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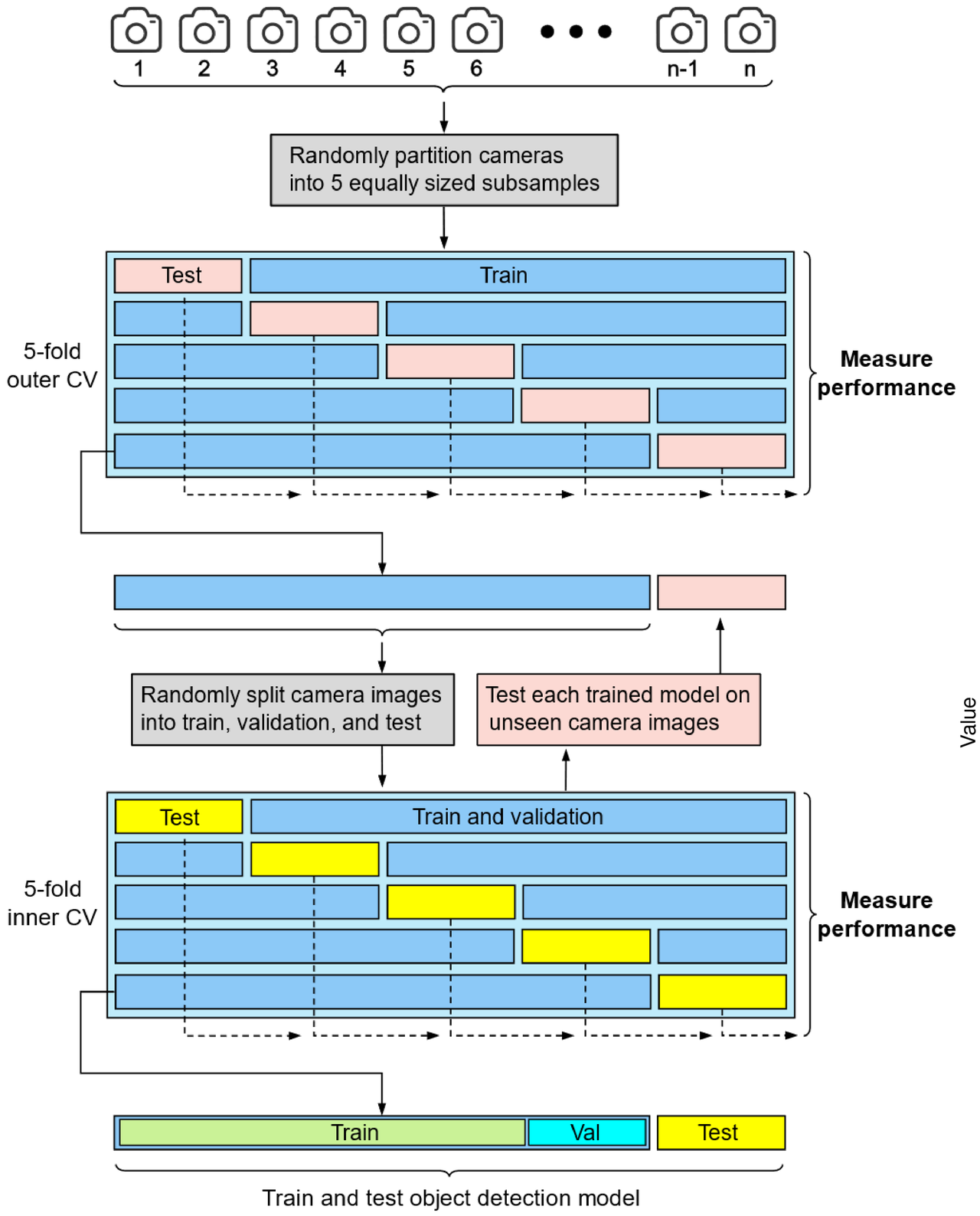
Image analysis for automated detection of wild boar in data collected from camera traps

- **Evaluate the performance of a YOLOv5 object-detection model to identify wild boar in camera trap images.**
- **How does contrast limited adaptive histogram equalization (CLAHE) of images affect performance?**

Two examples with comparison between original camera-trap images (top row) and images where contrast limited adaptive histogram equalization (CLAHE) have been applied (bottom row).



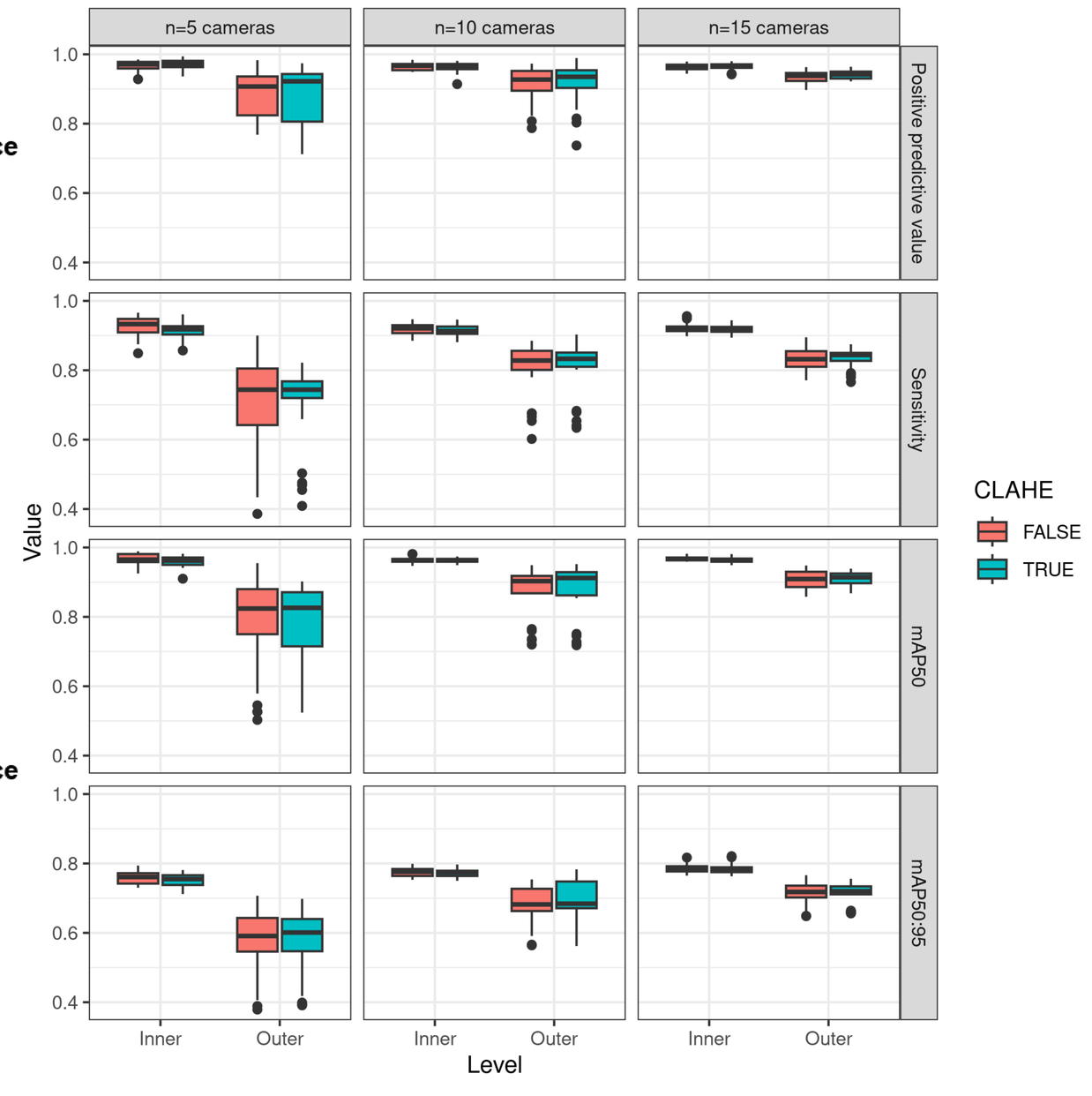


Illustration and results of the two-stage k×l-fold cross-validation schema to evaluate the performance of a YOLOv5 object-detection model to identify wild boar in camera trap images. The outer loop consisted of a group 5-fold cross-validation schema, where the cameras were randomly partioned into five equally sized folds to handle that images are logically grouped by camera. In each iteration, one fold was used for evaluating the performance on images from unseen cameras, while the remaining folds were used for training. The inner loop consisted of a stratified 5-fold cross-validation schema to ensure the proportion of images: *i)* without wild boar, *ii)* with one wild boar, and *iii)* with multiple wild boar, where the same in each dataset. In each iteration, one fold was used for evaluating the performance on images from cameras used in the training, while the images from the remaining folds were partitioned into train, and validation datasets containing 80% and 20% of the data, respectively.

Conclusion: Using CLAHE does not seem to enhance performance, however, using more cameras and images for training increases the performance of the object-detection model.

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