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Abstract. This study explores processes that measure and evaluate coordinate and photometric characteristics of moving objects in computer vision tasks on digital images and series of frames.

The task addressed relates to the lack of a comprehensive formalized method for end-to-end evaluation of the accuracy of coordinate and photometric measurements, which integrates high-fidelity simulation modeling, automatic data identification, and statistical analysis of the laws of error distribution in terms of structurally heterogeneous subsamples. To solve the task, a computational method for evaluating measurement accuracy indicators based on data from the SCVModel simulation modeling system has been devised. The method is based on a formalized representation of observation conditions through a morphological table with the use of cross-consistency testing to cut off physically unrealistic scenarios. An extended set of statistical characteristics has been defined and spatial-energy criteria for grouping measurements into subsamples have been introduced.

A distinctive feature of the devised method is that, unlike the generally accepted threshold metrics of integral quality, it enables studying measurement errors. They include full-fledged random variables with the calculation of their mathematical expectations, variances, asymmetry, and kurtosis. The results indicate that the mechanism behind spatial censoring of subsamples effectively isolates anomalous deviations caused by optical distortion or overlapping of objects. It is quantitatively proven that rejecting 5–10% of such measurements leads to a sharp decrease in the mean square deviation (from 6.30 to 0.40 pixels).

The scope of practical use of the method is verification and comparative analysis of moving object detectors. This method is implemented in the COMPARATOR software toolkit (Ukraine) and has been successfully applied to evaluate the Amanita (Ukraine) and YOLOv8 (USA) systems

Keywords: computer vision, measurement accuracy assessment, morphological table, statistical analysis, simulation modeling