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Chapter

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Digital Image Processing and Analysis for Activated Sludge Wastewater Treatment

- Muhammad Burhan Khan
- , Xue Yong Lee
- , Humaira Nisar
- , Choon Aun Ng
- , Kim Ho Yeap
- , Aamir Saeed Malik

Abstract

Activated sludge system is generally used in wastewater treatment plants for processing domestic influent. Conventionally the activated sludge wastewater treatment is monitored by measuring physico-chemical parameters like total suspended solids (TSSol), sludge volume index (SVI) and chemical oxygen demand (COD) etc. For the measurement, tests are conducted in the laboratory, which take many hours to give the final measurement. Digital image processing and analysis offers a better alternative not only to monitor and characterize the current state of activated sludge but also to predict the future state. The characterization by image processing and analysis is done by correlating the time evolution of parameters extracted by image analysis of floc and filaments with the physico-chemical parameters. This chapter briefly reviews the activated sludge wastewater treatment; and, procedures of image acquisition, preprocessing, segmentation and analysis in the specific context of activated sludge wastewater treatment. In the latter part

additional procedures like z-stacking, image stitching are introduced for wastewater image preprocessing, which are not previously used in the context of activated sludge. Different preprocessing and segmentation techniques are proposed, along with the survey of imaging procedures reported in the literature. Finally the image analysis based morphological parameters and correlation of the parameters with regard to monitoring and prediction of activated sludge are discussed. Hence it is observed that image analysis can play a very useful role in the monitoring of activated sludge wastewater treatment plants.

Keywords

Wastewater treatment Activated sludge Abnormal conditions Image segmentation Morphological parameters

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Authors

- *Muhammad Burhan Khan* [10]
- *Xue Yong Lee* [10]

- *Humaira Nisar* [10]
- *Choon Aun Ng* [11]
- *Kim Ho Yeap* [10]
- *Aamir Saeed Malik* [12]

Author Affiliations

- 10. Faculty of Engineering and Green Technology, Department of Electronic Engineering, Universiti Tunku Abdul Rahman, Kampar, Perak, Malaysia
- 11. Faculty of Engineering and Green Technology, Department of Environmental Engineering, Universiti Tunku Abdul Rahman, Kampar, Perak, Malaysia
- 12. Department of Electrical and Electronic Engineering, Centre for Intelligent Signal and Imaging Research, Universiti Teknologi PETRONAS, Tronoh, Perak, Malaysia