Response Letter

Dear Editor and Anonymous Reviewer,

We would like to express our sincere gratitude to the anonymous reviewer for his/her constructive feedback on our manuscript titled "Regression-Oriented Knowledge Distillation for Lightweight Ship Orientation Angle Prediction with Optical Remote Sensing Images," which we submitted to Signal, Image and Video Processing for consideration. Additionally, we extend our thanks to the editor or associate editor for their careful handling of our manuscript.

In this letter, we will provide a point-by-point response to the reviewer's concerns and summarize the changes we have made in revising the manuscript. We hope that both the reviewer and the editor find our revised manuscript satisfactory.

1. Reviewer's Feedback:

Reviewer 1's comments/concerns are shown as follows:

- **C1:** "The methodology section could benefit from a more detailed explanation of the knowledge distillation process, particularly how the feature-based guidance loss is implemented."

- **C2:** "Only one dataset is applied in the experiments. Employing more datasets in evaluation will make this work more convincing."

- **C3:** "Only a few methods have been compared with SOAP-KD. Including more SOTA frameworks in comparison would be better."

- **C4:** "The ablation study results are mentioned but not elaborated upon. For example, the impact of different loss terms is not presented."

- **C5:** "Discussing the limitations of the current study and potential areas for future research in 'Conclusion' would provide a more balanced view and could guide subsequent research in this field."

2. Our Response:

In this section, we offer a detailed, point-by-point response to the feedback provided by Reviewer 1. Here, RX denotes our response to the X-th concern of the reviewer.

- **R1:** We acknowledge the feedback from Reviewer 1 regarding the brevity of the feature-based guidance section. To address this, we have provided a more detailed explanation on the implementation of feature-based guidance in Section 2.4. Specifically, we highlight that we have designed an adapter network to align the feature dimensions between the teacher and student models. This adapter comprises a 3×3 convolutional layer, followed by batch normalization and a ReLU activation function.

- **R2:** We acknowledge that testing Mobile-SOAP and SOAP-KD on a wider range of datasets would enhance the persuasiveness of our proposed method. However, despite the significance of SOAP in remote sensing, FGSC-23 is currently the sole publicly available dataset that we have identified for this task. Given the time constraints for submitting the revision, we were

unable to manually annotate datasets originally intended for other tasks (such as ship classification or detection) to align with the SOAP task. Consequently, we have designated this endeavor as a future research direction, as mentioned in the revised Conclusion section.

- **R3:** We are grateful to Reviewer 1 for suggesting that we compare SOAP-KD with additional state-of-the-art (SOTA) methods. In response, we have included a recently introduced KD method called NFD (2024) in our comparison in Section 3. NFD is a feature-based KD framework that can be adapted for the SOAP task. Our experimental results, presented in Table 2, demonstrate that while NFD (2024) achieves SOTA performance in classification tasks, it does not perform well in regression tasks such as SOAP. Our proposed SOAP-KD method significantly outperforms NFD, demonstrating the superiority of SOAP-KD.

- **R4:** We thank Reviewer 1 for the valuable suggestion to elaborate on the ablation study results in Section 3.6. Taking this advice into account, we have provided a more detailed explanation of the second ablation study, which examines the effectiveness of the feature-based KD loss and the enhanced cGAN-KD approach. Using ResNet8 as an illustrative example, we demonstrate that the feature-based KD loss alone is capable of significantly reducing the test error of student models. Furthermore, the refined cGAN-KD approach further diminishes this error. These findings underscore the suitability of combining the feature-based KD loss with the cGAN-KD approach.

- **R5:** We acknowledge the value of discussing the limitations of the proposed method and potential future work in the Conclusion section (Section 4), as it can provide useful insights for subsequent research in this field. Taking this suggestion to heart, we have included an additional paragraph at the end of the conclusion section to address the limitations and outline potential avenues for future work.

In addition to the modifications we have implemented based on the previous feedback, we have also refined the writing in the abstract, Introduction section, and various other parts of the manuscript. We trust that the reviewer and editor will find the revisions satisfactory.

Best,

Xin Ding