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ORIGINAL ARTICLE

A swarm-optimized microbial colony counter

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Abstract

The identification of bacterial colonies is deemed to be crucial in microbiology as it helps in identifying specific categories of bacteria. The careful examination of colony morphology plays a crucial role in microbiology laboratories for the identification of microorganisms. Quantifying bacterial colonies on culture plates is a necessary task in Clinical Microbiology Laboratories, but it can be time-consuming and susceptible to inaccuracies. Therefore, there is a need to develop an automated system that is both dependable and cost-effective. Advancements in Deep Learning have played a crucial role in improving processes by providing maximum accuracy with a negligible amount of error. This research proposes an automated technique to extract the bacterial colonies using SegNet, a semantic segmentation network. The segmented colonies are then counted with the assistance of blob counter to accomplish the activity of colony counting. Furthermore, to ameliorate the proficiency of the segmentation network, the network weights are optimized using a swarm optimizer. The proposed methodology is both cost-effective and time-efficient, while also providing better accuracy and precise colony counts, ensuring the elimination of human errors involved in traditional colony counting techniques. The investigative assessments were carried out on three distinct sets of data: Microorganism, DIBaS, and tailored datasets. The results obtained from these assessments revealed that the suggested framework attained an accuracy rate of 88.32%, surpassing other conventional methodologies with the utilization of an optimizer.