QUANTITATIVE CHARACTERIZATION OF DRINKING WATER STABILITY USING FLOW CYTOMETRY AND MACHINE LEARNING

SUPERVISORS

Prof. dr. Willem Waegeman

MSc. Peter Rubbens

TUTORS

MSc. Peter Rubbens

BACKGROUND

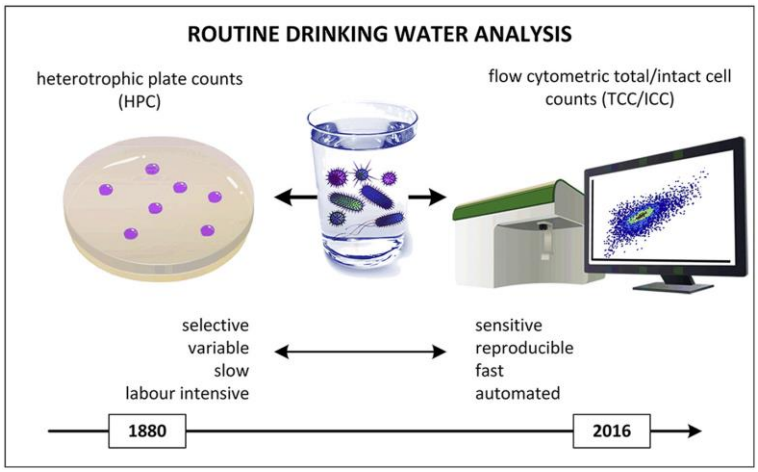
All

MORE INFO

willem.waegeman@ugent.be

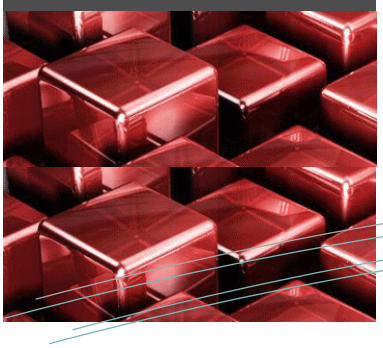
Background

Flow cytometry is becoming a fundamental tool for the study of bacterial communities. It is a high-throughput method, able to measure thousands of cells in a fraction of time. Its applications range from investigating controlled communities in the lab, to rapidly assessing microbial community dynamics in aquatic ecosystems, such as drinking water distribution networks [1]. As a microbial community can be used as a proxy to characterize drinking water quality, our research groups are currently investigating the possibilities of using flow cytometry as a monitoring tool to characterize the stability of drinking water. As flow cytometry gives rise to large amounts of data, one of the main challenges is to develop sophisticated data analysis methods in order to characterize these large amounts of data and go towards an early-warning system.



Scope of the thesis

The ultimate goal is to develop a quantitative flow cytometric fingerprint which is able to describe the stability of the microbial community. In a next step, these fingerprints need to be integrated together and modeled towards an early-warning system. To accomplish these two steps, a combination of feature extraction and machine learning techniques will be used, for which microbiological limits have to be taken into account. The pipeline will be validated on data retrieved from controlled experiments (short-term dynamics) and an actual drinking water distribution facility which was measured for two years (long-term dynamics). Having experience in R or Python is an advantage, but these are no prerequisites.



[1]: S. Van Nevel, S. Koetzsch, C.R. Proctor, M.D. Besmer, E.I. Prest, J.S. Vrouwenvelder, A. Knezev, N. Boon, F. Hammes; Flow cytometric bacterial cell counts challenge conventional heterotrophic plate counts for routine microbiological drinking water monitoring; Water Research **113**: 191-206, 2017.