Advanced Machine Learning

intro

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GitHub repo: https://github.com/jarek-pawlowski/advanced-machine-learning

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Fast analysis of ECG results boosted by artificial intelligence

CarnaLife System connects with holters via GSM, WiFi or Bluetooth and enables remote monitoring of the centre's patients. The ECG results from a patient are preliminarily analysed by certified artificial intelligence algorithms, what helps to reduce the time a physician spends on the test analysis and facilitates the diagnostics.

Certified algorithms detecting irregularities in the ECG signal on the level higher than 95%*

Artificial intelligence algorithms are compliant with the EC-57 standard, confirmed on MIT BIH, NST, AHA reference databases and on clinical data. They provide 98.78 effectiveness in detection and analysis of heart rhythm, 95.5 effectiveness in detection of supraventricular events and atrial fibrillation as well as 95.5 effectiveness in detection of ventricular events. The algorithms are fed by anonymised patient data and thus improve their effectiveness on a permanent basis.

Assistance in cardiac rehabilitation of patients after myocardial infarction through teleconsultation and post-treatment check ups.

CarnaLife System enables remote collection of ECG, blood pressure and, optionally, pulse oximetry measurements. The tests are performed under the supervision of a specialist who, in the remote contact with a patent, advises physical exercises, rest or other rehabilitation-related activities.

neurosys

Rezultaty: precyzja detekcji

Detektor radzi sobie zarówno z typami mikrobów rosnących w małe jak i dużo większe kolonie

Table 6. Average precision calculated for the each class of microbes separately at different IoU-thresholds for Faster R-CNN (ResNet-50) with higher-resolution subset. We get overall better performance for smaller colonies.

	microbe type				
IoU	*S.aureus*	*B.subtilis*	*P.aeruginosa*	*E.coli*	*C.albicans*
0.5	86.0%	72.4%	69.9%	73.1%	82.0%
0.55	85.9%	69.5%	67.4%	68.9%	82.0%
0.6	84.8%	64.6%	65.6%	64.0%	80.8%
0.65	80.9%	56.9%	62.4%	56.6%	79.6%
0.7	77.9%	48.9%	57.9%	47.9%	77.1%
0.75	71.1%	39.8%	50.9%	39.0%	73.2%
0.8	58.4%	30.0%	38.0%	30.2%	65.5%
0.85	37.4%	17.5%	23.3%	19.4%	49.4%
0.9	14.8%	6.3%	7.9%	7.4%	19.2%
0.95	0.6%	0.4%	0.7%	0.5%	1.8%
0.5:0.95	59.8%	40.6%	44.4%	40.7%	**61.1%**

AP

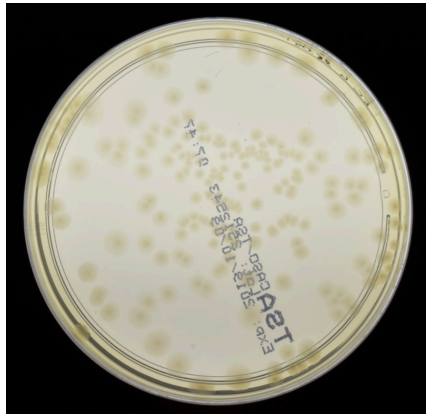
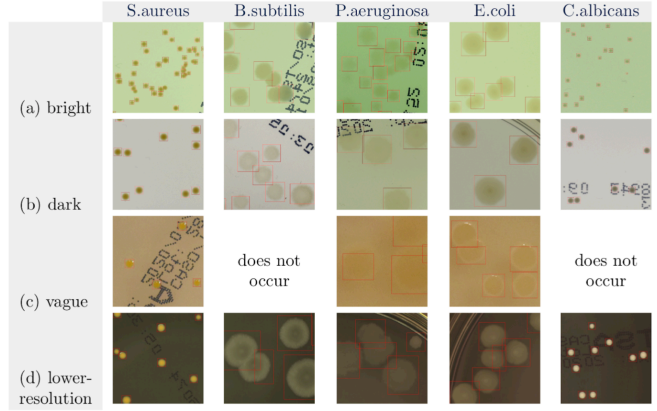
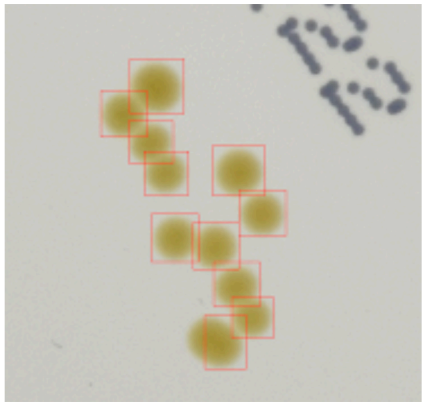


Table 3. Examples of Cascade R-CNN with HRNet predictions for different types of microbes grown inside a Petri dish captured in four different setups, as in Table 1. Each image is of 20 × 20 mm size.





Timeline and Grading:

https://github.com/jarek-pawlowski/advanced-machine-learning

- 10 lectures

- 5 seminars
  - 20 minutes (only! -- the hardest thing) + 10 min discussion
  - presented in pairs, while each person presents his own part

- 4 laboratory tasks:
  - you have to send 1 or 2 or 3 reports,
  - labs grading
  - 1 report **3.5** +/- 0.5
  - 2 reports **4.5** +/- 0.5
  - 3 reports **5.0**

- **final grade** is the average of presentation grade and lab grade