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COMMENTS AND CORRECTIONS

Corrections to "Underground Defects Detection Based on GPR by Fusing Simple Linear Iterative Clustering Phash (SLIC-Phash) and Convolutional Block Attention Module (CBAM)-YOLOv8"

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In the above article [1], inaccuracies are present in the naming and corresponding explanation of a concept. Upon careful review and analysis, we have identified inaccuracies in the definition and naming of a specific concept within the article. During the training process, we explored various module optimizations. Unfortunately, due to the similar effects of the two modules, the definition and naming of the concept in the article were inaccurately represented. Specifically, the GhostConv module was incorrectly identified as the AKConv module that had been incorporated. To ensure the accuracy and integrity of our research, all authors unanimously request the necessary corrections to rectify the inaccuracies in the naming and explanation. This correction is crucial for maintaining the precision and completeness of our study.

Specifically, in the fifth sentence of the abstract, "GhostConv" should be modified to "AKConv." Additionally, in Section I, the first sentence of the third-to-last paragraph, the term "GhostConv" should be changed to "AKConv." Similarly, in the first sentence of the sixth sentence of the first paragraph in Section II, "GhostConv" should be revised to "AKConv." In Section VII, the second sentence of the third paragraph, "GhostConv" should be replaced with "AKConv." Lastly, reference [26] should be removed from the reference list.

Additionally, the explanation of Section II-B-2) and the Figure 7 should be modified as follows:

2) AKCONV

Timely and accurate interpretation of GPR defect images is crucial; however, owing to YOLOv8's large model parameters and high computational cost, it is challenging to deploy in resource-constrained environments. This article introduces a lightweight AKConv network to optimize the YOLOv8 model. AKConv is illustrated in Figure 7. AKConv provides arbitrary parameter counts and arbitrary sampling shapes for the convolutional kernel. It defines the initial positions of the kernel for any size using a novel coordinate generation algorithm. Additionally, offsets are introduced to adjust the sampling shape at each position [2]. These advancements enable the model to become lightweight while enhancing detection results. Therefore, by replacing the original Conv with AKConv in the backbone and neck, our method substitutes the original network modules with a lighter and faster network, greatly improving the efficiency of model training.

Due to the incorrect module naming, modifications are required for Figures 1 and 5, as well as Pseudocode 2. The corrected versions of the figures and pseudocode are provided below:

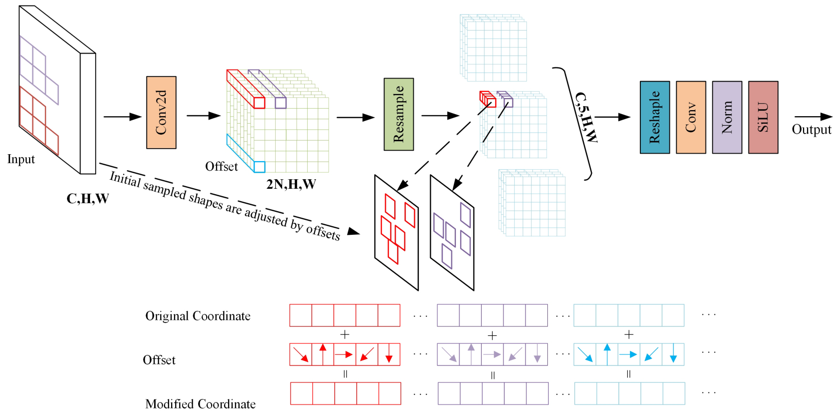

FIGURE 7. The AKConv Module.

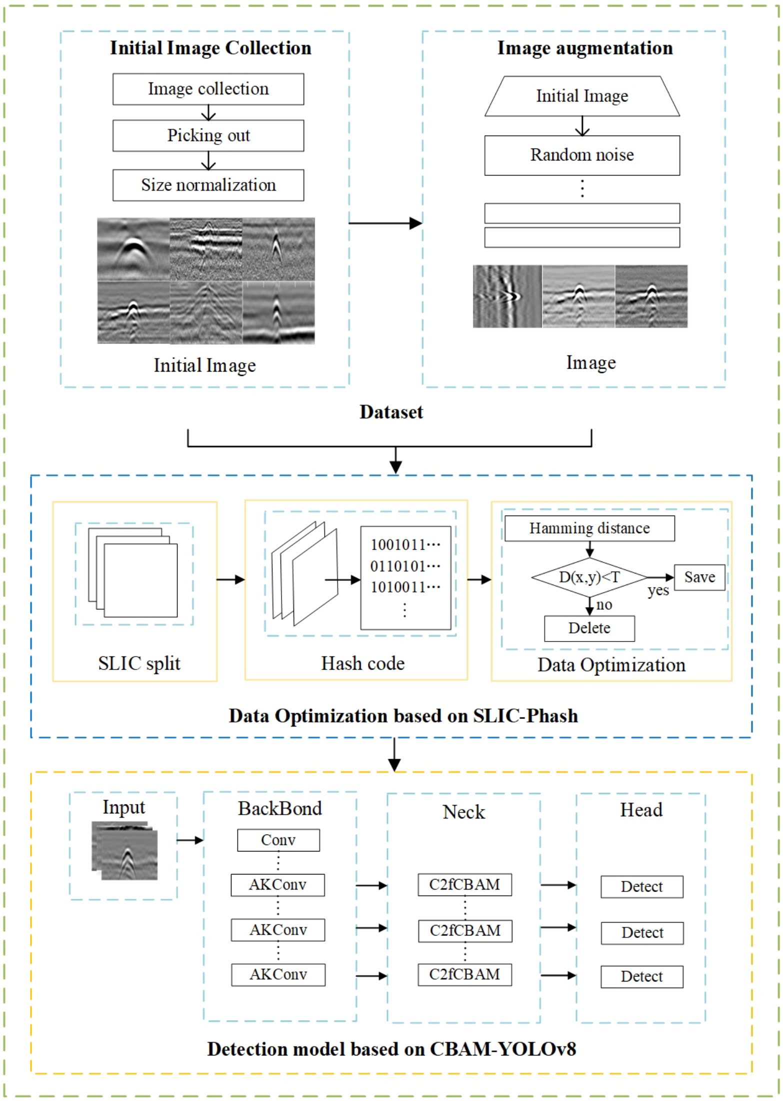

FIGURE 1. Framework of the proposed model.

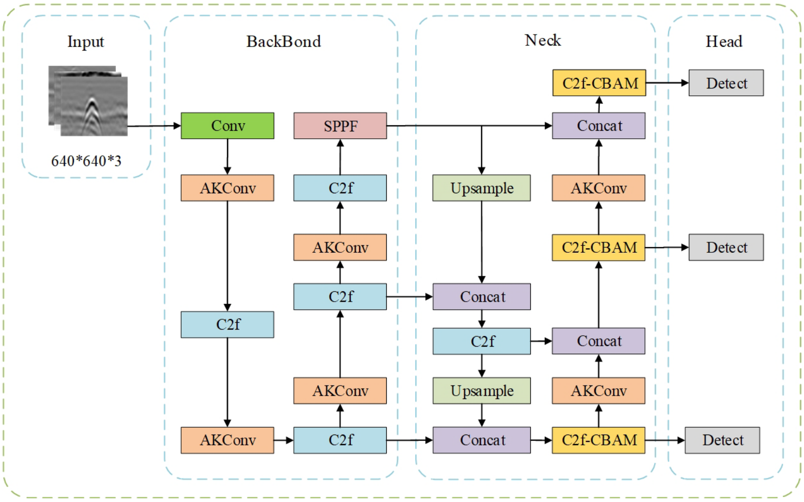

FIGURE 5. Architecture of the CBAM-YOLOv8.

Algorithm 2 CBAM-YOLOv8

Input: Image img, number of classes nc
Parameters: nc = 3 – number of classes
img_size = 640 – input image size
batch_size = 16 – batch size for training
lr = 0.01 –initial learning rate
epochs = 300 –number of training epochs
Output: bboxes, class_ids, scores
for epoch in range(epochs) :
 for img_batch in DataLoader(batch_size) :
  Backbone // extract features from input image
   x_1 = conv(img, 64, kernel=3, stride=2) // first conv layer
   x_2 = AKConv(x_1, 128, kernel=3, stride=2) // add AKConv
   x_3 = C2F(x_2) $*$ 3 // CSPDarknet53 to 2-Stage FPN module
   x_4 = AKConv(x_3, 256, kernel=3, stride=2)
   x_5 = C2F(x_4) $*$ 6
   x_6 = AKConv(x_5, 512, kernel=3, stride=2)
   x_7 = C2F(x_6) $*$ 6
   x_8 = AKConv(x_7, 1024, kernel=3, stride=2)
   x_9 = C2F(x_8) $*$ 3
   x_{10} = SPPF(x_9) // spatial pyramid pooling

  Head // generate feature pyramids for detection
   p_3 = upsample(x_{10})
   p_3 = concat(p_3, x_6)
   p_3 = C2F(p_3) $*$ 3
   p_3 = CBAM(p_3) // channel attention

   p_4 = upsample(p_3)
   p_4 = concat(p_4, x_4)
   p_4 = C2F(p_4) $*$ 3
   p_4 = CBAM(p_4)

   p_5 = AKConv(p_4, 256, stride=2)
   p_5 = concat(p_5, p_3)
   p_5 = C2F(p_5) $*$ 3
   p_5 = CBAM(p_5)

   p_6 = AKConv(p_5, 512, stride=2)
   p_6 = concat(p_6, x_8)
   p_6 = C2F(p_6) $*$ 3
   p_6 = CBAM(p_6)
   bboxes, class_ids, scores = Detect([p_3,p_5,p_6], nc)
   Return bboxes, class_ids, scores
 end
end

REFERENCES

[1] N. Wang, Z. Zhang, H. Hu, B. Li, and J. Lei, "Underground defects detection based on GPR by fusing simple linear iterative clustering phash (SLIC-phash) and convolutional block attention module (CBAM)-YOLOv8," *IEEE Access*, vol. 12, pp. 25888–25905, 2024, doi: 10.1109/ACCESS.2024.3365959.
[2] X. Zhang, Y. Song, T. Song, D. Yang, Y. Ye, J. Zhou, and L. Zhang, "AKConv: Convolutional kernel with arbitrary sampled shapes and arbitrary number of parameters," 2023, *arXiv:2311.11587*.