A study on error detection of ocean observation data by anomaly detection

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Abstract

Globally-covered ocean monitoring system Argo with more than 3,700 autonomous floats has been working, and its accumulated big ocean observation data helps many studies such as investigation into climate change mechanism. Since the observed data sometimes involves errors, human experts must visually confirm and revise quality control (QC) flags. However, such manual QC by human experts cannot be performed in some countries. In addition, it is difficult to regularize the quality of the ocean observation data of all over the world because the manual QC depends on human experts' heuristics. Therefore, demands have been increasing for automated error detection technologies in Argo observation data.

This paper verifies the validity of the data observed in the sea area other than the North Pacific using the method proposed by Hayashi et al. [Hayashi 18]. Since the method is unsupervised learning, it could be expected to detect unknown errors. Experimental results shown that the method could give a high anomaly score for some error cases. On the other hand, it is difficult to give a high anomaly score to error cases that appeared continuously in multiple layers. Therefore, the method is effective for detecting errors with large fluctuations and appearing on a single layer, and it is difficult to detect errors with minute fluctuations and appearing on multiple layers continuously.
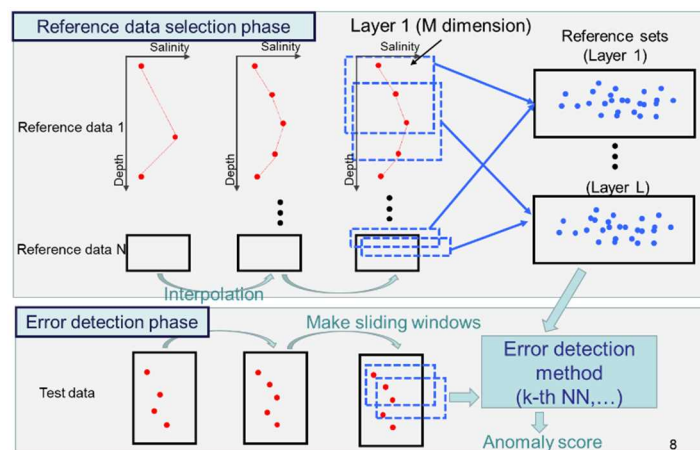
Figure. Overview of the proposed method

References

[Hayashi 18] Shogo Hayashi, Satoshi Ono, Shigeki Hosoda, Masayuki Numao, Ken-ichi Fukui：Error Detection in Ocean Data Considering Spatial Autocorrelation, The Japanese Society for Artificial Intelligence, Vol. 33, (in Japanese)

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