Encoder-Decoder Machine Learning approach for meteo-oceanographic time-series prediction

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Environmental state evaluation through its dynamic parameters plays a key-role in assessment procedures to apply prediction models for early anomaly detection. This work presents the implementation of a Machine Learning Encoder-Decoder pattern applied to environmental in-situ data (air and seawater temperature, and wind speed) measured at Gloria offshore drilling platform - Romanian Black Sea Shelf. The station was chosen because there are no boundary interaction with the coastal region which enabling the development of the multivariate, uni-directional time-series prediction algorithm. The model provided less than 5% mean absolute error (MAE) for 7 data points (months) forecast requiring the last 10 data points as input. The model accuracy enable the anomaly identification for meteo-oceanographic monthly average data. Future evolution of the seawater temperature extend the model for coastal areas with an less then 5% additional accuracy reduction. This model was developed mainly using available open-source frameworks permitting the integration with most of the visualization platforms available today.

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