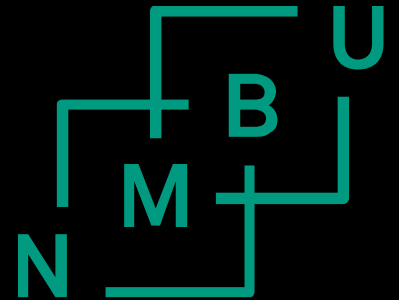


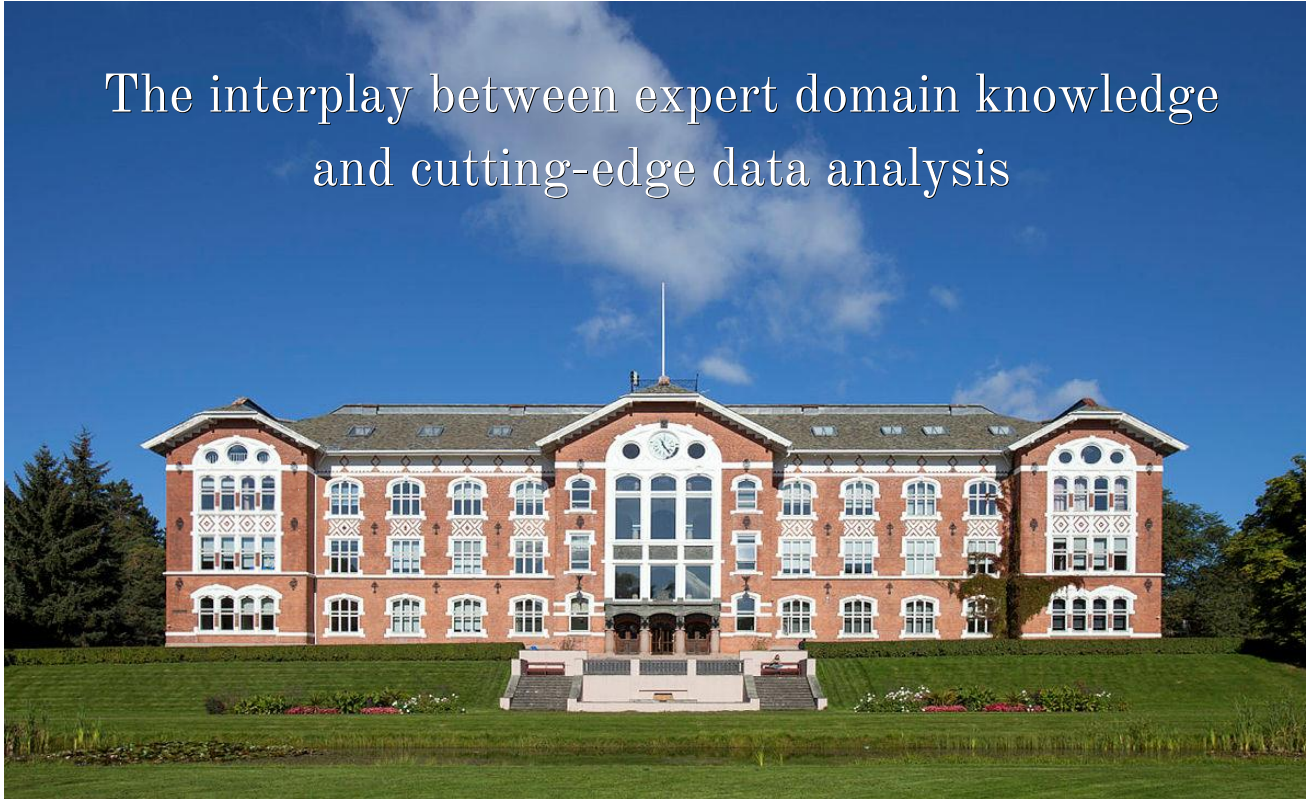
Intelligent life and environmental sciences driven by machine learning and robotics

Kristian Hovde Liland, REALTEK, NMBU



NMBU's hallmark

The interplay between expert domain knowledge
and cutting-edge data analysis

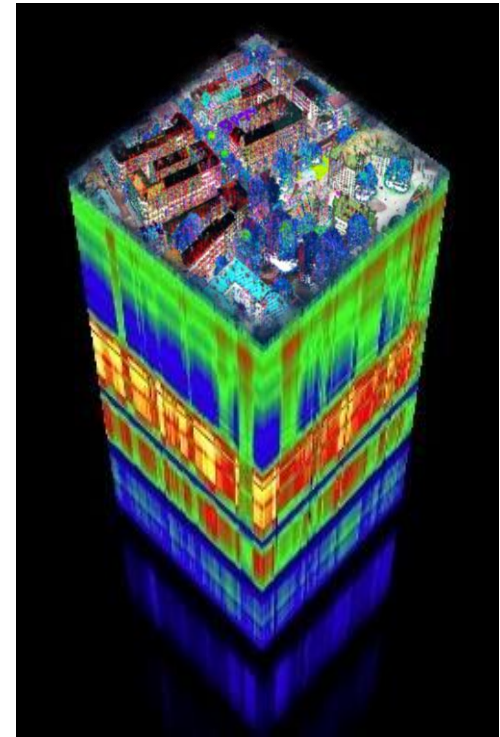
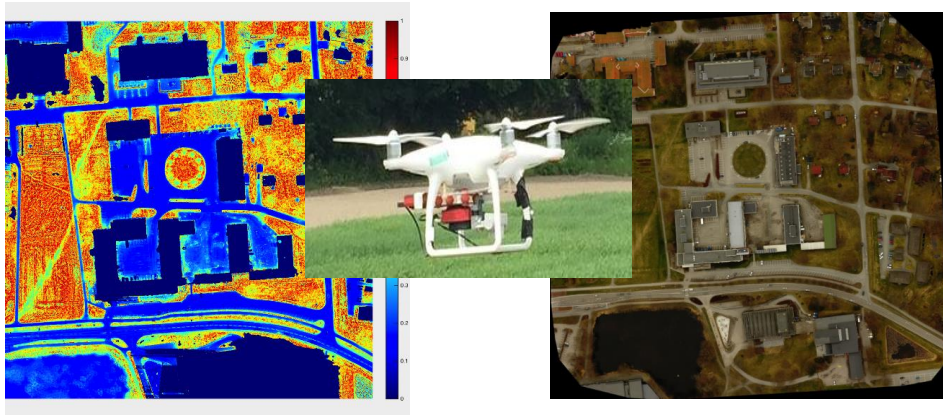


Robotics and automation

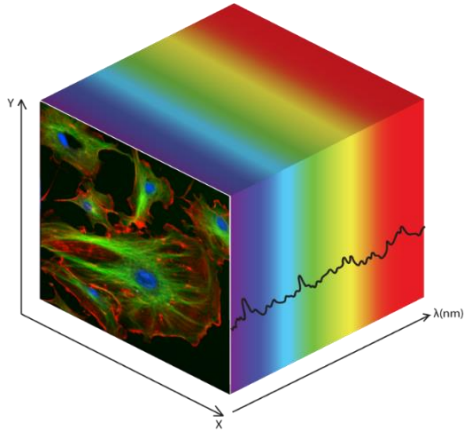


Spectral imaging from the skies

- Characterisation and mapping of vegetation
- Fault detection in solar cells
- City micro climate
- Quality control and maintenance planning



Analysis of hyperspectral imaging data

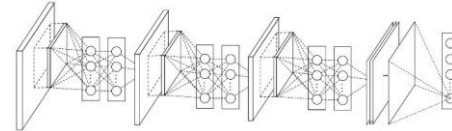


<http://www.photonetc.com/hyperspectral-imaging>



Image

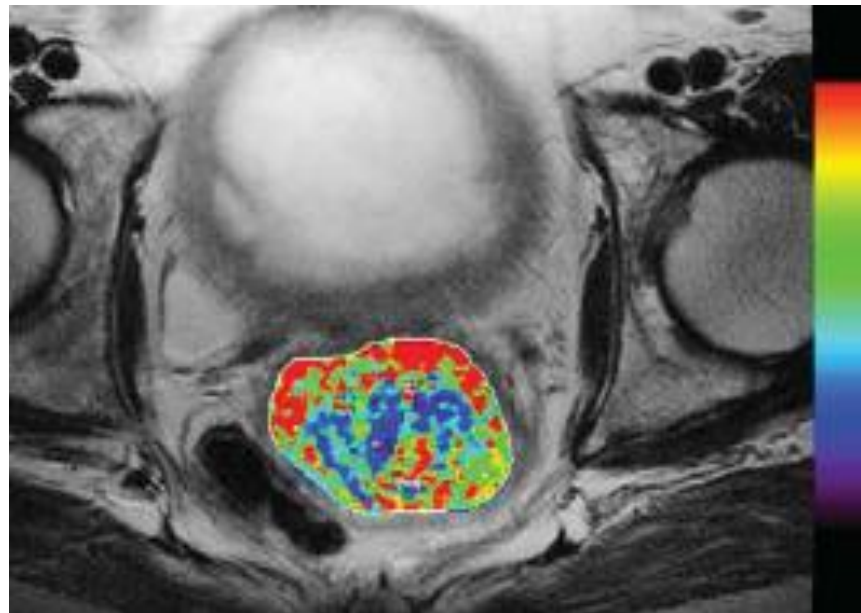
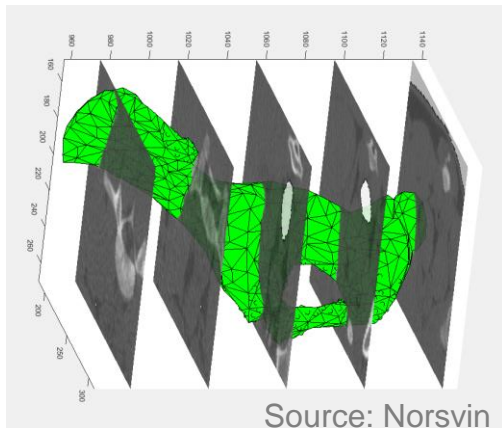
Spectral



- Classification
- Calibration
- Biological interpretation

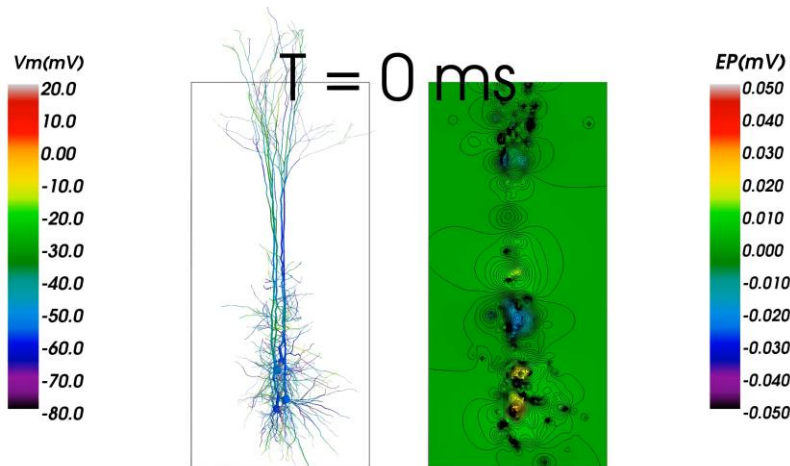
Medical imaging of animals and humans

- Detection and delineation of tumors
- Optimised therapy strategy
- Probability of relapse



Computational neuroscience

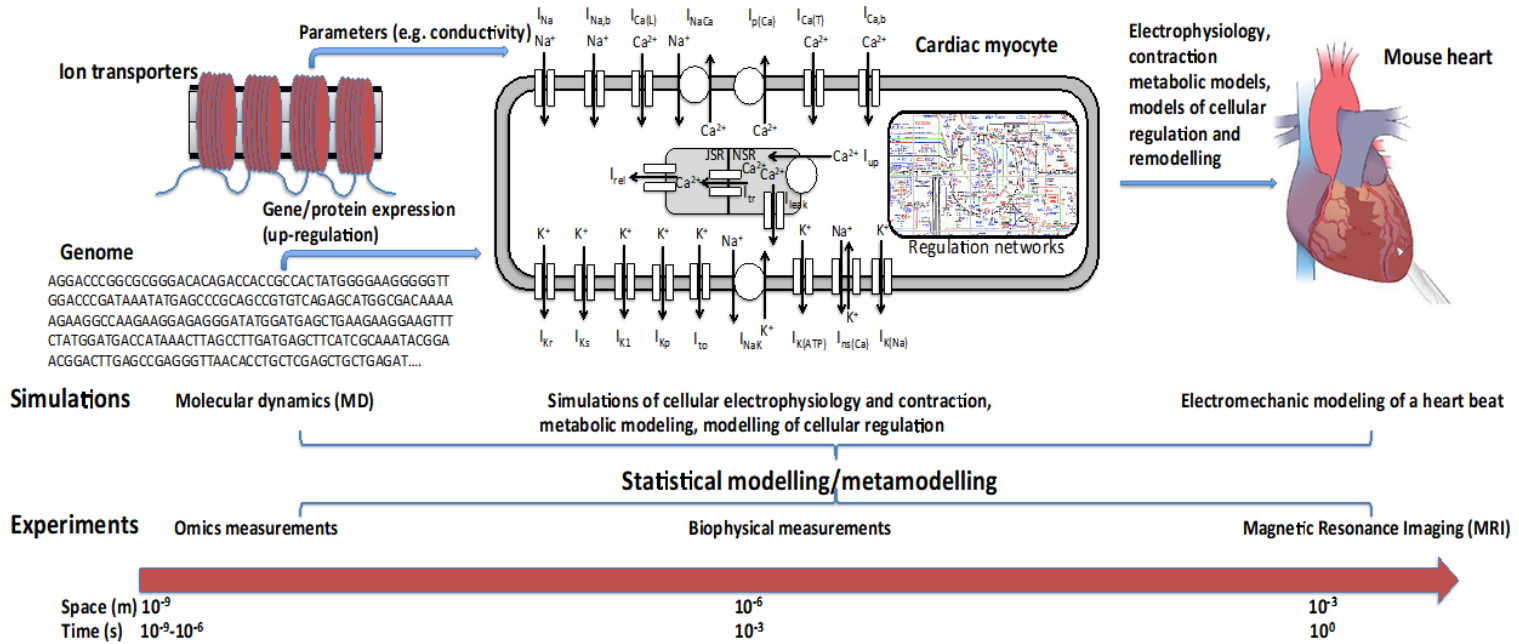
- Understand the brain through models and simulations
- Develop leading simulation and modeling tools and methods
- Provide foundation for bio-inspired AI



Co-funded by
the European Union



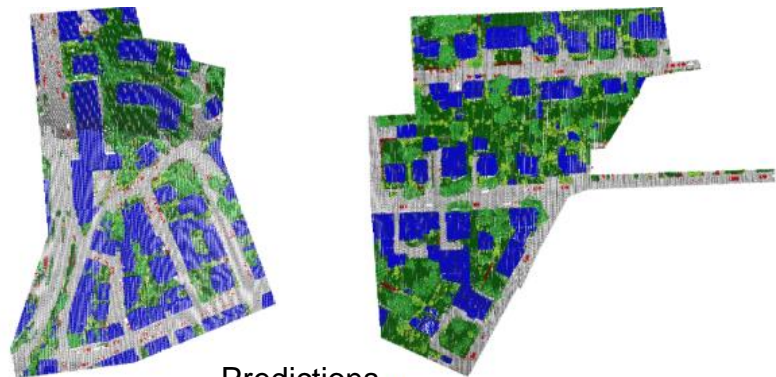
Multiscale heart modelling



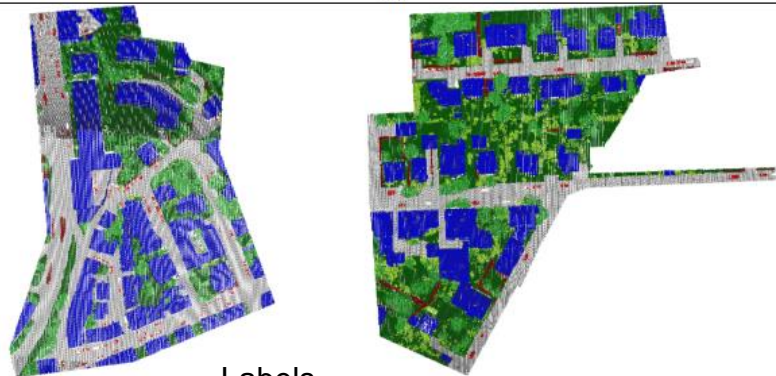
Deep geomatics

- Land cover segmentation
 - Convolutional neural networks on LIDAR and RGB data
 - CNNs on 3D point clouds

- Sheep trajectory tracking
 - Individual space-time analysis with massive data fusion



Predictions

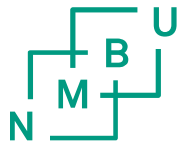


Labels

The digital cow

- Automatic milking systems (robots)
 - Data from multiple sensor systems
- High-dimensional and longitudinal data
 - New mathematical approaches
 - Improve health surveillance, feeding and breeding





Method development

- Orders of magnitude faster model selection for
 - Tikhonov/Ridge- and Partial Least Squares Regression
- Spatial post-processing of deep learning predictions
 - Improving accuracy through neighbourhood assignment
- Microcontroller deep learning
 - Sound and image analysis miniaturized
- GPS-free navigation and collision avoidance
 - Robot/drone movement in no/low signal areas
- Large scale brain simulation technology



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Data science education

2017:

- Master program in data science
 - First class graduating this spring

2018:

- Five-year master program in data science (siv.ing)
- 1/3 specialization in applied field



Artificial intelligence
Water engineering
Environmental
Engineering
Education
Technology



Thank you for
your
attention!

Thank you for
your
attention!



Oliver Tomic



Kristin Tøndel



Kristian Hovde Liland



Anne Cathrine Gjørde



Jon Olav Vik



Olav Reksen



Peer Berg