

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. Whereas this demands a large number of radiologists to analyze all the images, a lot of countries are missing experienced breast radiologists.



1 in 8 women affected during her lifetime



Every 1000 women screened, 5 will have breast cancer.
But 100 will be recalled for further testing.

We can do better !

[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. The starting point of this internship will be the 2nd position of the DREAM Challenge [5]. Using Tensorflow implementation [4] as the starting point, the goal is to reproduce and improve the results by testing several extensions:

- Improving the architecture/training procedure
- multi-gpu training
- more data, more detailed labeling
- attention mechanism

The intern is highly encouraged to take initiatives, to propose and test new ideas.

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

Modalities :

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

Note that this internship could lead to a research scientist position at Therapixel and / or a PhD in partnership with a French Research Institute.

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>