

Medizintechnik Bild- und Datenverarbeitung

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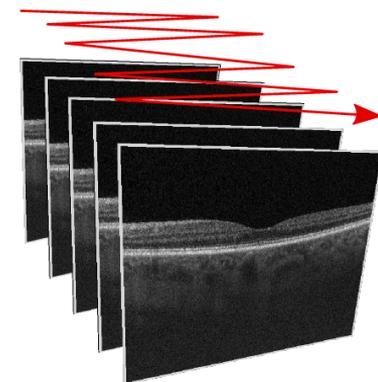


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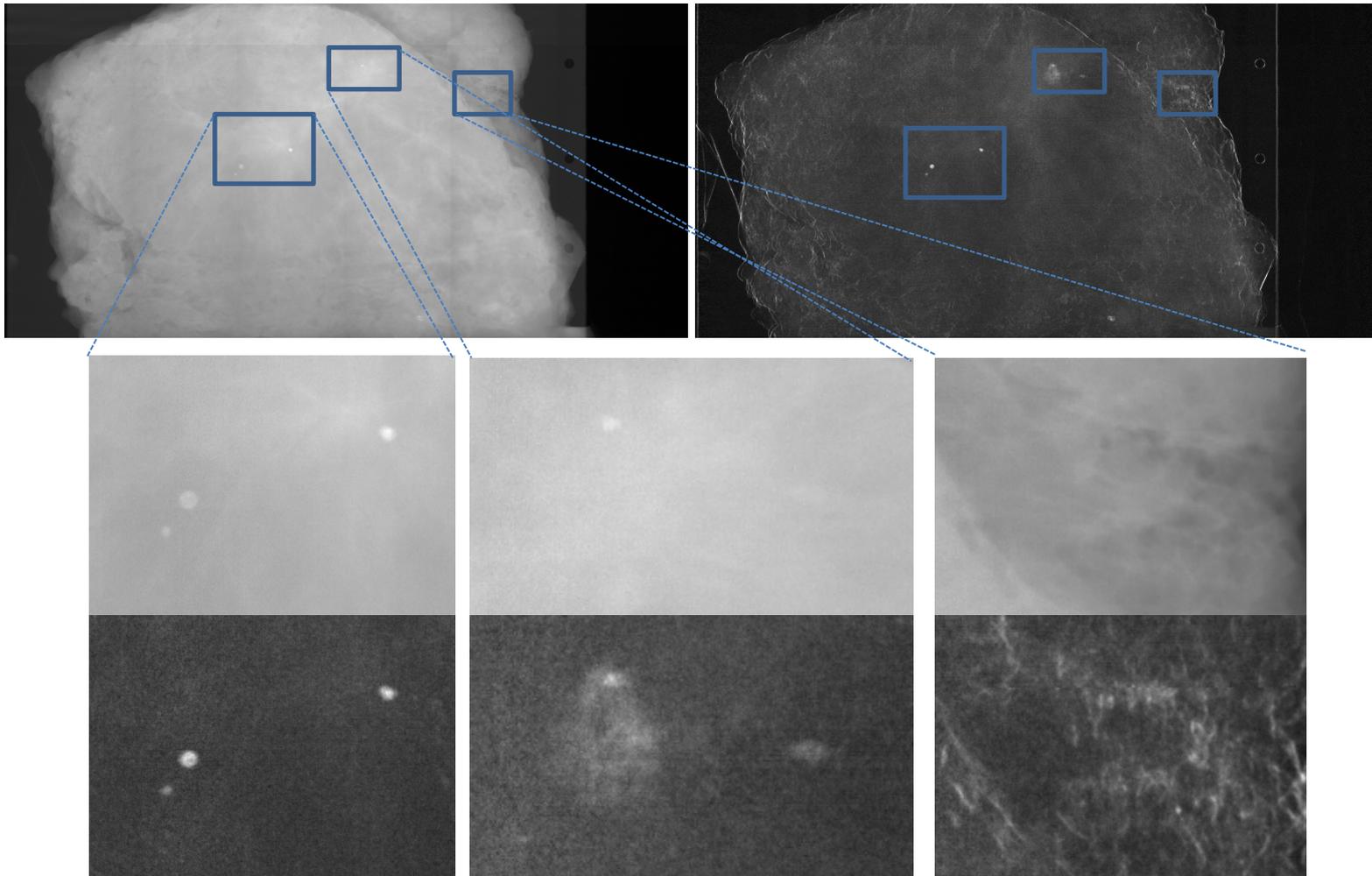


Medizinische Bildverarbeitung



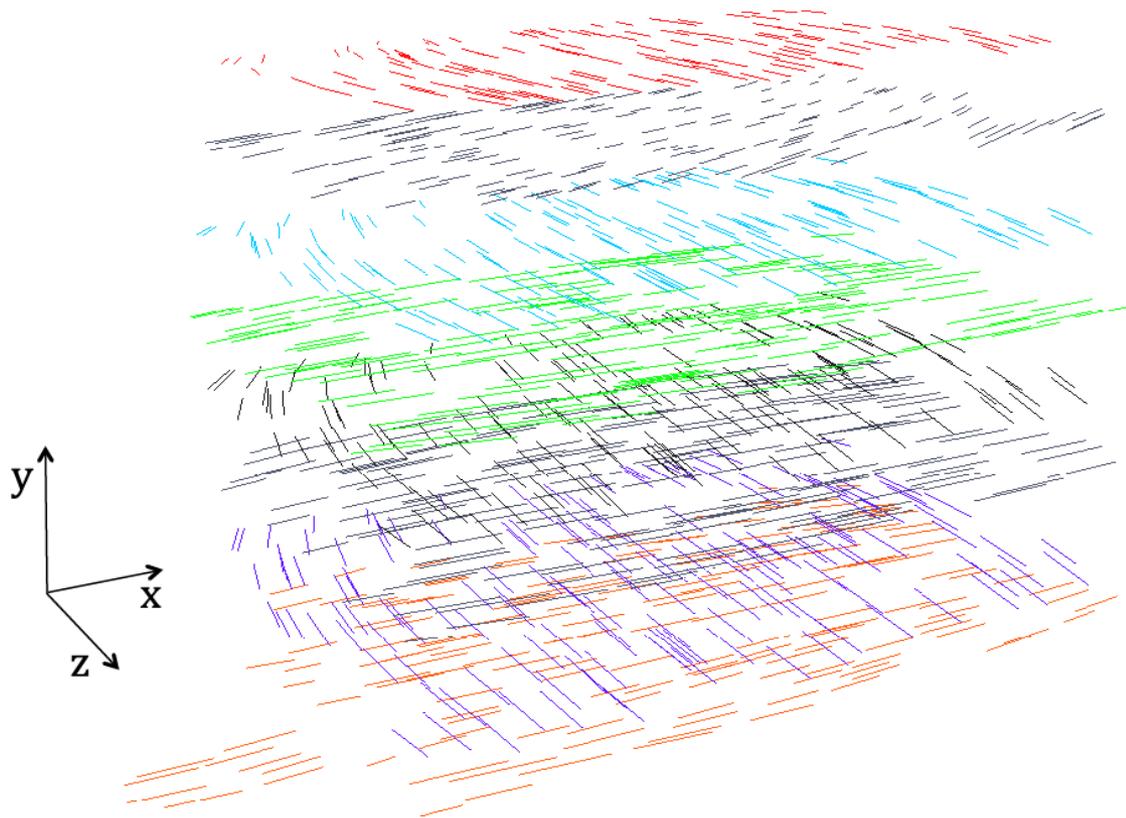


Dunkelfeld-Bildgebung



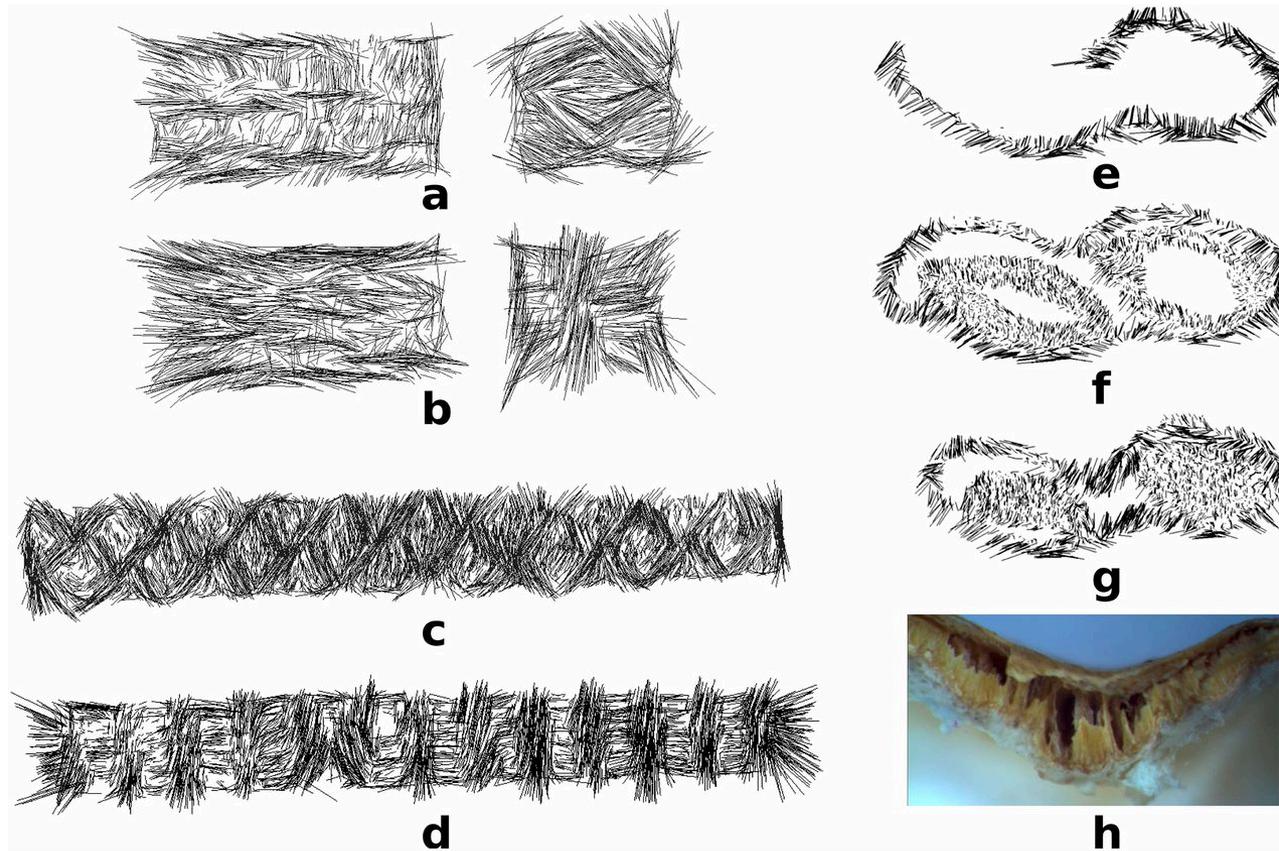


Dunkelfeld-Bildgebung (2)





Dunkelfeld-Bildgebung (2)

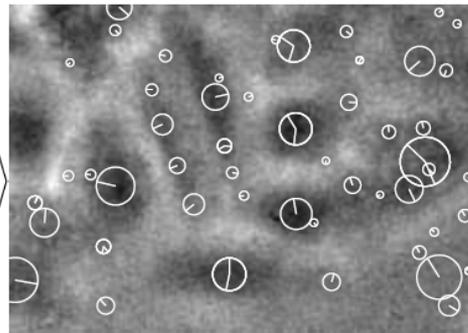


Zellbildgebung – Zellanzahl



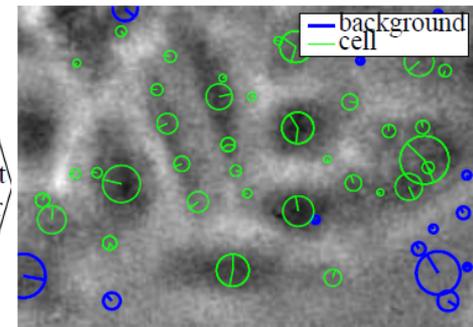
(a) A positively defocused input image. The contrast was improved for clarity.

SIFT



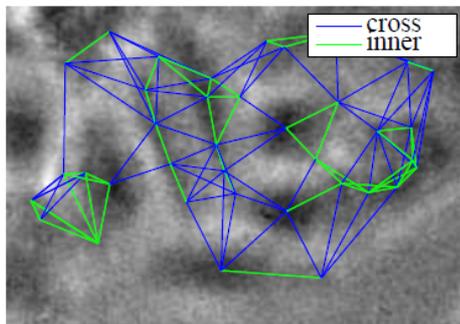
(b) Each circle represents a keypoint. The radius lengths and angles correspond to the keypoint scale and orientation.

Keypoint classifier



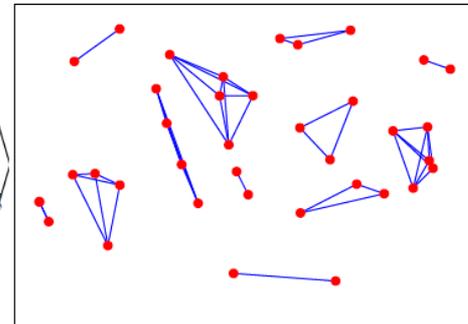
(c) Each keypoint is classified as either a cell keypoint or a background keypoint.

Profile classifier



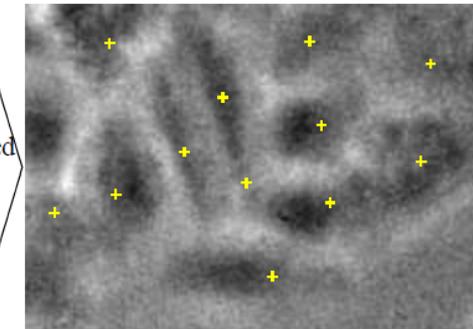
(d) A profile between each two nearby keypoints is classified as either "inner" or "cross" profile.

Hierarchical clustering



(e) The result of the agglomerative hierarchical clustering.

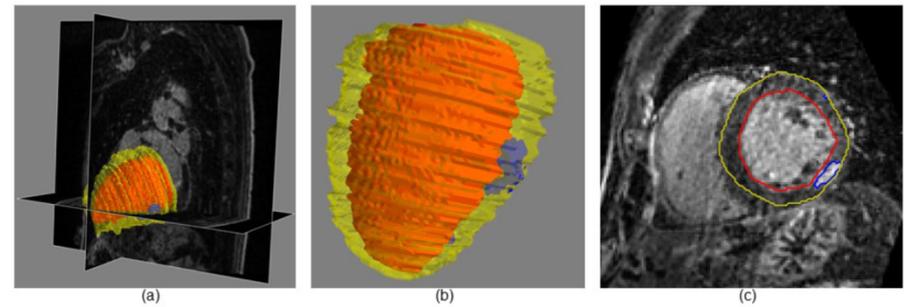
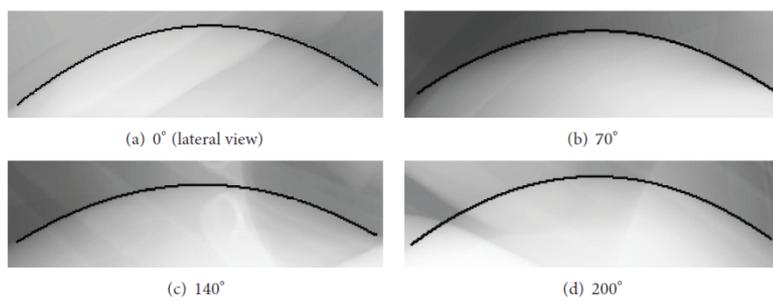
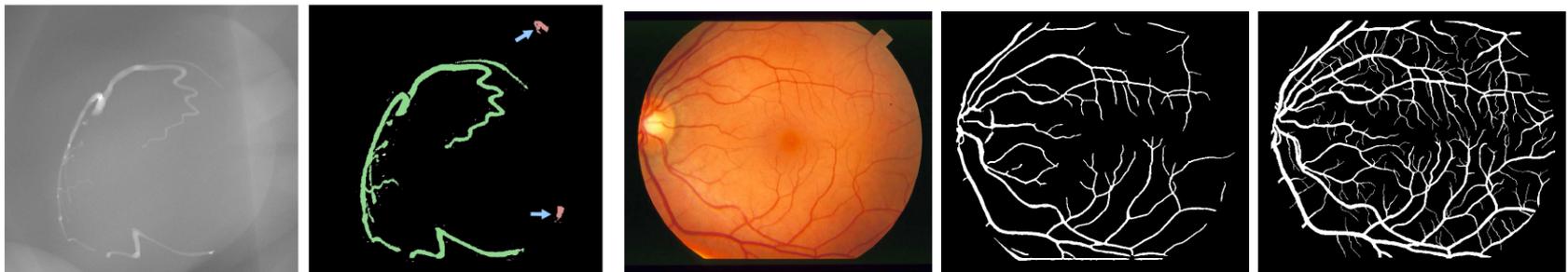
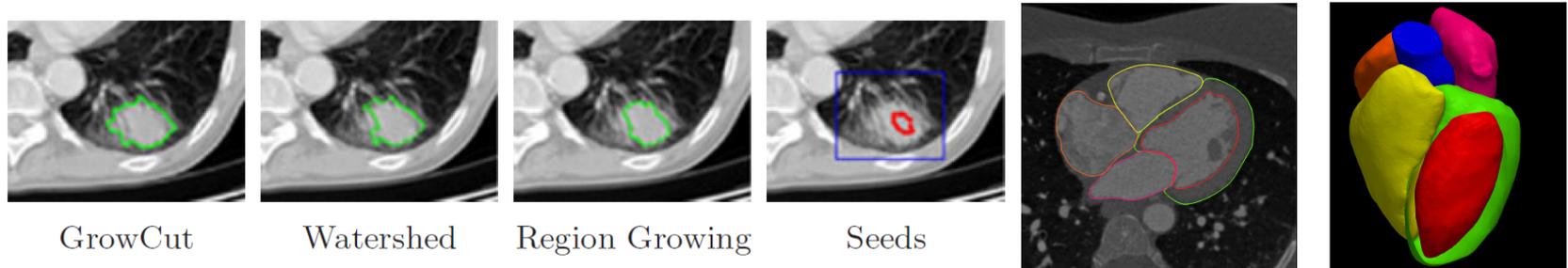
Weighted average



(f) The detection result. Each sign marks a cell.

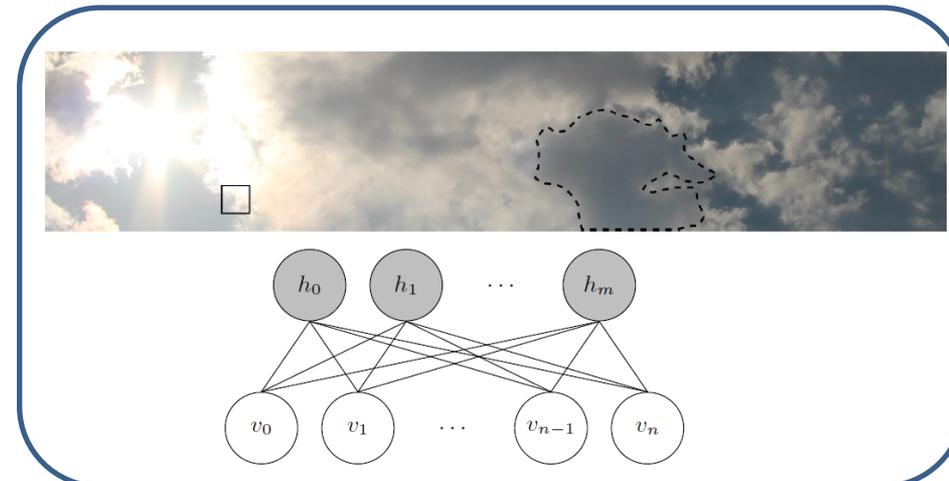
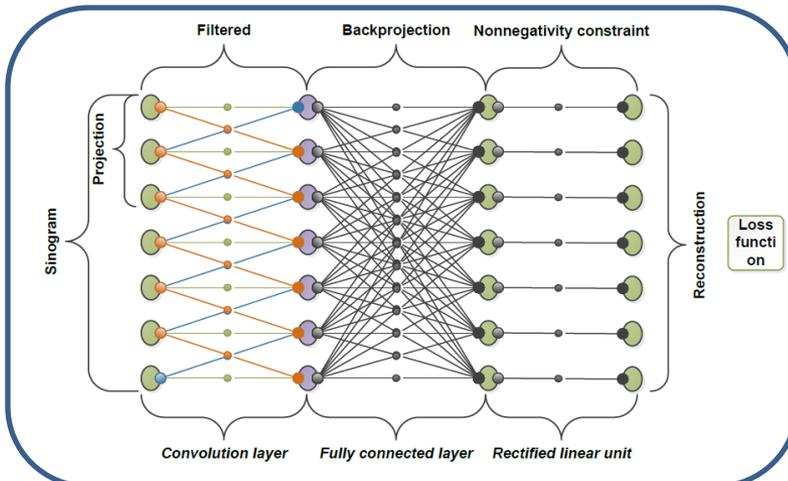
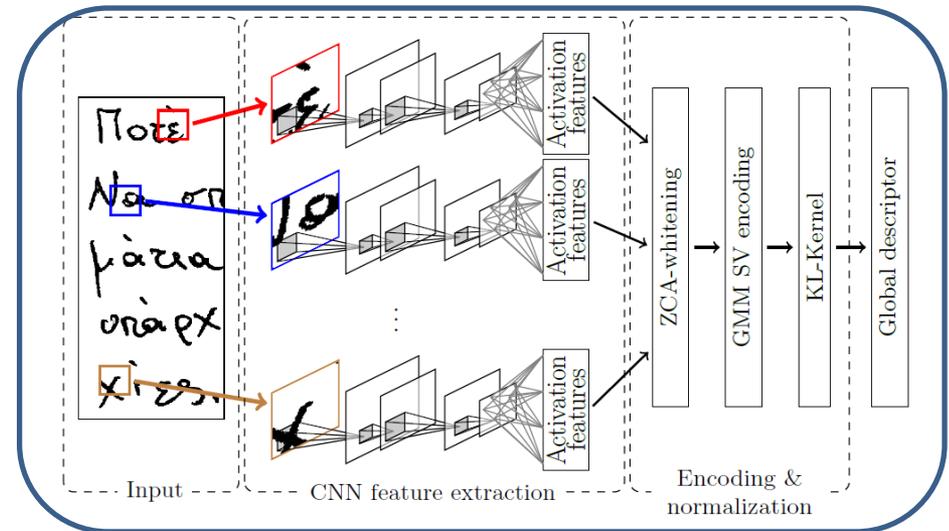
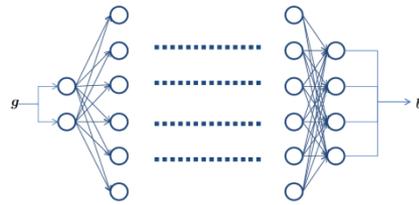
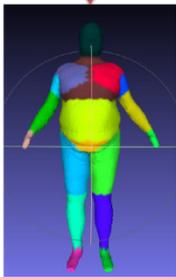


Radiomics



Datenanalyse

| G | H | W | J | P/W | P/I |
|---|-----|----|----|-----|-----|
| M | 187 | 98 | 48 | 36 | 33 |





Computer Tomographie

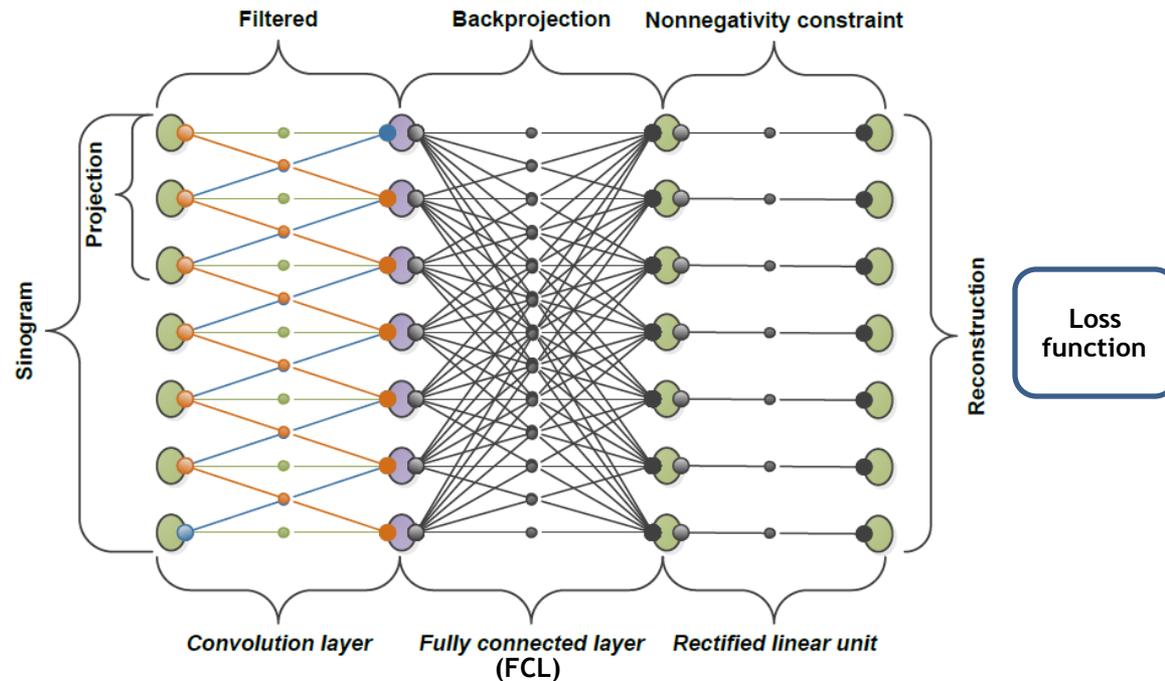
- Effiziente Lösung mittels gefilterter Rück-Projektion:

$$f(x, y) = \int_0^{\pi} p(s, \theta) * \frac{1}{-2\pi^2 s^2} d\theta \quad \text{mit } s = x \cos \theta + y \sin \theta$$

- Drei Schritte:
 - Faltung entlang s
 - Rückprojektion über θ
 - Unterdrückung negativer Werte

„Deep Learning“ CT

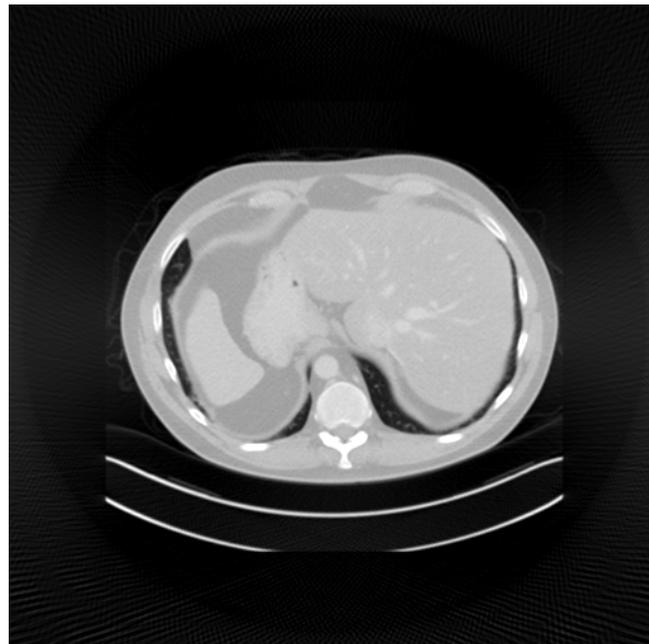
- Alle drei Schritte können als neuronales Netz formuliert werden:





„Deep Learning“ CT

- Anwendung auf unvollständige Scans [3]:



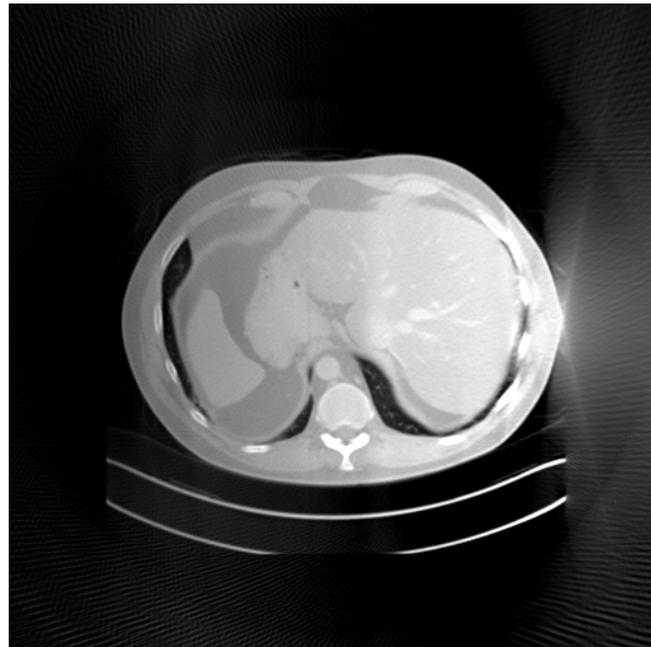
Reconstruction with 360 deg

[3] Tobias Würfl, Florin Ghesu, Vincent Christlein, Andreas Maier. Deep Learning Computed Tomography. MICCAI 2016. Submitted



„Deep Learning“ CT

- Anwendung auf unvollständige Scans [3]:



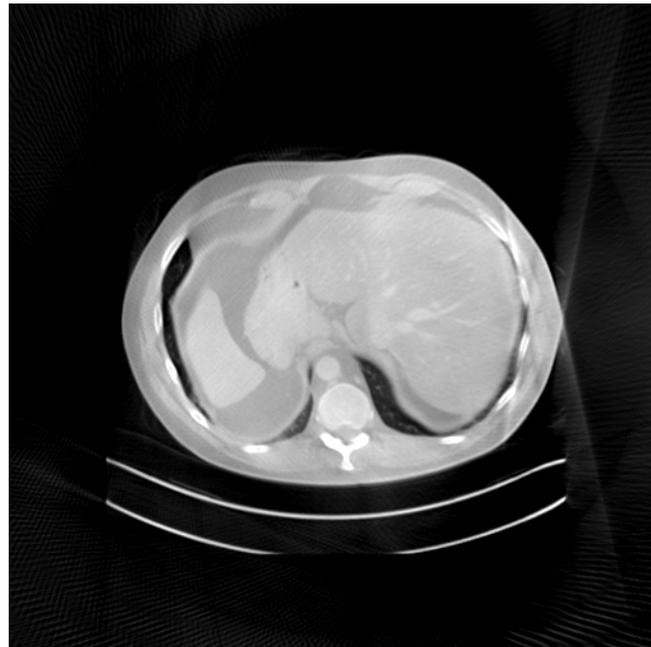
Reconstruction with 180 deg (FBP)

[3] Tobias Würfl, Florin Ghesu, Vincent Christlein, Andreas Maier. Deep Learning Computed Tomography. MICCAI 2016. Submitted



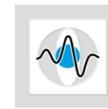
„Deep Learning“ CT

- Anwendung auf unvollständige Scans [3]:



Reconstruction with 180 deg (NN)

[3] Tobias Würfl, Florin Ghesu, Vincent Christlein, Andreas Maier. Deep Learning Computed Tomography. MICCAI 2016. Submitted



Ausblick

- Bild- und Datenverarbeitung ist eine spannende Richtung der MT
- In diesem Zweig erfahren Sie
 - wie Bilder entstehen / berechnet werden
 - wie man große Datenmengen auswerten kann
 - wie Big Data Technologien wie „Deep Learning“ funktionieren
- Spezialveranstaltungen für alle Modalitäten wählbar:
 - Röntgen / CT
 - Magnetresonanz Tomographie
 - PET / SPECT



Kooperationen

