Support vector machines and multilayer perceptron networks used to evaluate the cyanotoxins presence from experimental cyanobacteria concentrations in the Trasona reservoir (Northern Spain)

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Abstract

Cyanobacteria also known as blue-green algae can be found in almost every conceivable environment. Cyanobacteria blooms occur frequently and globally in water bodies and they are a major concern in terms of their effects on other species such as plants, fish and other microorganisms, but especially by the possible acute and chronic effects on human health due to the potential danger from cyanobacterial toxins produced by some of them in recreational or drinking waters. Consequently, anticipation of cyanotoxins presence is a matter of importance to prevent risks. The aim of this study is to build a cyanotoxin diagnostic model by using support vector machines and multilayer perceptron networks from experimental cyanobacteria concentrations in Trasona reservoir (recreational reservoir used as a high performance training centre of canoeing in the Northern Spain). For this purpose, some biological parameters (phytoplankton species expressed in biovolume and the chlorophyll concentration) in combination with the most important physical-chemical parameters are considered. The results of the present study are two-fold. In the first place, the significance of each biological and physical-chemical variables on the cyanotoxins presence in the reservoir is presented through the model. Secondly, a predictive model able to forecast the possible presence of cyanotoxins is obtained. The agreement of the model with experimental data confirmed its good performance. Finally, conclusions of this innovative research work are exposed.