Editorial
Volume 12:3, 2021

Global Journal of Technology and Optimization

ISSN: 2229-8711 Open Access

Introduction on Some Applications of Machine Learning Techniques

Mingcong Deng*

Department of Electrical and Electronic Engineering, Tokyo University of Agriculture and Technology, Nakacho, Koganei, Tokyo, Japan

Editorial

We welcome you to Global Journal of Technology and Optimization, a publication devoted to the distribution of high-caliber, legitimate and cutting-edge research going on in the field of Technology and Optimization. In the field of optimization, one of the major branches is machine learning. For almost all machine learning algorithms, whether it is supervised learning, unsupervised learning, or reinforcement learning, it generally comes down to solving optimization problems. In the last few decades, more and more researchers have begun to incorporate machine learning into automatic control, such as the field of robot control, cargo transportation, material processing, and medical fields, with the expectation of better control performance and theoretical development. In this issue, some papers on the application of machine learning in control in our lab will be introduced. The machine learning methods mainly involved Q-learning [1], Ant Colony Optimization (ACO) [2], Support Vector Machine (SVM) [3] (also Support Vector Regression (SVR) [4]), Particle Swarm Optimization (PSO) [5] and Change Finder [6].

In container yard terminals, containers brought by trucks arrive in random order. A new Q-learning system for material handling of container yard terminal has been proposed in [7], where each container has several desired positions and the learning performance can be improved. In [8], an algorithm based on ACO and the modified ACO method is applied for the scheduling problems in steel works. Besides, the route derived by the proposed method is compared with that by Q-learning method. Modeling for the 3D micro-hand is proposed in [9] by using Multi-Output Support Vector Regression (MSVR) and ACO, where MSVR estimates the input–output relation of the micro-hand and ACO optimizes the parameters of the MSVR model. In [10], an adaptive nonlinear sensorless control for an uncertain miniature pneumatic curling rubber actuator is considered and SVR is proposed to estimate the output for avoiding the use of a sensor. The PSO-SVR-based estimation method with the generalized Gaussian kernel is proposed for the modeling of a miniature pneumatic bending rubber actuator in [11] and the estimation ability has been improved compared with [10]. PSO-SVR with the generalized Gaussian kernel is also used for motion estimation [12], where isomorphic technique & operator theory-based sensorless adaptive nonlinear control considering passivity for the actuator is given. In [13], a SVM-based control scheme of a two-wheeled mobile robot in a noisy environment is proposed, where SVM is used for estimating the control parameters from the noisy environment. SVR is as a prediction model for the estimation of arriving time for a robot to soccer ball in RoboCup Soccer Simulation 2D League, and SVR is optimized by PSO method to increase predicting accuracy in [14]. Early fault detection method makes the system dependable and can increase productivity. In [15], a fault detection method using SVM combined with ChangeFinder is proposed to detect fault early in a Tank-system.

The above mentioned papers in our Lab all present researches related to machine learning methods. The studies are mostly concerned with the control of systems. We will show our control techniques in the future.

***Address for Correspondence:** Mingcong Deng, Department of Electrical and Electronic Engineering, Tokyo University of Agriculture and Technology, Nakacho, Koganei, Tokyo, Japan, E-mail: deng@cc.tuat.ac.jp*

Received 29 May 2021; **Accepted** 31 May 2021; **Published** 03 June 2021

References

1. Watkins, Christopher J. C. H., and Peter Dayan. “Q-learning”. *Mach Learn*. 8 (1992): 279-292.
2. Dorigo, Marco, and Mauro Birattari, Thomas Stutzle. “Ant colony optimization”. *IEEE Comput Intell Mag*. 1 (2006): 28-39.
3. Boser, Bernhard E., Isabelle M. Guyon, and Vladimir N.Vapnik. “A Training Algorithm for Optimal Margin Classifiers”. *Proceedings of the Fifth Annual Workshop on Computational Learning Theory*. (1992): 144-152.
4. Smola, Alex J., and Bernhard Scholkopf. “A tutorial on support vector regression”. *Stat Comput*. 14 (2004): 199-222.
5. Kennedy, James, and Russell Eberhart. “Particle Swarm Optimization”. *Proceedings of The International Conference on Neural Networks*. 4 (1995): 1942-1948.
6. Takeuchi, Junichi, and Kenji Yamanishi. “A unifying framework for detecting outliers and change points from time series”. *IEEE Trans Knowl Data Eng*. 18 (2006): 482-492.
7. Hirashima, Yoichi, Kazuhiro Takeda, and Shigeaki Harada, et al. “A Q-learning for group-based plan of container transfer scheduling”. *JSME Int. J*. 49 (2006): 473-479.
8. Deng, Mingcong, Akira Inoue, and Satoru Kawakami. “Optimal path planning for material and products transfer in steel works using ACO”. *Proceedings of 2011 International Conference on Advanced Mechatronic Systems*. (2011): 47-50.
9. Kawamura, Shuhei, and Mingcong Deng. “Recent Developments on Modeling for a 3-DOF Micro-Hand Based on AI Methods”. *Micromachines*. 11 (2020): 792.
10. Deng, Ming, and Toshihiro Kawashima. “Adaptive nonlinear sensorless control for an uncertain miniature pneumatic curling rubber actuator using passivity and robust right coprime factorization”. *IEEE Trans Control Syst Techno*. 24 (2015): 318-324.
11. Fujita, Kou, Mingcong Deng, and Shuichi Wakimoto . “A miniature pneumatic bending rubber actuator controlled by using the PSO-SVR-based motion estimation method with the generalized Gaussian kernel”. *Actuators*. 6 (2017):6.
12. Deng, Mingcong, Kou Fujita, and Keisuke Ueno. “Experimental Study on Operator-based Nonlinear Control for a Miniature Pneumatic Bending Rubber Actuator by Using PSO-SVR-GGD Method”. *Proceedings of the 16th IEEE International Conference on Networking, Sensing and Control*. (2019): 317-322.

13. Jiang, L., Mingcong Deng, and Akira Inoue. "Support vector machine-based two-wheeled mobile robot motion control in a noisy environment". *Proceedings of the Institution of Mechanical Engineers, Part I: Journal of Systems and Control Engineering*. 222(2008): 733-743.

14. Deng, Mingcong, Naoyuki Matsumoto, and Michinobu Kitayama, et al. "Online estimation of arriving time for robot to soccer ball in RoboCup Soccer using PSO-SVR". *Proceedings of the 2014 International Conference on Advanced Mechatronic Systems*, 2014: 543-546.

15. Furukawa Yosuke, and Mingcong Deng. "Fault detection of tank-system using ChangeFinder and SVM". *Proceedings of the 2020 International Conference on Advanced Mechatronic Systems* (2020): 260-265.

How to cite this article: Deng Mingcong. "Introduction on Some Applications of Machine Learning Techniques." *Global J Technol Optim* 12(2021): 255.