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## Distributed system for detection of biological contaminants

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The paper proposes a distributed system for detecting the types of biological contaminants existing on the objects surfaces. The system realizes biofouling detection method based on image processing technique. The system processes a series of object images obtained in the visible and near infrared spectral ranges. One image in the series is marked as the base image. All images of the series are converted to one common shooting point and to one common angle. The object of interest is detected on the base image, and then the background on all images is removed. To recognize the type of biological contaminants, we used a pre-trained classifier based on support vector machine method.

The proposed detection method has an obvious parallelism in data processing. Each image in the series, except the base, can be processed independently. Therefore it is quite easy to implement on a computing cluster using standard parallel computing libraries such as MPI. The central host of cluster is used to implement non-parallel branches of image processing algorithm. These include interactive segmentation, the search for key points of the base image, and classifier training. The central host also solves the problem of the data distribution on cluster nodes and synchronization of all nodes. Other knots of a cluster are processing all images in a series, except the base image. They implement the search key points, converting the images to a single point shooting, background removal and identification types of biofouling. After processing, for each image the map of pollution is formed. This map is sent to the storage, located at the central node of the cluster.

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