WATER QUALITY MONITORING USING HIGH RESOLUTION MICROSCOPIC IMAGES AND MACHINE LEARNING

MOTIVATION
> Microbiological analysis in water is very expensive due to the cost of time and use of substances for its identification.
> Environmental microbiology is the only area that has not had a major innovation for 40 years in Chile and generates the highest number of deaths in countries without drinking water treatment.

RESULTS
> Using 515,000 416x416 px images in a 70/20/10 ratio, I achieved an accuracy of 85.76% and a sensitivity of 82.14% in a range of 45 FPS.
> Analysis results in 2.49.

ML architecture for Microbiology
> A tri-modular hybrid architecture was designed that contemplates a GRU-RNN sequential model to discriminate microorganisms from particles. A 3D-CNN spatial model is then used to estimate the superfamily and classify the microorganism. Finally, it goes through a static model that identifies and transforms (transformed vision) the results of the previous models to obtain a digital image of the microorganism based on its microbial metabolism.