

عنوان مقاله:

Comparison of Regression and Deep Learning Approaches in Modeling Time Series to Predict Air Pollutant Concentration in City of Tehran

محل انتشار:

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خلاصه مقاله:

The rapid growth of urbanization and the global population have resulted in climate change, air contamination, and various human health problems. Thus, estimating air pollution indices has become important to environmental science studies. With relevant data increasingly available, machine learning frameworks have been proposed as a particularly useful method to predict air pollution. Based on four years of Tehran's neighborhood air pollution data analysis, this paper proposes three machine learning approaches to predict NO₂ and CO concentration: Autoregressive Integrated Moving Average (ARIMA), Long Short-Term Memory Networks (LSTM), and Multiple Linear Regression (MLR). This paper compared the ability of the ARIMA, LSTM, and MLR machine learning methods to forecast the daily concentrations of NO₂ and CO at Punak air quality monitoring station, from ۲۰۱۷ to ۲۰۲۰. By applying four performance measurements, the ARIMA model displays the worst performance among the three models in all datasets with RMSE values of ۴۷.۳۹ and ۱.۲۹, and ۰.۰۱۲ and ۰.۰۱ for NO₂ and CO respectively. The LSTM and MLR models achieve the best forecasting result with RMSE = ۱۷.۶ and ۶.۴۱, MAE = ۱۰.۵۹ and ۴.۳۳, = ۰.۴۵۸ and ۰.۴۶, and RRSE = ۱.۰۶ and ۱.۱۰ for NO₂ forecasting and RMSE = ۰.۴۲ and ۰.۳۲, MAE = ۰.۲۴ and ۰.۲۵, ۰.۹۶ and ۰.۹۸, and RRSE = ۰.۴۳ and ۰.۴۴ for CO forecasting.

کلمات کلیدی:

Air Pollutant, Machine Learning, urban area, No₂, CO

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