Ferienakademie Course 10

Computational Medical Imaging

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Topic list:

Basics of X-ray CT:

- analytical reconstruction (Fourier slice theorem, FBP)
- iterative reconstruction (series expansion, least squares, gradient-based optimization)
- line integral discretization (Siddon's method, Joseph's method)
- including prior information (statistical modeling, regularization)
- modeling issues (beam hardening, scatter)
- incomplete data (truncation, trajectories, data completeness)

Applications of CT:

- optical tomography (overview)
- light field tomography (overview)
- X-ray phase-contrast (overview)
- X-ray tensor tomography (overview)

Deep Learning:

- basics (universal function approximation, activation functions, CNNs)
- embedding of operators (framelets, known operator learning, variational networks)
- generative adversarial networks
- adversarial examples
- task-based losses
- recurrent networks (RNN, LSTM, GRU)
- image reconstruction (analytical and iterative and "direct" methods)

Please send your three preferred topics (sorted by preference)
by email to lasser@in.tum.de by July 19, 2018