

Hydroinformatics of Smart Cities: Real-Time Water Quality Prediction Model Using a Hybrid Approach

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Abstract : Water is one of the most important resources for human society. The world is currently undergoing a wave of urban growth, and pollution problems are of a great impact. Monitoring water quality is a key task for the future of the environment and human species. In recent times, researchers, using Smart Cities technologies are trying to mitigate the problems generated by the population growth in urban areas. The availability of huge amounts of data collected by a pervasive urban IoT can increase the transparency of decision making. Several services have already been implemented in Smart Cities, but more and more services will be involved in the future. Water quality monitoring can successfully be implemented in the urban IoT. The combination of water quality sensors, cloud computing, smart city infrastructure, and IoT technology can lead to a bright future for environmental monitoring. In the past decades, lots of effort has been put on monitoring and predicting water quality using traditional approaches based on manual collection and laboratory-based analysis, which are slow and laborious. The present study proposes a methodology for implementing a water quality prediction model using artificial intelligence techniques and comparing the results obtained with different algorithms. Furthermore, a 3D numerical model will be created using the software D-Water Quality, and simulation results will be used as a training dataset for the artificial intelligence algorithm. This study derives the methodology and demonstrates its implementation based on information and data collected at the floating harbour in the city of Bristol (UK). The city of Bristol is blessed with the Bristol-Is-Open infrastructure that includes Wi-Fi network and virtual machines. It was also named the UK 's smartest city in 2017. In recent times, researchers, using Smart Cities technologies are trying to mitigate the problems generated by the population growth in urban areas. The availability of huge amounts of data collected by a pervasive urban IoT can increase the transparency of decision making. Several services have already been implemented in Smart Cities, but more and more services will be involved in the future. Water quality monitoring can successfully be implemented in the urban IoT. The combination of water quality sensors, cloud computing, smart city infrastructure, and IoT technology can lead to a bright future for the environment monitoring. In the past decades, lots of effort has been put on monitoring and predicting water quality using traditional approaches based on manual collection and laboratory-based analysis, which are slow and laborious. The present study proposes a new methodology for implementing a water quality prediction model using artificial intelligence techniques and comparing the results obtained with different algorithms. Furthermore, a 3D numerical model will be created using the software D-Water Quality, and simulation results will be used as a training dataset for the Artificial Intelligence algorithm. This study derives the methodology and demonstrate its implementation based on information and data collected at the floating harbour in the city of Bristol (UK). The city of Bristol is blessed with the Bristol-Is-Open infrastructure that includes Wi-Fi network and virtual machines. It was also named the UK 's smartest city in 2017.

Keywords : artificial intelligence, hydroinformatics, numerical modelling, smart cities, water quality

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