



Master 2 Internship

Identification of bacterial colonies combining digital holography and artificial intelligence

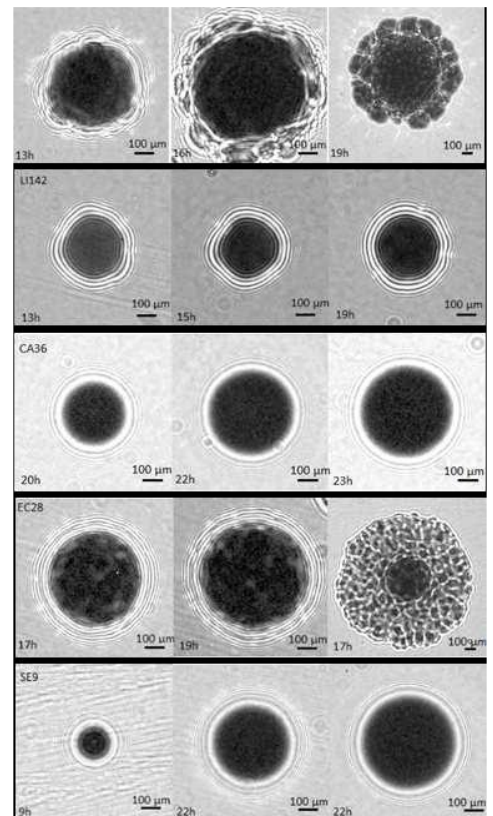
Keywords: digital holography, lensless microscopy, microbiology, artificial intelligence, classification, identification

Context :

This project in collaboration with researchers from CEA-LETI / DTBS is positioned within the framework of the automation of medical analysis laboratories and the fight against microbial antibiotic resistance.

The goal is to detect and classify microbial micro-colonies as early as possible in order to best target the delivery of the appropriate antibiotic (de-escalation strategy). Information is taken using a CMOS optical sensor using digital holography technique. This provides a low cost, robust and compact instrument which can be used inside the incubator itself, thus allowing dynamic work. We rely on a 10-micron-scale resolution, but above all on the very large field of view of instruments developed in the team. This very large field of view gives access to very valuable statistics for identification, but above all makes it possible to work directly on the Petri dish typically used in clinical laboratories.

Recent developments in Artificial Intelligence provide access to high-performance algorithms through software toolkits. Unlike the original lensless microscopy approach, this is done without performing image reconstruction. It is the raw information from the optical sensor that is fed to the deep neural network. We have already been able to perform a proof of concept which showed an identification rate of around 98% on 5 laboratory species.



Objectives:

In this context, the objective of the internship is to extend the validation to a greater number of species and to make the proof of concept even more convincing by working on the identification algorithms. The work will consist on the one hand in a laboratory phase of growing microbial colonies and acquiring the data that will enrich our input database. On the other hand, it will be about using network architectures that will simplify the pre-processing of input data. The candidate should have an interest in an approach combining laboratory work and digital data processing. Knowledge of python is a prerequisite.

Hosting lab:

Laboratoire des Technologies de la Microélectronique (LTM/CNRS)

CEA-LETI-Minatec campus

17 avenue des martyrs 38000 Grenoble



Duration: 6 mois



Starting March 2021

TO APPLY

Send CV to :

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