Mohn Medical Imaging and Visualization Centre

Postdoctoral Research Fellow in Radiology and Imaging-related Medical AI at Haukeland University Hospital

Marek Kociński

Bergen, 22nd April 2025

Education

2009 – PhD in Computer Science
2003 - Master's Degree in Electronics and Telecommunication

Scientific interests (Biomedical engineering)

- Algorithms and software for quantitative analysis and visualization of 2D/3D medical images and signals (eg. voxel time series)

Skills

Programming:	Python, C++, Matlab, R
Scripting & OS:	Bash, Linux.
Tools:	OpenGL, Insight Toolkit (ITK), The Visualization Toolkit (VTK), Qt,
Data:	Pandas, Matplotlib, Seaborn.
Medical Imaging:	DICOM, NIfTI, ITK-SNAP, Paraview.
ML & DL:	scikit-learn, PyTorch, FastAI, Monai.
Other:	Git, LaTeX
Interests:	Electronics (embedded systems, sensors)
Team Leadership:	Strong communication in multidisciplinary projects, across diverse teams
Learning:	Eager to learn and master new technologies

Professional Experience

2009 – 2023 – Assistant Professor,
Institute of Electronics, Technical University of Lodz, Poland

2019 – 2022 - Postdoctoral Fellow, Department of Biomedicine, University of Bergen, Norway

Teaching: Undergraduate and graduate-level courses

(Medical Imaging, Image Processing, Computer Graphics, Digital Signal Processing, Algorithms and Data Structures, Fundamentals of Programming, Microprocessors Systems, Electronic Circuits, Digital Systems, Graphical User Interface Design...).

Supervision: Supervised more than 40 bachelor's and master's theses and Erasmus final projects, co-supervised a doctoral thesis.

(Guiding students: artificial intelligence, data science, machine learning, deep learning, computer vision, biomedical image processing and analysis, 3D computer graphics, robotics, and medical imaging).

Publications: Co-author of approximately 60 scientific publications.

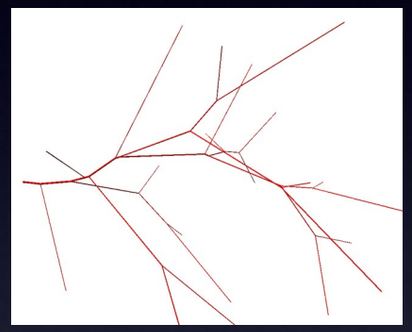
Projects related to:
Brain vasculature, skull removal, Alzheimer’s disease, endometrial carcinoma, prostate cancer, kidney, maxillofacial surgery, brain perfusion

Thank you!

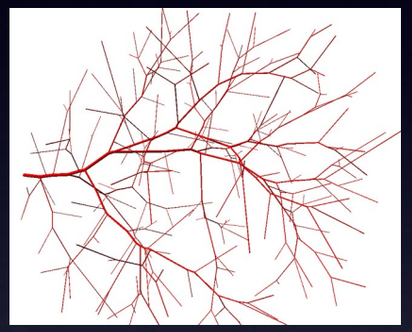
PhD thesis (in the field of computer science)

Quantitative analysis of vascular trees represented by digital images

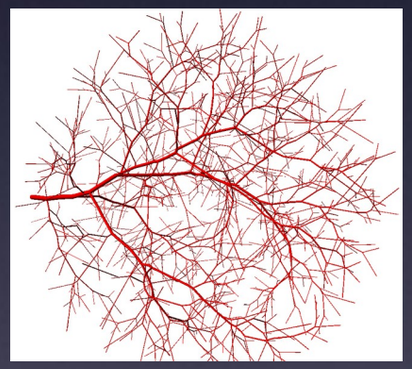
20 outlets



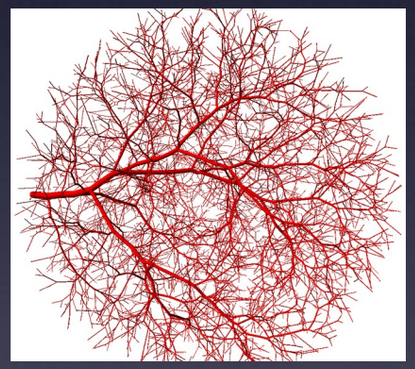
200 outlets



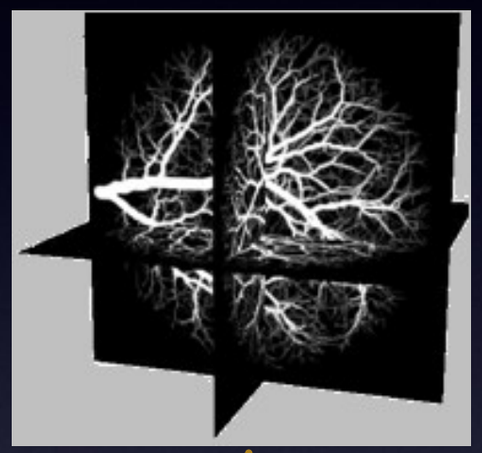
1000 outlets

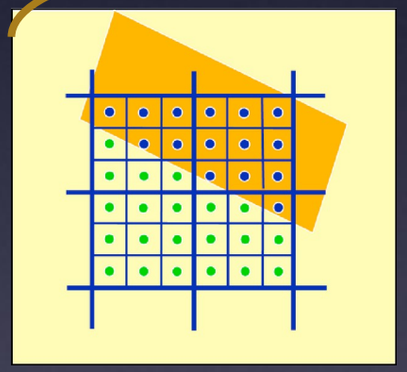


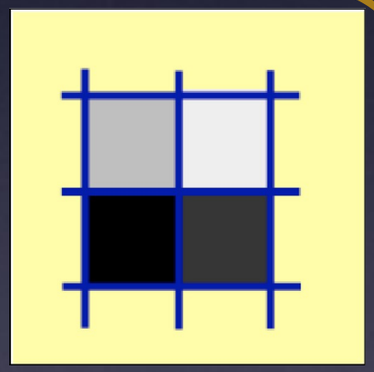
4000 outlets



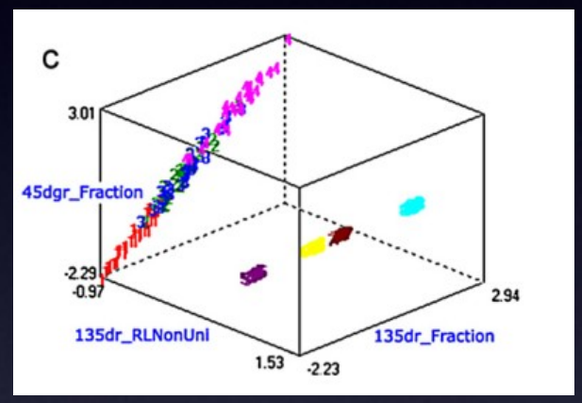
Vascular tree growth computer simulation. (Vector model)







Convertion model to 3D raster image

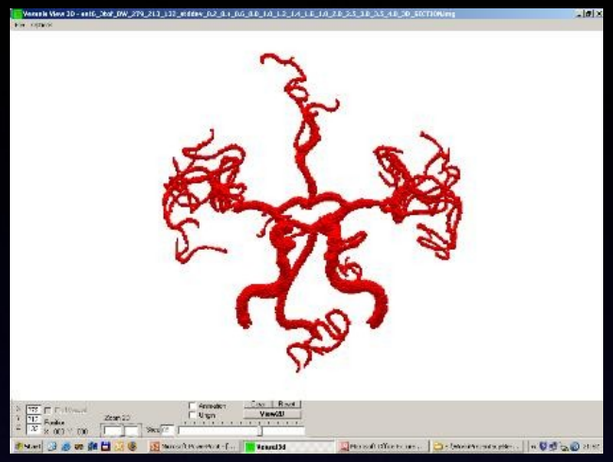


2D & 3D texture features

Marie Curie Fellowship

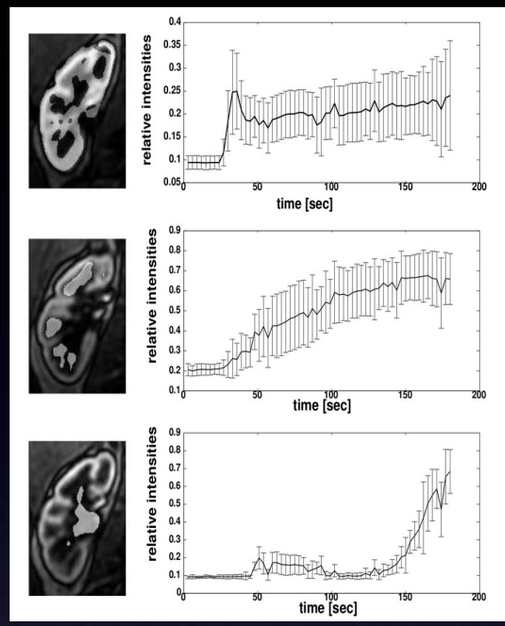
Department of Biomedicine, UiB

The 3D vascular model

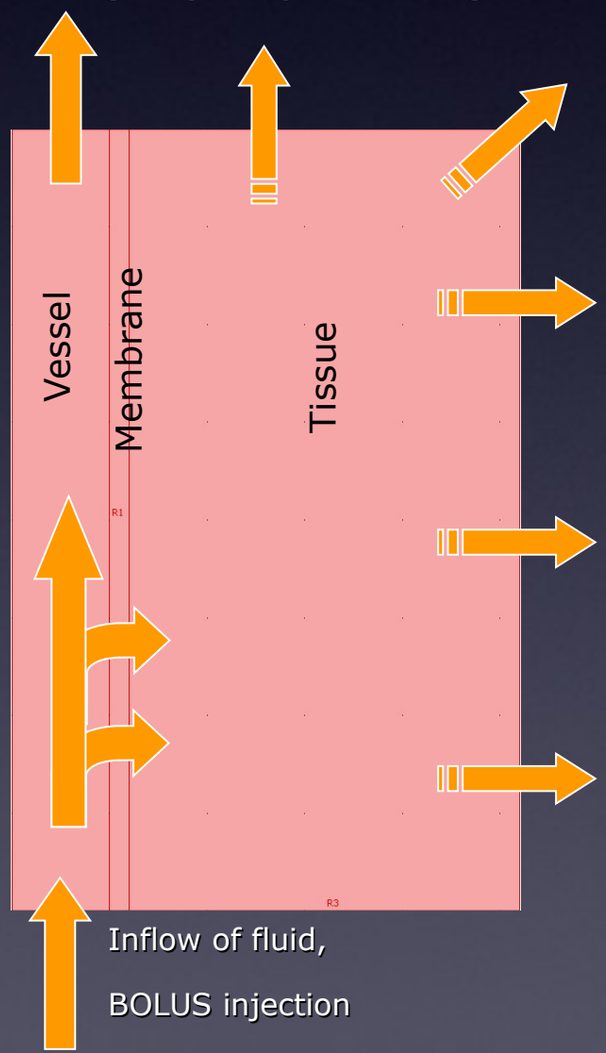


Assessment of Renal Function from 3D Dynami Contrast Enhanced MR Images using Independent Component Analysis

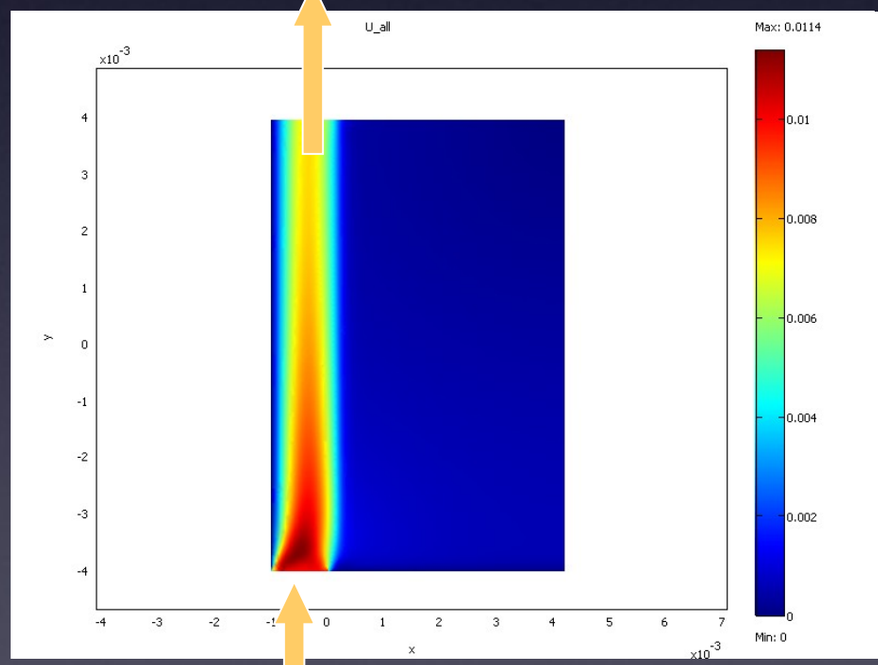
Frank G. Zöllner[1,2], Marek Kocinski[3], Arvid Lundervold[2], Jarle Rørvik[1]



Modeling capillary exchange and leakage of contrast agent in perfusion imaging



Outflow

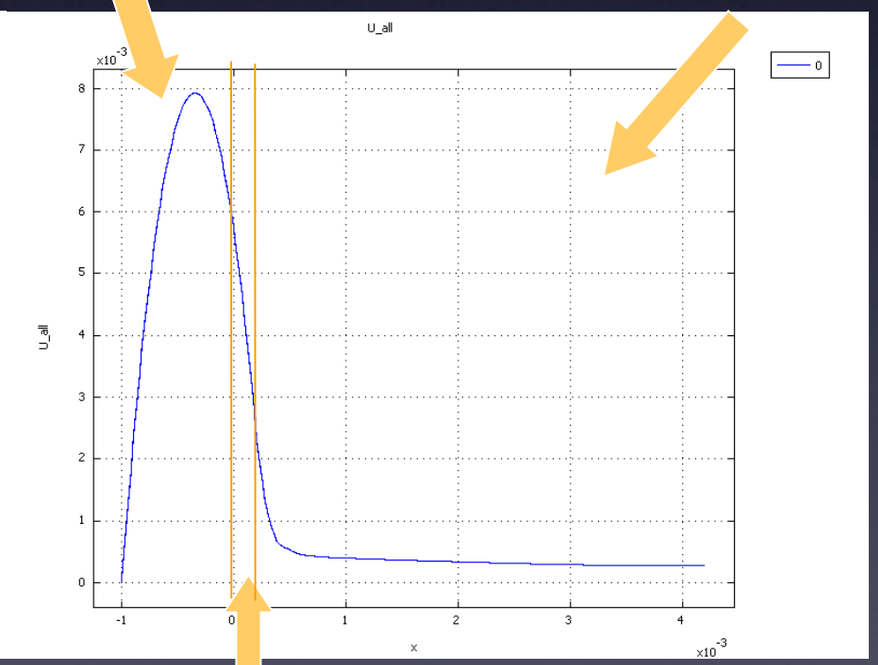


Inflow

Vessel

Velocity profile

Tissue

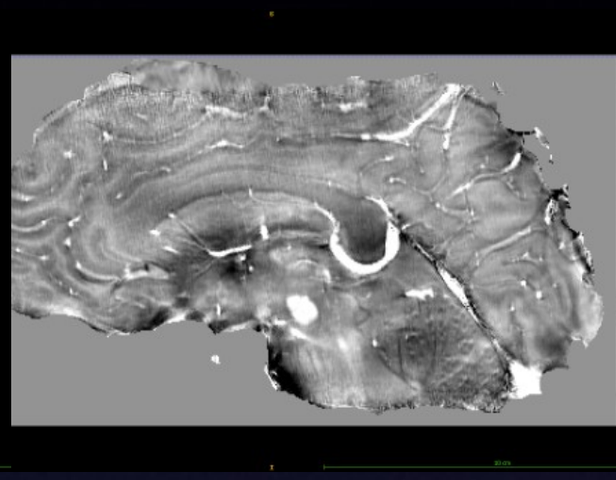


Membrane

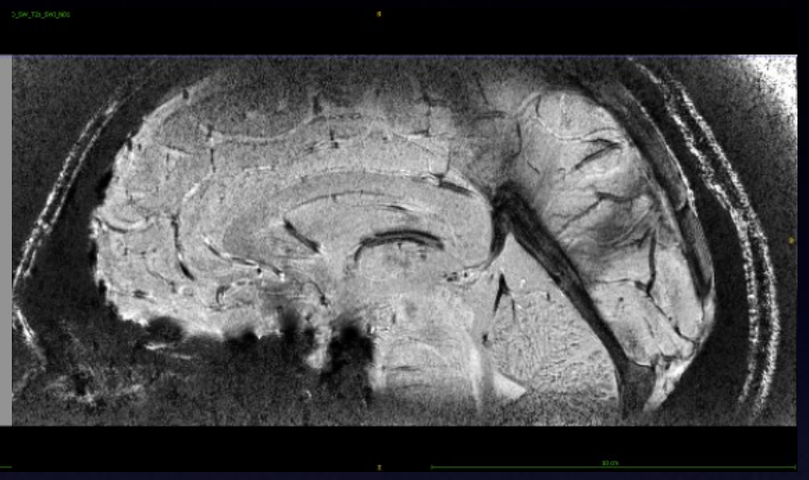
Modeling of blood vessels

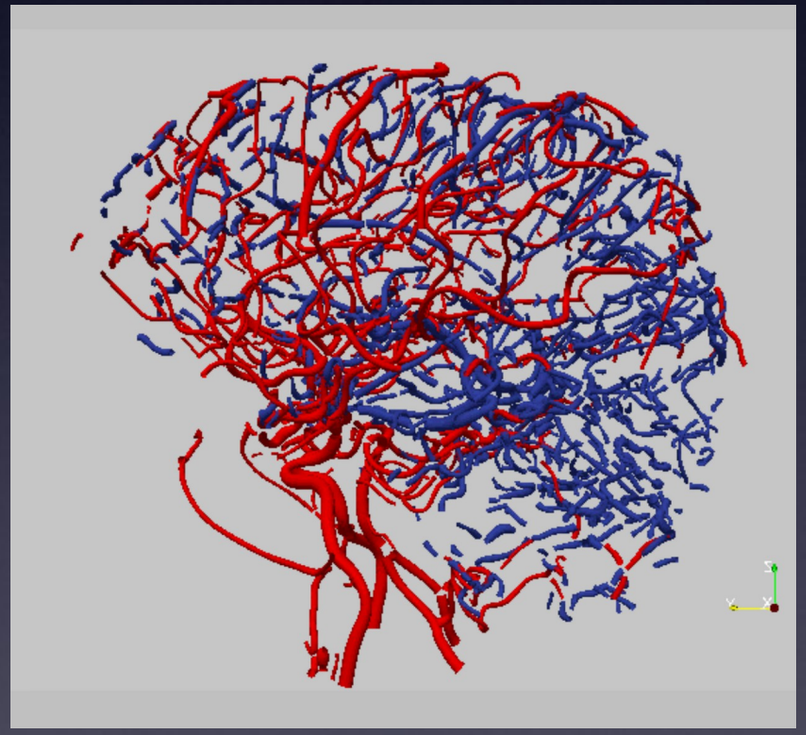
ToF (Arteries)

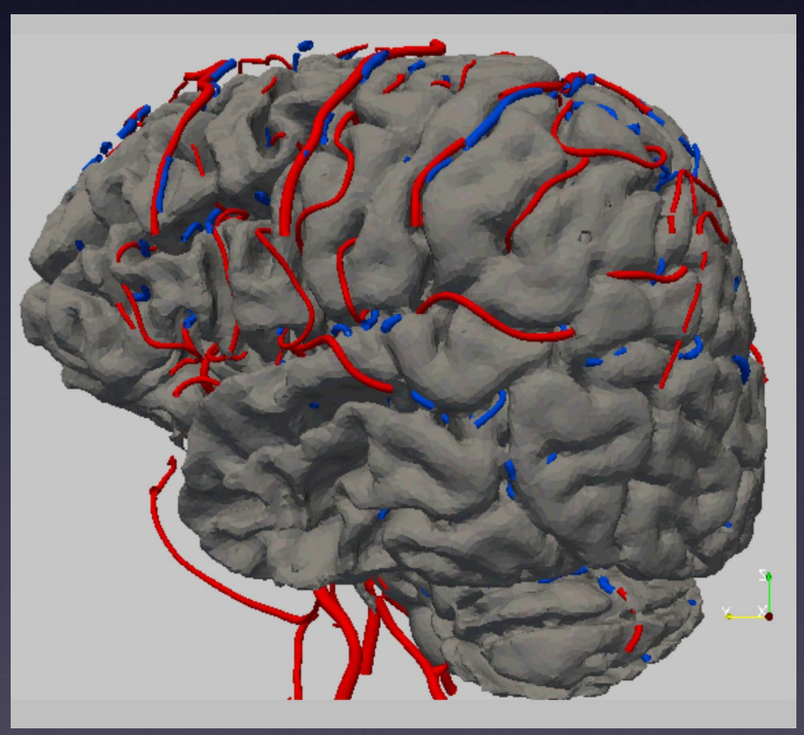
QSM (Veins)



SWI (Veins)





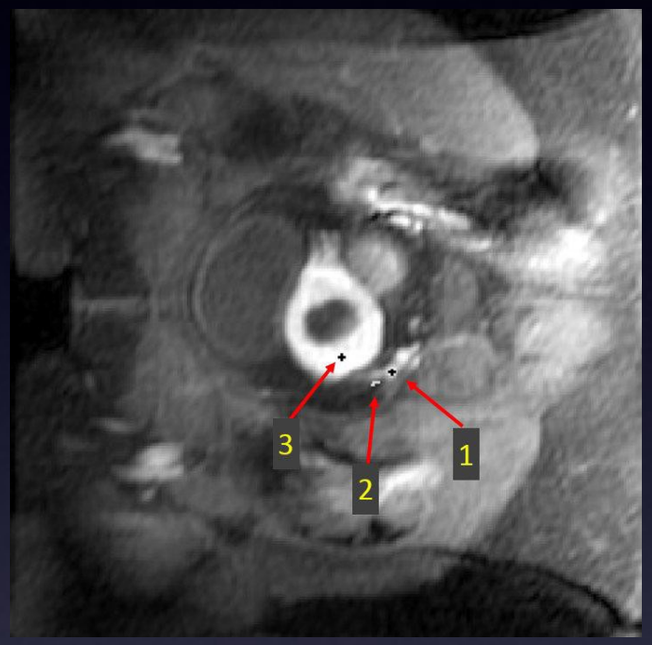


3D model of arteries (red, ToF) and veins (blue, QSM), grey matter (grey, T1).

3D Image Texture Analysis

Quantitative analysis and modeling of DCE images for tissue characterization (kidney, prostate, endometrial carcinoma)

MRI-DCE



1 – an artery
2 – weak enhancement
3 – endometrium

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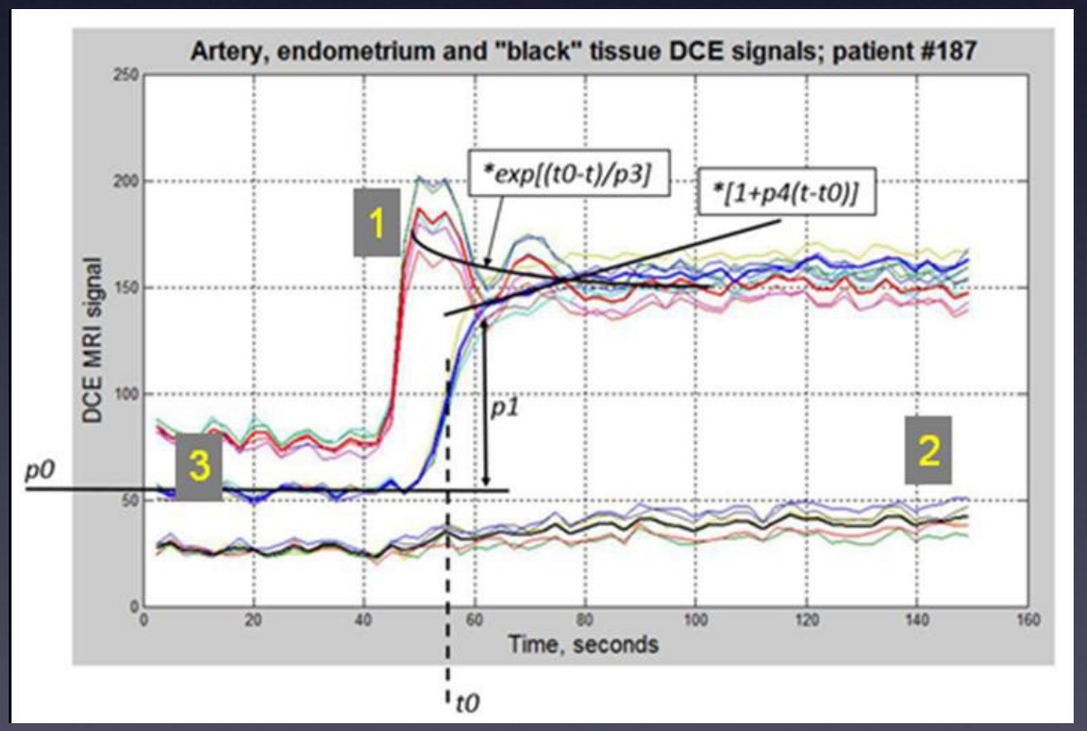
SIGNAL PROCESSING ALGORITHMS, ARCHITECTURES, ARRANGEMENTS, AND APPLICATIONS
SPA 2016
September 21-23rd, 2016, Poznań, POLAND

Texture analysis of 2D spatial distribution of blood pharmacokinetic model parameters for endometrial carcinoma classification

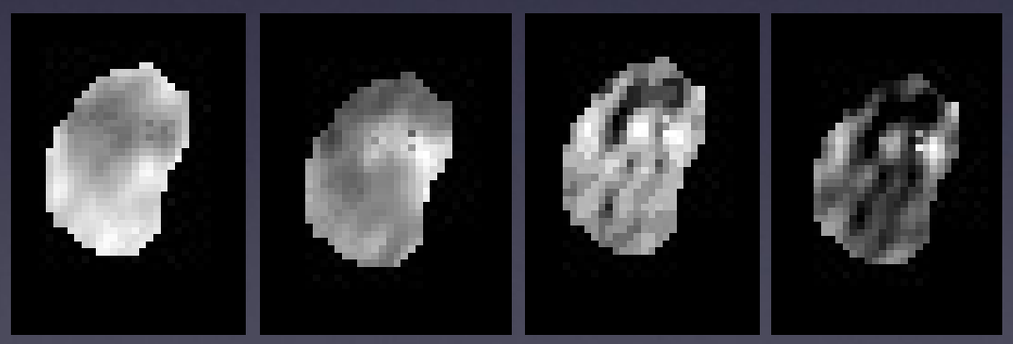
Marek Kociński, Andrzej Materka
Institute of Electronics
Lodz University of Technology
Łodz, Poland
marek.kocinski@p.lodz.pl

Arvid Lundervold[1,2], Helga Salvesen[2],
Sigmund Ytre-Hauge[3], Ingfrid Haldorsen[3]
[1] Department of Biomedicine
[2] Department of Clinical Science
[3] Department of Radiology
University of Bergen
Bergen, Norway

An empirical, continuous, 6-parameter mathematical model of actual DCE-MRI signal at each ROI voxel

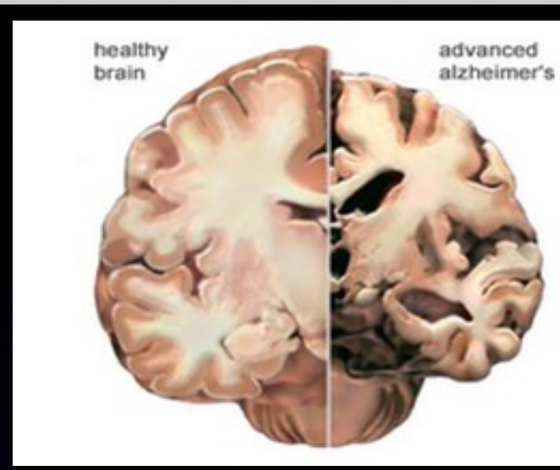


Pharmacokinetic parameter maps



p_1 t_0 p_3 p_4

To find an early predictor(s) of AD



Functional activity level reported by an informant is an early predictor of Alzheimer’s disease

Alexandra Vik[1], Marek Kociński[1,2], Ingrid Rye[3], Astri J. Lundervold[3] and Alexander S. Lundervold[1,4*]

Predicting conversion to Alzheimer’s Disease in individuals with Mild Cognitive Impairment using clinically transferable features

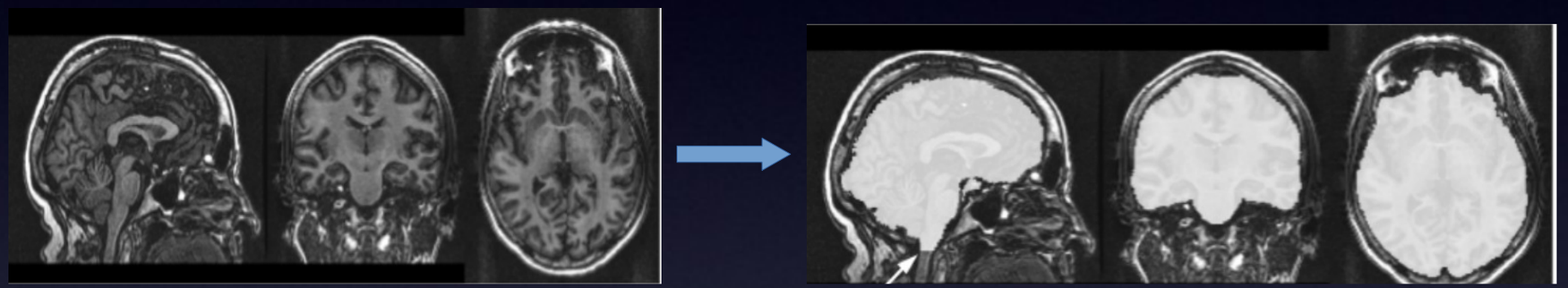
Ingrid Rye[1,+], Alexandra Vik[2+], Marek Kocinski[2,3,4+], Alexander S. Lundervold[2,5], Astri J. Lundervold[1], and for the Alzheimer’s Disease Neuroimaging Initiative[**]

Personalized prognosis & treatment using Ledley-Jaynes machines: An example study on conversion from Mild Cognitive Impairment to Alzheimer’s Disease

P.G.L. Porta Mana [1,2,*], I. Rye [3], A. Vik [2], M. Kociński [2,4], A. Lundervold [2,4], A. J. Lundervold [5], A. S. Lundervold [1,2]

2D and 3D U-Nets for skull stripping in a large and heterogeneous set of head MRI using `fastai`

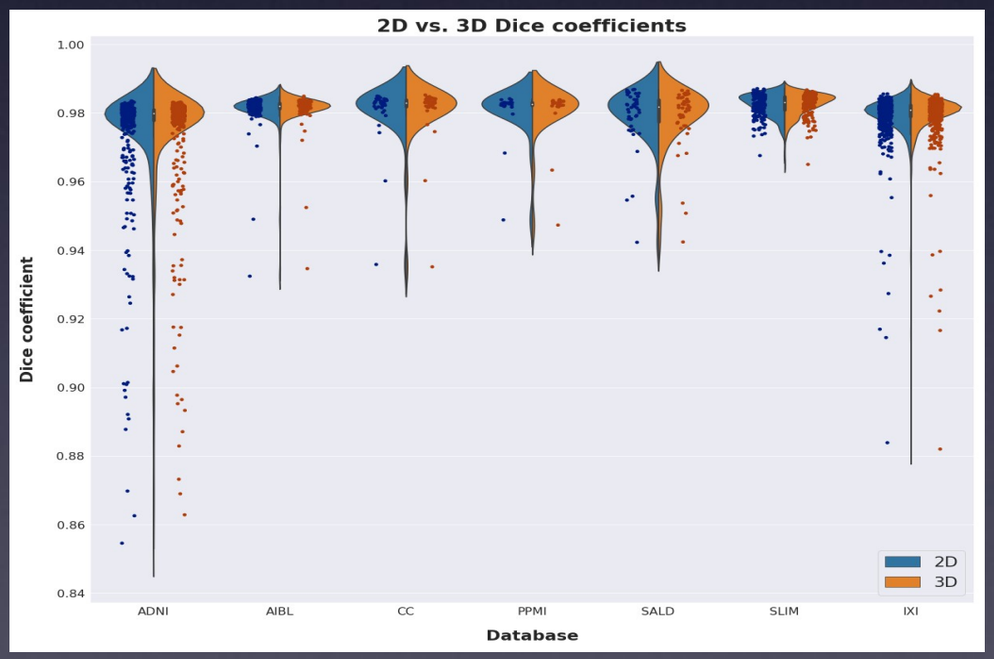
Satheshkumar Kaliyugarasan[1,2,*], Marek Kociński[1,3,4,*], Arvid Lundervold[1,3,*], Alexander Selvikvåg Lundervold[1,2,*], for the Alzheimer’s Disease Neuroimaging Initiative[**], and for the Australian Imaging Biomarkers and Lifestyle flagship study of ageing[***]



Data sets:
ADNI
AIBL
IXI
PPMI
SLIM
Calgary-Campinas
SALD

Training test: 2791 3D images
Test sets: 934 + 561 3D images

Dice = 0.978
Jaccard = 0.957



Violin plot of the Dice scores obtained by our models on the test dataset

Thank you!

Erasmus students from TUL in BBB, May 2015