**A Systematic Survey on the Research of AI-predictive Models for Wastewater Treatment Processes**

**AUTHORS:**

1. VARUN MOHAN; UNIVERSITI MALAYSIA PAHANG
2. Al-Fahim Mubarak Ali; Universiti Malaysia Pahang, College of Computing and Applied Sciences, Pekan, 26600, MALAYSIA

https://orcid.org/0000-0002-3382-7851

1. Mohamed Ariff Ameedeen; Universiti Malaysia Pahang, College of Computing and Applied Sciences, Pekan, 26600, MALAYSIA

https://orcid.org/0000-0002-4977-0538

**DOI** : https://doi.org/10.52866/ijcsm.2023.01.01.0010

**KEYWORDS**: Systematic literature review, Support Vector Machine, Neural Network

**ABSTRACT:**

Context: To increase the efficiency of wastewater treatment, modeling and optimization of pollutant removal processes are the best solutions. The relationship between input and output parameters in wastewater treatment processes (WWTP) are the complicated one, and it is difficult for designing of models using statistics. Artificial Intelligence (AI) models are generally more flexible when comparing with statistical models while modeling complex datasets with nonlinearity and missing data.

Objective: Studies on WWTP of AI based are increasing day by day. Therefore, it is crucial to systematically review the AI techniques available which are implemented for WWTP. Such kind of review helps for classifying the techniques that are invented and helps to identify challenges as well as gaps for future studies. Lastly, can sort out the best AI technique to design predictive models for WWTP.

Method: With the help of the most relevant digital libraries, the total number of papers collected are 1222 which are based on AI modelling on WWTP. Then the filtration of the papers is mainly based on the inclusion and exclusion criteria. Also, to identify new relevant papers, snowballing is the other technique applied.

Results: Finally selected 76 primary papers to reach the result that were published between 2004 and 2020.

Conclusion: ANN with MLP approach on BP algorithm become a supervised neural network called BPNN is the most used AI modelling for WWTP and around 40% of the experimental research done with BPNN. Then there are some limitations on AI modelling of WWTP using photoreforming which is the current study of WWTP represents a promising path for generating renewable and sustainable energy resources like chemicals and fuels.

**REFERENCES**

[1] D. S. Manu and A. K. Thalla, "Artificial intelligence models for predicting the performance of biological wastewater treatment plant in the removal of Kjeldahl Nitrogen from wastewater," Applied Water Science, vol. 7, pp. 3783-3791, 2017/11/01 2017.

[2] M. E. Ahmed, A. Al-Dhafeeri, and A. Mydlarczyk, "Predominance of attached versus suspended growth in a mixed-growth, continuous-flow biological reactor treating primary-treated petrochemical wastewater," Arabian Journal for Science and Engineering, vol. 44, pp. 4111-4117, 2019.

[3] V. G. Mohan, A. F. M. Ali, B. L. Vijayan, S. Azad, and M. A. B. Ameedeen, "A Supervised Neural Networkbased predictive model for petrochemical wastewater treatment dataset," in 2022 First International

Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), 2022, pp. 1-