EGU2020-5524
https://doi.org/10.5194/egusphere-egu2020-5524
EGU General Assembly 2020

Development of artificial neural networks for the prediction of the consumption of pathogenic microorganisms in water and for the calculation of the risk of individual annual contamination

Kombo Mpindou Gilver Odilon Mendel, Chorda Ramon Estela, and Garcia Ganzalez Eva
Universidad politecnica de Valencia, Instituto de Ingeniería del Agua y Medio Ambiente, Hydraulica, Spain
(kgilver@gmail.com)

In developing countries, diseases related to lack of water or inadequate water quality cause the death of approximately 5 million people annually, of whom about 1.8 million die from diarrhoeal diseases, 90% of them being children under five, which is equivalent to 4,500 children per day (WHO, 2004; Rojas, 2006). The WHO reports that improvements in water quality alone reduce morbidity from diarrhoeal diseases by a third or more (WHO, 2007), and drinking water treatment plants are currently the focus of Protozoan studies on water supply. Giardia and Crytosporidium are two of the protozoa that are currently of greatest interest due to their resistance to conventional disinfection processes (Johnson et al., 2003), and they can exist in the presence of high concentrations of free chlorine (Corbitt, 1999). A reality that confirms this fact is that 98% of the individuals affected by epidemic outbreaks in the United States were supplied by drinking water plants using a conventional treatment system.

The DWTP of the Dam that caters 859885 people, corresponds to a series of municipalities in the northern area of the metropolitan area of Valencia (Spain), and the central-north-western districts of the city of Valencia face this problem. In a study conducted from 2006 to 2010, in the water used for human consumption in the city of Valencia, some positive concentrations of networked oocysts were detected. In conclusion, it is possible that the protozoa entered the network, as the analyses indicate, and that the pathology exists in the environment although no outbreaks have been recorded to date. Given that it is present in raw water, it is very convenient and interesting to develop a tool capable of evaluating the water treatment process, from production to the consumer, a useful tool for operators as a support for decision-making. The campaign was carried out throughout the year, taking a weekly sample, the analyses were made with the EPA1623 method. A survey was also carried out in person on volunteers who indicate their age, sex, postal code o and number of glasses of tap water ingested. The purpose of this study was to show how an artificial neural network can be useful to predict the consumption of pathogenic microorganisms. More specifically, the aim is to develop a backpropagation type neuronal network capable of discriminating between those who consume and those who do not, based on the answers given by the subjects to a questionnaire, with the main objective of demonstrating the usefulness of the methodology based on neuronal networks for risk stratification, applying it to the calculation of the probability of the annual risk of individual contamination of the population

supplied