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The Artificial Neural Network Model for the simulation of the airborne toxin in the urbanized area

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Providing a real-time working system to localize the dangerous contaminant source is one of the main challenges for the city's emergency response groups. Unfortunately, all proposed frameworks capable of estimating the contamination source localization based on recorded by the sensors network the substance concentrations cannot work in real-time. The reason is the significant computational time required by the applied dispersion models.The solution might be an application of the trained Artificial Neural Network (ANN) instead of the dispersion model in the reconstruction algorithm. To be used, the ANN must learn to simulate airborne contaminant transport. Training the ANN is computationally expensive, but once trained, the ANN would be a high-speed tool enabling the estimation of the contaminant concentration distribution.

This paper presents the results of training the ANN to predict the time evolution of the dispersion of the airborne contaminant over a city domain. The spatial distribution of the contaminant is the multidimensional function dependent on the weather conditions (wind direction and speed), coordinates of the contamination sources, the release rate, and its duration. Wwe try to answer what topology should be ANN to forecast the contaminant strength correctly at the given point of the urbanized area at a given time.

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