

Implementasi Reinforcement Learning dengan Menggunakan Algoritma Twin Delayed Deep Deterministic Policy Gradient (TD3) untuk Pengendalian Ketinggian Air pada Sistem Coupled Tank = Implementation of Reinforcement Learning Using Twin Delayed Deep Deterministic Policy Gradient (TD3) Algorithm for Water Level Control in Coupled Tank System

Annisa Khoirul Mumtaza, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=9999920527753&lokasi=lokal>

Abstrak

Sistem coupled tank merupakan salah contoh penerapan sistem kontrol level industri yang memiliki karakteristik yang kompleks dengan non linieritas yang tinggi. Pemilihan metode pengendalian yang tepat perlu dilakukan untuk dapat diterapkan dalam sistem coupled tank agar dapat memberikan kinerja dengan presisi tinggi. Sejak awal kemunculannya, Reinforcement Learning (RL) telah menarik minat dan perhatian yang besar dari para peneliti dalam beberapa tahun terakhir. Akan tetapi teknologi ini masih belum banyak diterapkan secara praktis dalam kontrol proses industri. Pada penelitian ini, akan dibuat sebuah sistem pengendalian level pada sistem coupled tank dengan menggunakan Reinforcement Learning dengan menggunakan algoritma Twin Delayed Deep Deterministic Policy Gradient (TD3). Reinforcement Learning memiliki fungsi reward yang dirancang dengan sempurna yang diperlukan untuk proses training agent dan fungsi reward tersebut perlu diuji terlebih dahulu melalui trial and error. Performa hasil pengendalian ketinggian air pada sistem coupled tank dengan algoritma TD3 mampu menghasilkan pengendalian yang memiliki keunggulan pada rise time, settling time, dan peak time yang cepat serta nilai steady state error sangat kecil dan mendekati 0%.

.....The coupled tank system is an example of the application of an industrial level control system that has complex characteristics with high non-linearity. It is necessary to select an appropriate control method to be applied in coupled tank systems in order to provide high-precision performance. Since its inception, Reinforcement Learning (RL) has attracted great interest and attention from researchers in recent years. However, this technology is still not widely applied practically in industrial process control. In this research, a level control system in a coupled tank system will be made using Reinforcement Learning using the Twin Delayed Deep Deterministic Policy Gradient (TD3) algorithm. Reinforcement Learning has a perfectly designed reward function that is required for the agent training process and the reward function needs to be tested first through trial and error. The performance of the results of controlling the water level in the coupled tank system with the TD3 algorithm is able to produce controls that have advantages in rise time, settling time, and peak time which are fast and the steady state error value is very small and close to 0%.