

Gorokhovatskyi O. Medoids as a packing of ORB image descriptors / O. Gorokhovatskyi, O. Yakovleva // Advanced Information Systems. – 2024. - 8(2). – P. 5–11. <https://doi.org/10.20998/2522-9052.2024.2.01>

Джерело: <http://ais.khpi.edu.ua/article/view/305455>

Abstract

The aim of the research. The paper presents the research about the feasibility to use matching medoids obtained from the set of ORB descriptors instead matching the full set of binary descriptors for image classification problem. Research results. Different methods that include direct brute force medoids matching, grouping of medoids for separate classes, and grouping of descriptors followed by calculation of medoids amongst them were proposed. Numerical experiments were performed for all these methods in order to compare the classification accuracy and inference time. It has been shown that using of medoids allowed us to redistribute processing time in order to perform more calculations during preprocessing rather than during classification. According to modelling performed on the Leeds Butterfly dataset matching images based on medoids could have the same accuracy as matching of descriptors (0.69–0.88 for different number of features). Medoids require additional time for the calculation during preprocessing stage but classification time becomes faster: in our experiments we have obtained about 9–10 times faster classification and same 9–10 times increasing preprocessing time for the models that have comparable accuracies. Finally, the efficiency of the proposed ideas was compared to the CNN trained and evaluated on the same data. As expected, CNN required much more preprocessing (training) time but the result is worth it: this approach provides the best classification accuracy and inference time. Conclusion. Medoids matching could have the same accuracy as direct descriptors matching, but the usage of medoids allows us to redistribute the overall modeling time with the increasing preprocessing time and making inference faster.

Keywords:

image features; keypoints; medoids; classification; ORB; binary descriptors; features matching; grouping; bag of features; repeatability; classification accuracy.