

Improving Breast Cancer Detection with Faster R-CNN

Internship description: [Breast cancer](#) is the most frequently diagnosed solid cancer and second leading cause of cancer death among women. In most countries all the women beginning from a certain age should pass a mammography exam to detect the cancer as early as possible. This demands a very big number of experienced radiologists to analyze all the images and costs a lot to the national healthcare system.

[Therapixel](#) is a spin-off Inria created in 2013 specialized in medical imaging with 10 employees. It has recently won the [Digital Mammography DREAM Challenge](#) [1,2], a world-wide competition organized to improve the state-of-the-art in automatic mammography screening. This internship will explore Faster R-CNN [3] based approaches to further improve the results and can include following steps:

- using Tensorflow implementation [4] as the starting point
- replicating the results [5] obtained on DREAM Challenge
- improving the results by testing several extensions:
 - finding a better architecture/training procedure
 - multi-gpu training
 - more data
 - attention mechanism
 - more detailed labeling
 - ? (intern is highly encouraged to take initiative)

Candidate description:

- Motivated by medical challenges
- Good understanding of modern Deep Learning architectures (AlexNet, VGG, ResNet)
- Some experience with at least one Deep Learning framework (ideally Tensorflow)
- Good coding skills (Python / C++ / C)
- Familiar with standard Python libs (Numpy, Scipy, matplotlib)
- High general scientific culture and research spirit

Internship length: 6 months

Internship location: Paris, RER station Port Royal (pépinière Paris Santé-Cochin)

Salary: 2000 € net / month

Contact e-mail: stage-dl@therapixel.com

Please include your resume, motivation letter, and grades obtained so far.

Join Therapixel – help in building the medicine of the future

References:

[1] DM Challenge Yaroslav Nikulin (Therapixel) write up. Available:

<https://www.synapse.org/#!/Synapse:syn9773040/wiki/426908>.

[2] Therapixel Press Release <https://goo.gl/BSG6rZ>

[3] Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks, S. Ren et al, 2015: <https://arxiv.org/abs/1506.01497>

[4] Faster R-CNN implementation in Tensorflow: https://github.com/smallcorgi/Faster-RCNN_TF

[5] 2nd place DM Challenge submission:

<https://www.synapse.org/#!/Synapse:syn9773110/wiki/426911>