PCOG Yearly Team Meeting

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December 14, 2020

EuroCC National Competence Centre

National Competence Centre (NCC) in HPC and related disciples (HPDA/AI)

- Provide High Performance Computing (HPC) services to industry (including SMEs), academia, and the public

- Provide training and skills development

Competence Mapping

- Identify current HPC related competencies

- Current status of HPC in the country and needs (applications in both industry and academia)
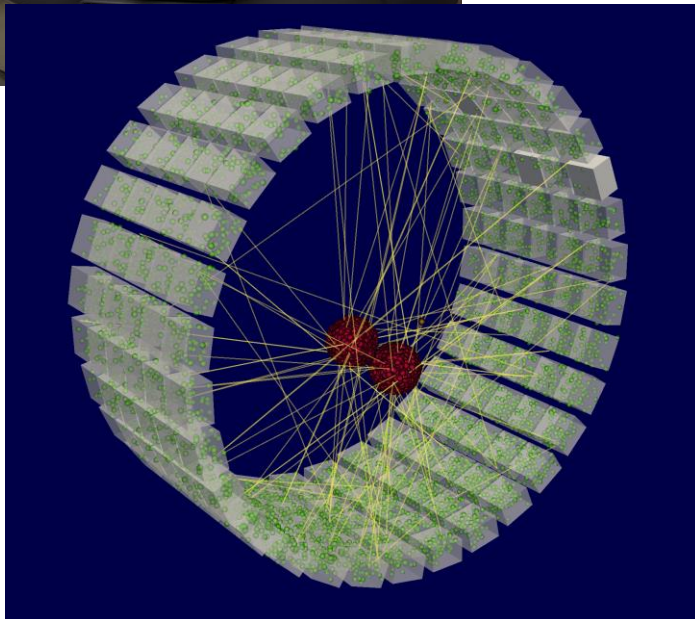
Training and Skills Development:

- Mapping of HPC related training activities in Luxembourg (Surveys/Mapping/Interviews)

Facilitation of Access to Scientific and Technical Expertise of Knowledge

- HPC demonstrators of applications of HPC in industry and research

HPC for Medical Imaging
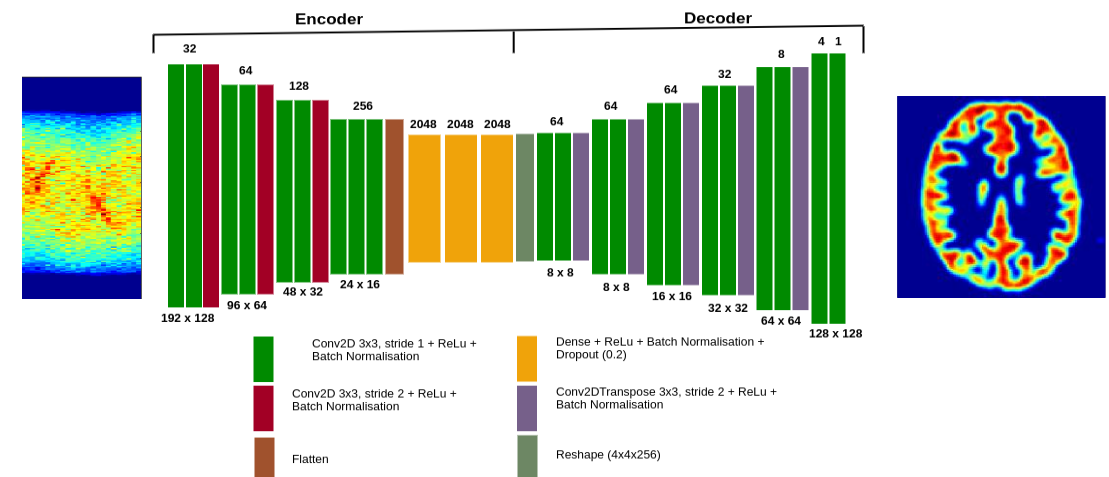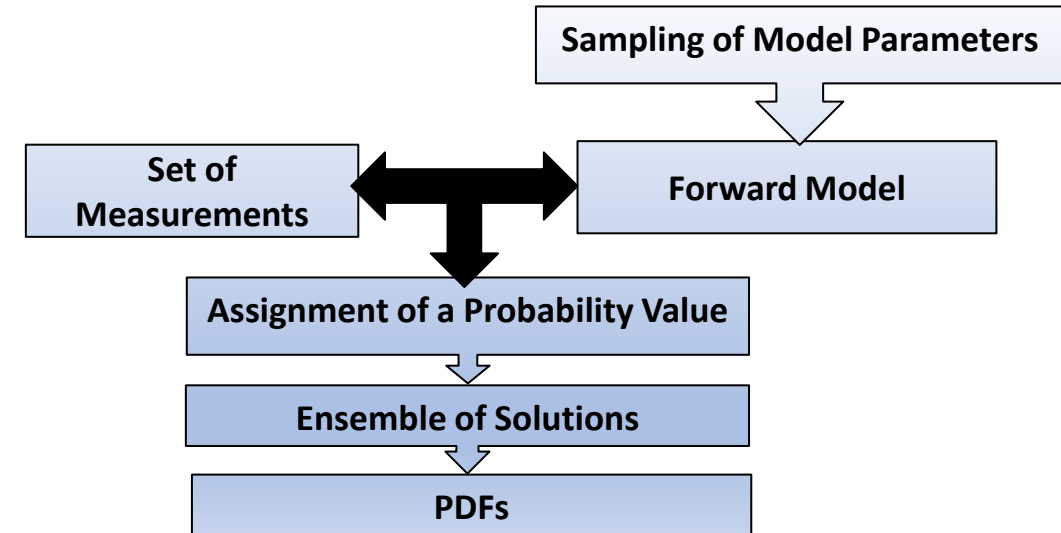
Data Simulation (Forward Problem)

Image Reconstruction (Inverse Problem)

Monte Carlo Parallel Tempering

MPI-CUDA Multi nodes GPU Implementation

Sampling of Model Parameters

Set of Measurements

Forward Model

Assignment of a Probability Value

Ensemble of Solutions

PDFs

CNN Reconstruction

Tensorflow Training on single node

Encoder | Decoder

32 | 64 | 128 | 256 | 2048 2048 2048 | 64 | 64 | 64 | 32 | 8 | 4 1

192 x 128 | 96 x 64 | 48 x 32 | 24 x 16 | 8 x 8 | 8 x 8 | 16 x 16 | 32 x 32 | 64 x 64 | 128 x 128

Conv2D 3x3, stride 1 + ReLu + Batch Normalisation

Conv2D 3x3, stride 2 + ReLu + Batch Normalisation

Flatten

Dense + ReLu + Batch Normalisation + Dropout (0.2)

Conv2DTranspose 3x3, stride 2 + ReLu + Batch Normalisation
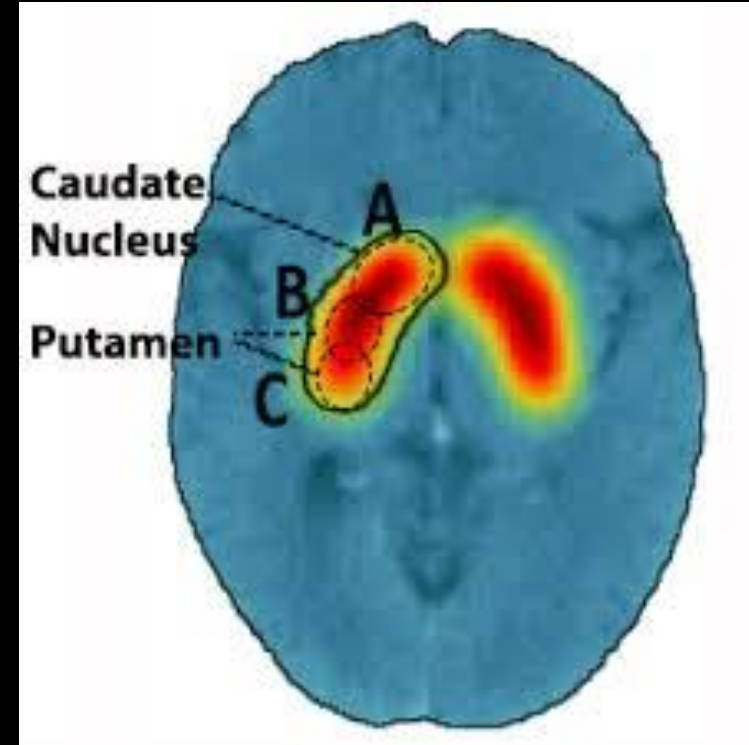
Reshape (4x4x256)

Applications

Small Animal Imaging
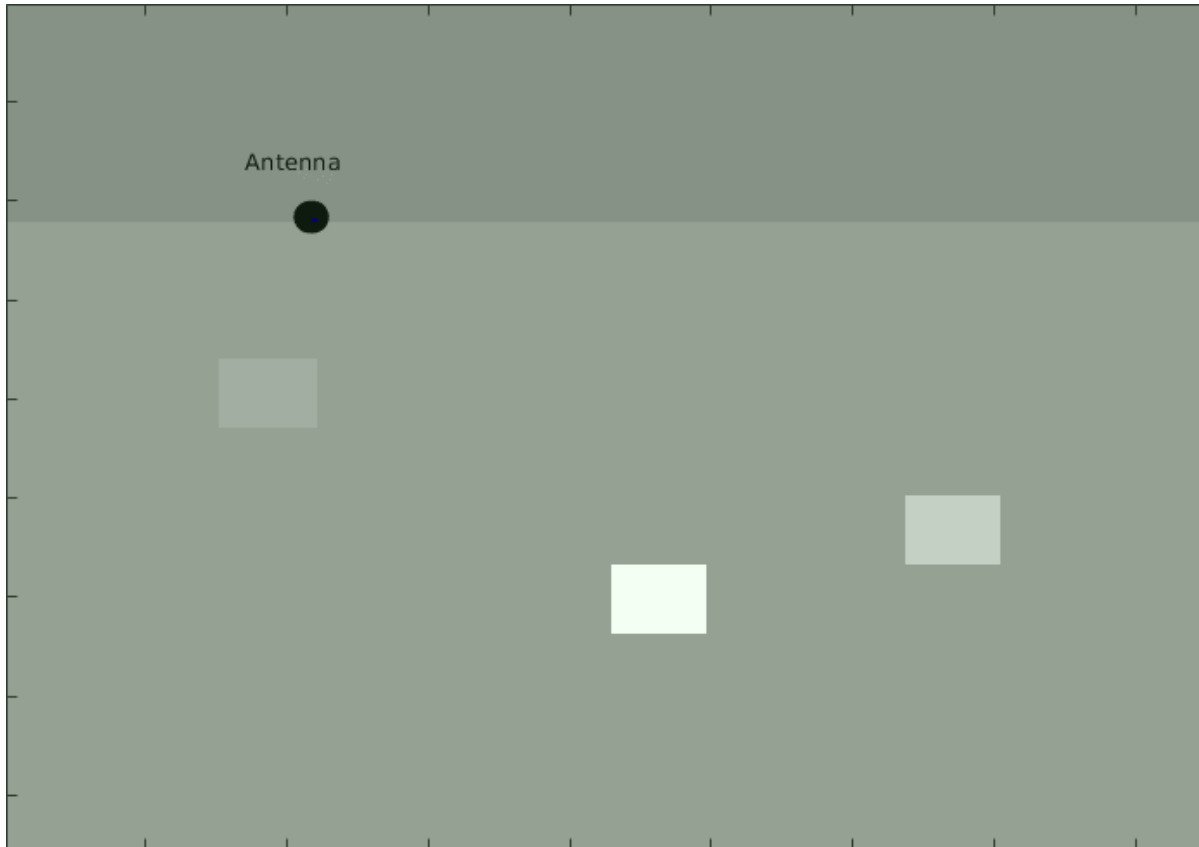**Kidneys (DTPA- Tc99m)**
Lungs (MAA-Tc99m)

SPECT for Parkinson' Disease
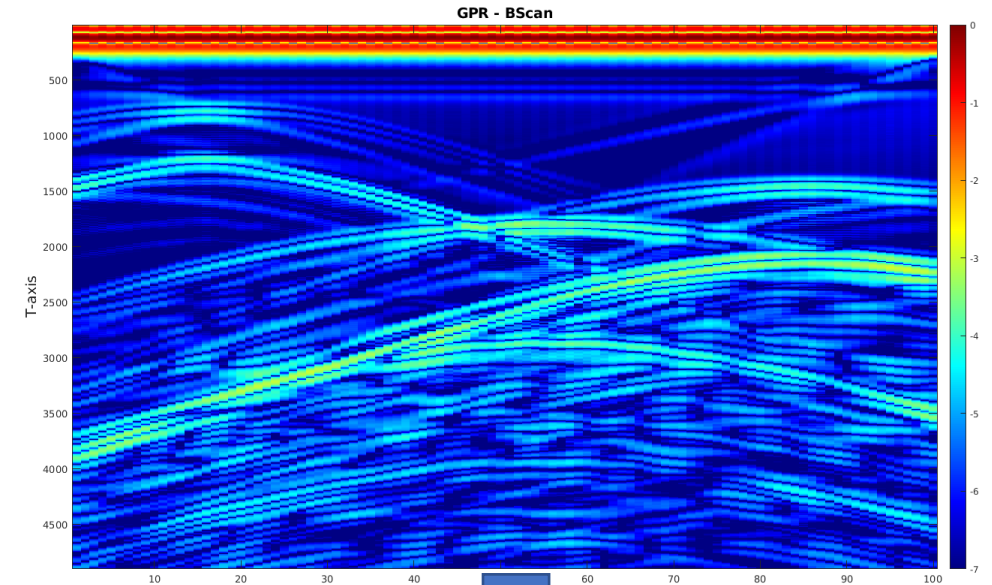**Brain Imaging (Ioflupane I123)**

Ground Penetrating Radars

A non-linear inverse problem with applications in geoscience

DATA

2D simulation of wave propagation in soil
Performed on the iris-cluster (single GPU)

1. AI/CNNs
2. Analytic Inversion
3. Iterative Reconstruction
4. Optimization

Objects ?

Multi GPU programming for
1. Simulation
2. Training
3. Iterative reconstruction

Thank you!!!