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Stable adaptive fuzzy data-driven controller for unknown dynamic within a class of nonlinear discrete-time systems

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For several control engineering applications especially automation systems, the system dynamic and models are required to design the controllers under the expectation performance. Unfortunately, the mathematical model and system dynamic are difficult to determine regarding the nonlinearity and uncertainty of practical plants. In this work, the controller for a class of nonlinear discrete-time systems is designed under the assumption that system dynamic and mathematical model are assumed to be unknown. This controller is constructed with a Fuzzy rule adaptive network (FREN) which can operate under the human knowledge of controlled plant within the format of IF-THEN rules. Only input-output data set is required to design this controller. Furthermore, the off-line learning phase can be neglected here with the closed-loop performance analysis. The experimental system is constructed to demonstrate the validation of the proposed controller.

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Robotic arm-fully automated knee surgery system- The research project of knee surgery, cutting and replacing via digital processing, fuzzy logic and PID control

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The research project of knee surgery, cutting and replacing via digital processing, fuzzy logic and PID control (Robotic Arm-Fully Automated Knee Surgery System): The purpose of the automation-based system is to get best results from a new surgery operation for cutting or a total knee replacement. Detailed analysis of kinematics not only in vigorous knee but also knees with injuries or ruptured ones is crucial to compare and gatherall datas and define the pathology to be corrected by drawing it out. Additionaly, evaluation of knee kinematics with digital processing unit is creative to assess the final judgments of the surgery. After detailing the analysis of kinematics by digital processing unit, determining the fuzzifiable attributes is a must. Defining fuzzy functions and identifying the membership set values, the rules and fuzzy graphs are the next steps during this process. Furthermore, executing the procedure to generate result by fuzzy logic software is combined with fuzzy pid control of a robotic arm, which is embedded in. Lastly, cleaning noise, which is gathered by pid control is the final statement for bringing the whole system to a conclusion.

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