

Response to Reviewers' Comments

We would like to thank the reviewer for all the constructive comments, which have improved the manuscript significantly. A detailed response to all comments can be found below, where the comments are in regular font and our point-to-point responses are in bold font. Line numbers correspond to the revised manuscript.

Comments:

- This study proposed and applied a deep learning based method to the medium spatial resolution images at national scale. In the produced dataset, types and locations of marine aquaculture are described in a detailed way, which fill in the gap of this data in China. The topic of the study is interesting and fits the scope of the journal. However, main innovations of this study should be stated more clearly. And there are still some problems that need more explanation. Here with concerns need to be addressed:

Response: Thanks for pointing out the contributions of our study and all the suggestions that improves our manuscript significantly.

- Question & Comment 1: Compared with the existing method, such as the other deep learning based methods, what are the differences or improvements in the structure of the proposed methods? It is the core value of this study. Thus, main innovations and contributions should be summarized more clear.

Response: Revised as suggested. Our main contributions are summarized and added to the introduction section (bellow and in the revised paper).

Line 68-74:

'To overcome these limitations, we proposed a novel framework for the large-scale marine aquaculture mapping. The main contributions of our study can be summarized as follows:

(1) We present a unified CNN-based framework for national-scale marine aquaculture extraction.

(2) A hierarchical cascade homogeneous neural network (HCHNet) model is proposed to learn discriminative and robust features.

(3) We provide the first detailed national-scale marine aquaculture map with a spatial resolution of 16 m. '

- Question & Comment 2: Have you considered the similar medium-spatial resolution images that may have more spectrum information, such as Landsat or Sentinel? I suggest more description about the data.

Response: Revised as suggested. Compared with the similar medium-spatial resolution images, we selected the GF-1 WFV images as our data sources for the higher temporal resolution and relatively wider swath. We added several sentences to the data section make this point more clear.

Line 109-111:

'Compared with other frequently used medium resolution satellite

imagery (e.g. Landsat, Sentinel), the wide coverage ability, high-frequency revisit time, and 16-m spatial resolution of the data significantly improves the capabilities for large-scale marine aquaculture areas observation and monitoring.'

- Question & Comment 3: Line 31: The production of marine aquaculture in 2017 should be replaced with the most recent statistical data

Response: Revised as suggested.

Line 30-31:

'The marine aquaculture production in China has increased from 10.6 million tons in 2000 (Bureau of Fisheries of the Ministry of Agriculture, 2001) to 20.7 million tons in 2019 (Bureau of Fisheries of the Ministry of Agriculture, 2020).'

- Question & Comment 4:Line 190: There are many other state-of-the-art models in the computer vision fields,why choose the above models for comparison? More reasons should be given for such selection.

Response: Revised as suggested. We selected these models for their similar encoders and the typical multi-scale structures, which are more suitable for comparison with the proposed hierarchical cascade structure. We added such expressions in the comparing section.

Line198-199:

'The above models are suitable for classification and comparison purposes, because nearly all of these methods are VGG-16 based neural networks and employed typical structures for multi-scale information extraction.'

- Question & Comment 5: Line 480: I suggest that more obvious differences should be point out in this figure.

Response: Revised as suggested. We revised the Fig.7 to show the advantages of the proposed algorithm. As shown in the new version of Fig.7, the black solid outlined areas clearly indicate where our methods obtained better results.

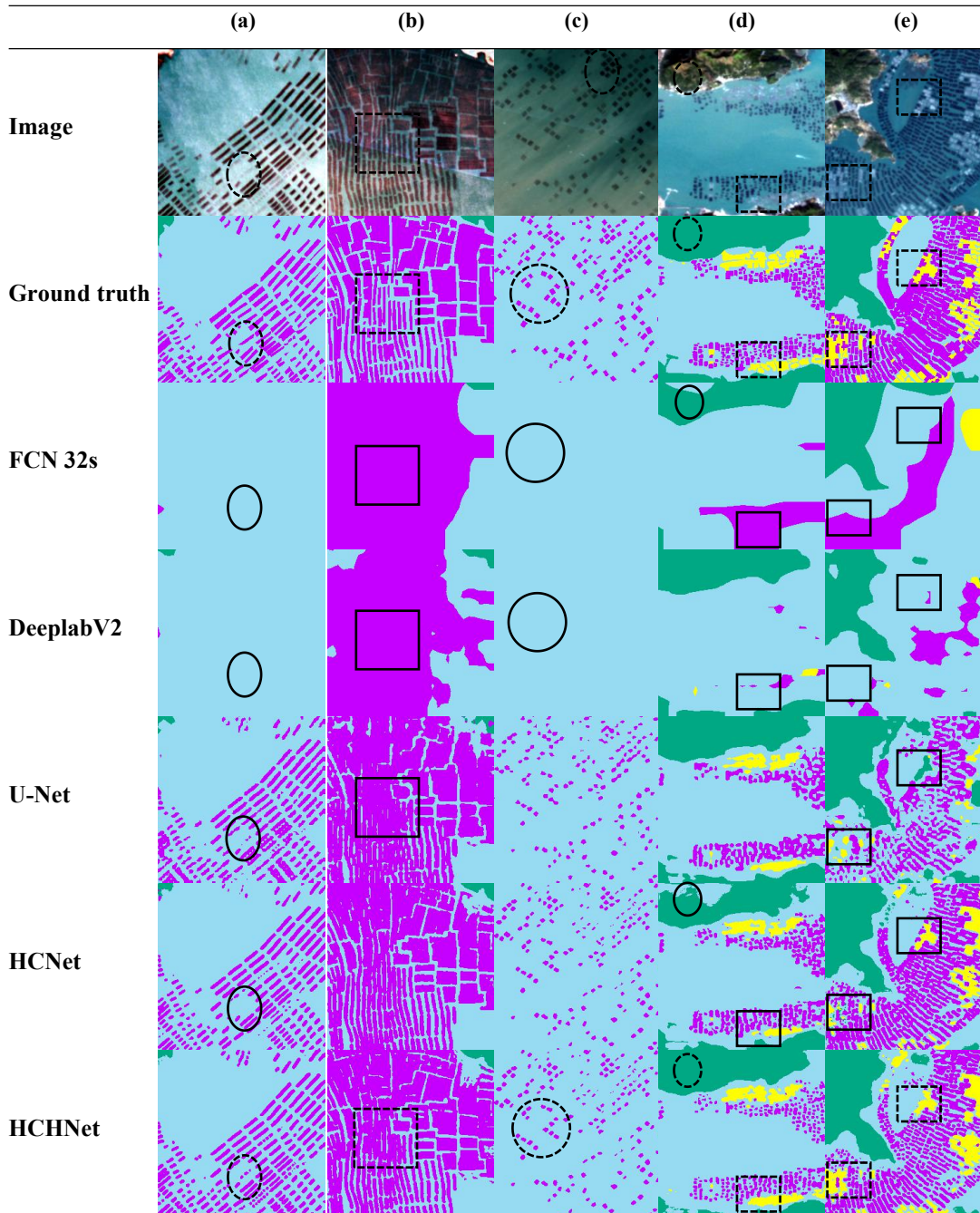


Figure 7: The classification results of MPC and MAC areas comparing the proposed HCHNet method with other approaches. The black solid outlined areas indicate where HCHNet obtains better results. The dotted line shows same locations in other images. The red, yellow, blue, and green areas in the classification maps represent the MPC, MAC, sea, and land areas, respectively.

- Question & Comment 6: Line 495: As illustrated in the line 280, this study used the publicly available data to mask out coastal land areas that do not intersect with marine aquaculture areas. Why the table still shows accuracy values of the land area?

Response: In our study, we used the publicly available data to mask out

coastal land areas. However, some of the small land areas, such as island or seashore, are not include in the coastal land areas. Meanwhile, some of the land areas in the public data may be changed by the land reclamation project. Thus, the table still shows accuracy values of the land area.