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EDITORIAL

Reviews and Responses for Filtering Techniques for ADS-B Trajectory Preprocessing

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Reviewers: Antonio Franco and Matthias Schäfer

Editor: Junzi Sun

1. Original paper

The DOI for the original paper is https://doi.org/10.59490/joas.2024.7882

2. Review - round 1

2.1 Reviewer 1

In this paper, authors present a valuable contribution to an interesting and active field of research, namely, ADS-B trajectory pre-processing to increase data quality. The need for research is well motivated and the proposed paper structure is appropriate. The stated trajectory filtering modules that have been implemented in the traffic library are adequately explained and illustrated through application examples. In my opinion, this piece of research constitutes a positive contribution to the OpenSky network Community.

Nonetheless, there is as an important point of criticism regarding the literature review. On the one hand, no bibliographical reference about filtering techniques in time series is provided. On the other hand, the level of self-citation is abnormally high in this conference paper. In 13 out of 14 bibliographical references, at least one of the authors coincide with one of the authors of this paper, which means a 93

All in all, my recommendation is to accept the paper with a minor revision to address the only question raised.

2.2 Reviewer 2

This paper provides a detailed overview of common issues in ADS-B trajectory data and presents various filtering techniques to mitigate the effects of noise and artifacts. The authors introduce a range of methods, from rolling-window filters to Kalman filters, and offer practical implementations through the open-source Python library traffic. The contribution is highly valuable, as it provides the community with tools to handle noisy ADS-B data effectively. Especially in the crowdsourced world, easily accessible data cleansing tools like this are key to broad usage of available data by a wide range of researchers. The paper delivers a clear and comprehensive explanation of different types of noise (both random and systematic) in ADS-B data. The techniques presented are practical and well-documented, making them accessible for real-world use. The open-source implementation in the traffic library is a significant contribution, fostering reproducibility and collaboration.

A minor issue is that the paper does not provide a systematic evaluation of the results. Although ground truth data might not be available, quantifying the amount of data filtered by each technique and assessing the resulting gaps in time series due to filtering would strengthen the analysis.

Also, in Section 2.6 the paper states that airborne position data results from fusing information from different sensors. While this is often true, it highly depends on the aircraft type and its specific avionics systems. Airbus aircraft typically use data fusion, whereas Boeing aircraft rely on it less for ADS-B OUT.

3. Response - round 1

3.1 Response to reviewer 1

Nonetheless, there is as an important point of criticism regarding the literature review. On the one hand, no bibliographical reference about filtering techniques in time series is provided. On the other hand, the level of self-citation is abnormally high in this conference paper. In 13 out of 14 bibliographical references, at least one of the authors coincide with one of the authors of this paper, which means a 93% self-citation rate. Authors are encouraged to enhance the literature review to address both issues.

Response

Thank you for raising this important point. We acknowledge the high level of self-citation and understand the concern. However, I would like to clarify that the specific topic of crowdsourced ADS-B data filtering has, to our knowledge, not been the primary focus of previous scientific papers but rather addressed as part of a data preprocessing section of a more general contribution. The contributions presented in this paper are the result of collaborative efforts from various contributors to the traffic library, which is why there is significant overlap with earlier works by the authors.

Eventually, we considered expanding the citations to better address related research and provide a more balanced perspective.

3.2 Response to reviewer 2

A minor issue is that the paper does not provide a systematic evaluation of the results. Although ground truth data might not be available, quantifying the amount of data filtered by each technique and assessing the resulting gaps in time series due to filtering would strengthen the analysis.

Response

Thank you for your comment. We acknowledge that evaluating filtering techniques in a systematic manner is indeed a complex task. However, this paper focuses on characterizing the noise in crowdsourced ADS-B data and exploring various methods for handling such data, with an emphasis on the quality of filtering and performance, particularly CPU time. While evaluating the amount of data filtered and assessing gaps in time series would certainly be valuable, we chose not to approach the topic from that angle. Additionally, filters like Kalman filters are considered optimal by definition, as they estimate the most probable signal while accounting for the error (via covariance matrices), making them well-suited for the problem at hand.

Also, in Section 2.6 the paper states that airborne position data results from fusing information from different sensors. While this is often true, it highly depends on the aircraft type and its specific avionics systems. Airbus aircraft typically use data fusion, whereas Boeing aircraft rely on it less for ADS-B OUT.

Response

Thank you for the clarification. We added your comment as a footnote on the sentence your pointed out.