The Convergence of HPC and AI for Healthcare on Intel® Based Supercomputers

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Due to recent advancements in Deep Learning (DL) algorithms and frameworks, we have started to witness the convergence of High Performance Computing (HPC), Machine Learning (ML), and various application domains, such as healthcare. This opens the possibility to address the high complexity problems that deal with large data and were considered unsolvable in the past. In this talk we will present several use-cases going from synthetic to real-world problems for medical image classification, segmentation, and generation, using both 2-D and 3-D data. The focus will be on the scale-out behavior and best practices, while also giving details into the bottlenecks encountered in the various use-cases. Jointly working within Intel's IPCC (Intel Parallel Computing Centers) program, we will present SURFsara's collaborations with DellEMC, NKI (Netherlands Cancer Institute), and the EXAMODE (www.examode.eu) project consortium. We will demonstrate how large memory HPC systems enable solving medical AI tasks.

We will focus on multiple use-cases, all performed on large CPU-based supercomputers:

(1) High accuracy for detecting thoracic pathologies from Chest X-Ray images, in collaboration with Dell EMC.
(2) Large CT image synthesis using Progressive GANs, in collaboration with the Netherlands Cancer Institute.
(3) Large histopathology image analysis, in collaboration with the EXAMODE H2020 consortium.