validate consistent accuracy and convergence of the scheme*

<ABS-HEAD>Abstract

<ABS-P>In this study, bio-inspired computing is presented for finding an approximate solution of governing system represents the dynamics of the HeartBeat Model (HBM) using feed-forward Artificial Neural Networks (ANNs), optimized with Genetic Algorithms (GAs) hybridized with Interiort-Point Algorithm (IPA). The modeling of the system is performed with ANNs by defining an unsupervised error function and optimization of unknown weights are carried out with GA-IPA; in which, GAs is used as an effective global search method and IPA for rapid local convergence.

<ABS-P>Design: scheme is applied to study the dynamics of HBM by taking different values for perturbation factor, tension factor in the muscle fiber and the length of the muscle fiber in the diastolic state. A large number of simulations are performed for the proposed scheme to determine its effectiveness and reliability through different performance indices based on mean absolute deviation, Nash-Sutcliffe efficiency, and Thiel's inequality coefficient.

<KWD>Keywords: Heartbeat dynamics; Artificial Neural Networks; Nonlinear systems; Genetic Algorithms; Interior point methods; Hybrid Computing.