IMPROVED YOLO V8 FISH TARGET DETECTION IN YANGTZE RIVER DELTA WATER ECOLOGICAL HEALTH INDICATOR

Bachelor's thesis

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Specialty: 106 Geography
Educational program: Cartography, Geinformatics and Cadastre

ABSTRACT

The relevance of the research. In recent years, China's efforts to control the water environment have been increasing, and actions such as "five waters co-governance" and "black and smelly water body remediation" have achieved obvious results in water ecological environment protection. However, the urbanization process, industrial and agricultural development and other factors still cause fundamental, structural and trend pressure on water ecological environment protection, and there is a great threat. The improvement of physical and chemical indexes of water quality cannot fully reflect the state of water ecological health, which needs to be combined with biological indexes. Aquatic biological monitoring uses aquatic indicator organisms, physiological characteristics and behavioral responses of aquatic organisms, has the advantages of real-time, sensitivity, stability, diversity and long-term, and can more effectively monitor the water ecological health status. Among them, fish are extremely sensitive to changes in water environment, with obvious characteristics, large individuals and easy to observe, wide distribution and easy to collect. Fish can obviously respond physiologically and behaviorally to changes in the ecological environment, so they occupy a crucial and typical position in biological monitoring. However, the traditional manual survey needs to consume a lot of manpower, material resources and financial resources, and can not detect fish in real time, and may ignore some information. Therefore, the

use of deep learning technology to identify fish and achieve all-weather automated monitoring can significantly improve efficiency, while saving manpower, material and financial resources to ensure high accuracy and effectiveness of detection.

The object of the research is the indicator fish of water ecological health in Yangtze River Delta, and **the subject** is the recognition effect of aquatic ecological health indicator fish under different models.

The purpose of the research is to provide data basis and technical support for the study of water ecological health in the Yangtze River Delta. With indicator fish as the research object, YOLO v8 is used to realize automatic detection of indicator fish, providing a new method for water ecological monitoring.

To achieve the purpose of the work, the following **tasks** were set:

1. Consult the relevant data to determine the Yangtze River Delta water ecological health indicator fish species;

2. According to the list of indicator fish, picture and video data were collected to build the Yangtze River Delta water ecological health indicator fish sample bank;

3. The identification model of aquatic ecological health indicator fish in Yangtze River Delta was constructed;

4. Improved YOLO v8 algorithm to improve the efficiency and accuracy of the model for indicator fish detection.

Research methods. Using YOLO v8 network, several fish recognition models were constructed by replacing AFPNHead4 detection head and adding HAttention attention mechanism. Through comparison, testing and evaluation, a fish recognition model YOLO v8-HAT for water ecological health indicators was obtained.

Structure of the work. The structure of the work. The qualification work consists of six parts, introduction and conclusion, arranged on page 4 and 63 respectively. Contains 20 diagrams, 11 tables, and an appendix. The results have not been discussed or published.