

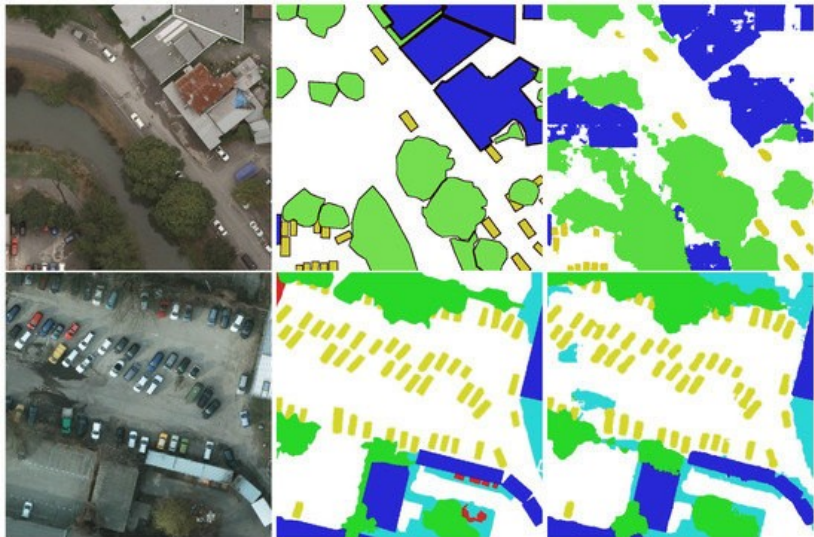
Understanding Variational Autoencoders' Latent Representations of Remote Sensing Images

Hannes Stärk

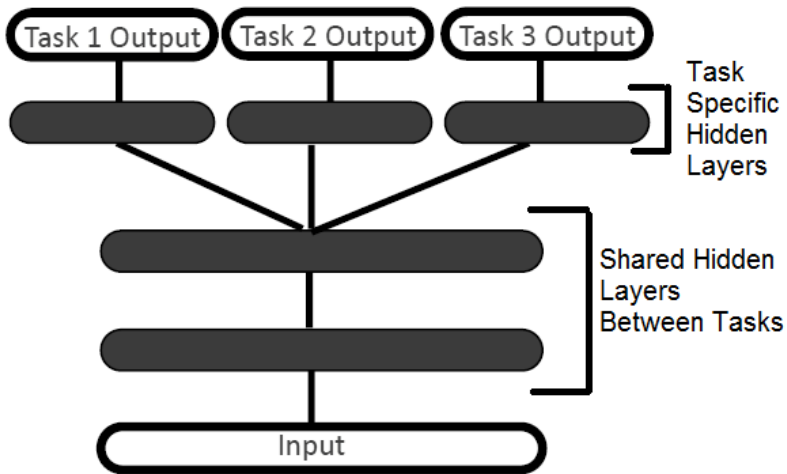
September 14, 2019

Gliederung

- ▶ Motivation
- ▶ Vorwissen
- ▶ Implementierung, Hardware, Software
- ▶ Datensatz
- ▶ Architekturen
- ▶ Architektur Experimente
- ▶ Latenter Raum Experimente
- ▶ Fazit, Wie kann es weiter gehen



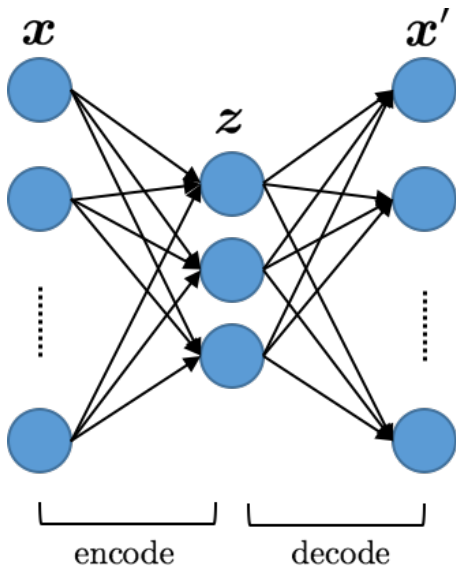
Credit: **2017-audebert-segment**



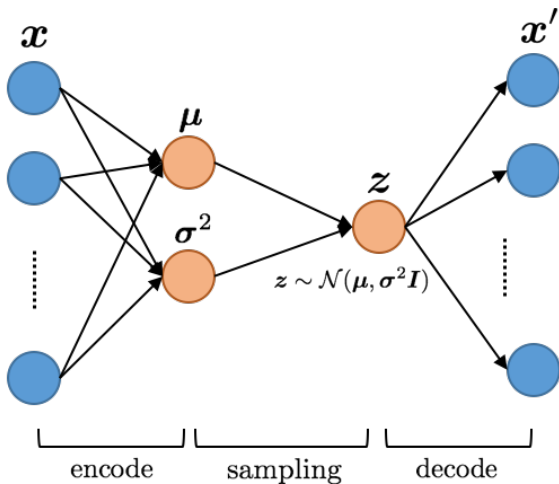
Credit: **2015-Riemer-multitask**

Motivation

- ▶ Trial-and-Error Multi-Task Architekturen
- ▶ Multi-Task Taxonomie
- ▶ Latente Informationen einzelner Schichten in Single-Task Modellen
- ▶ Latenten Raum eines Variational Autoencoders verstehen



Credit: *GRID INC*



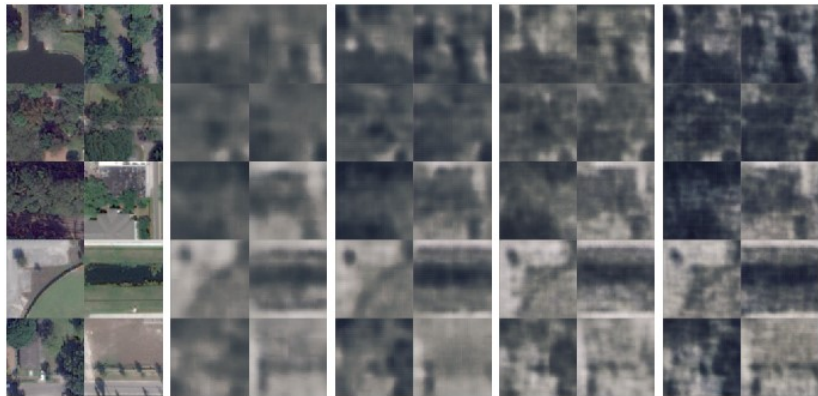
Credit: *GRID INC*

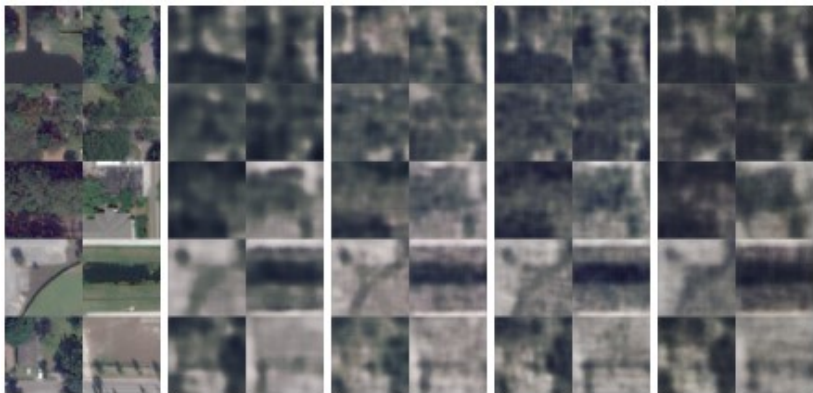
Implementierung, Hardware, Software

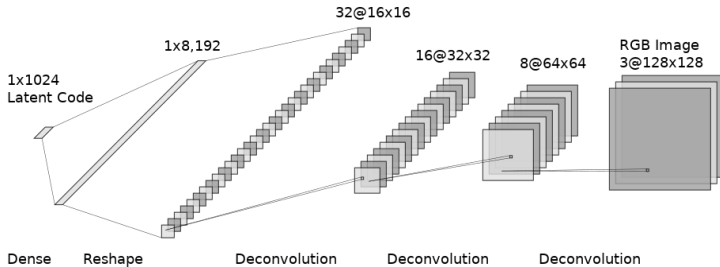
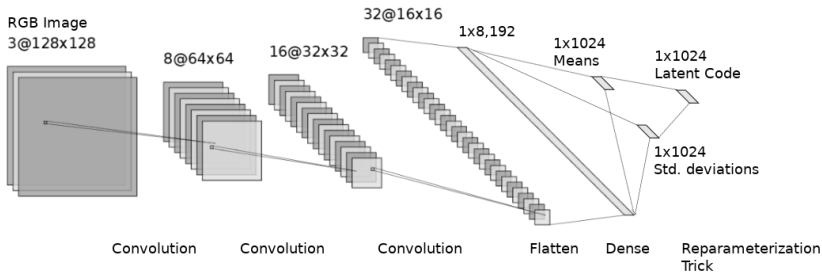
- ▶ Python
- ▶ Tensorflow
- ▶ Container der Uni Hannover
- ▶ Machine-Learning Rechner der UniBw

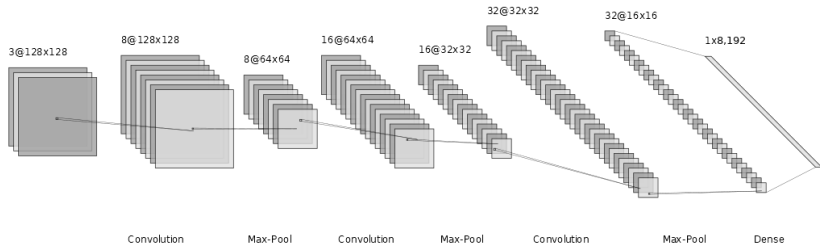
Architektur Experimente

- ▶ Anzahl von convolutional Schichten
- ▶ Anzahl von Filtern
- ▶ Kernel Größe
- ▶ Max/Average Pooling









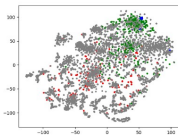
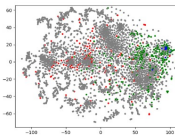
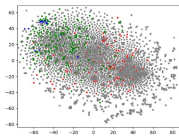
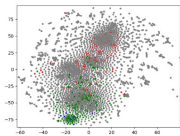
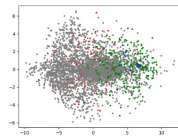
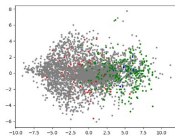
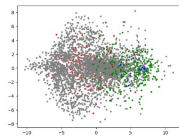
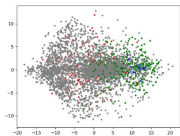


Latenter Raum Experimente

- ▶ 4000 Bilder \Rightarrow 4000 Encodings
- ▶ Dimension reduzieren
- ▶ Visualisieren

t-Stochastic-Neighbor-Embedding

- ▶ Machine-Learning Verfahren zur Dimensions Reduktion
- ▶ Besonders gut geeignet für einzelne Visualisierungen
- ▶ Fokus auf Kontext von Punkten zu ihren Nachbarn

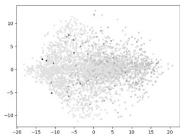


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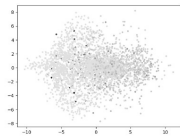
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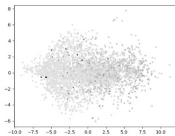
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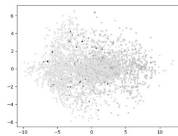
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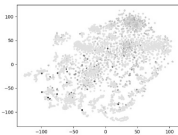
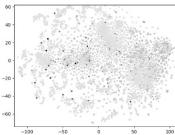
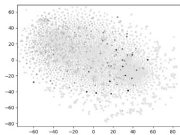
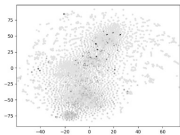
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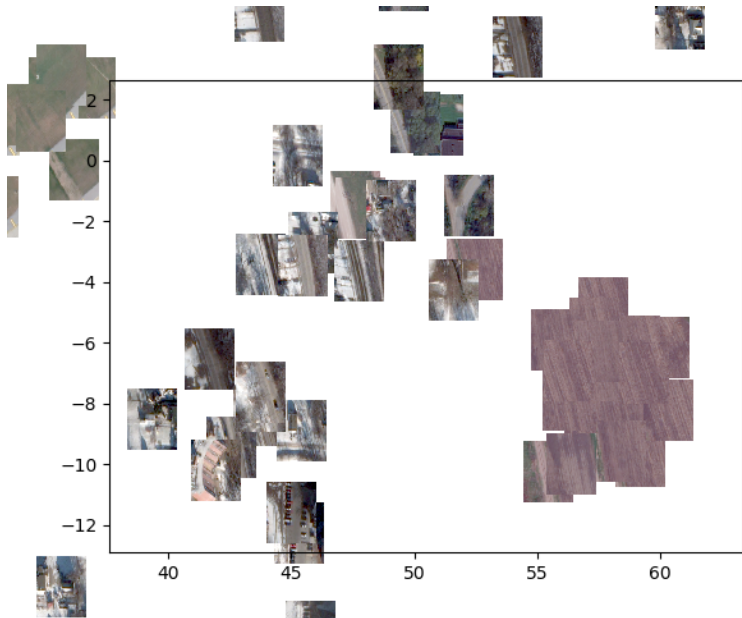
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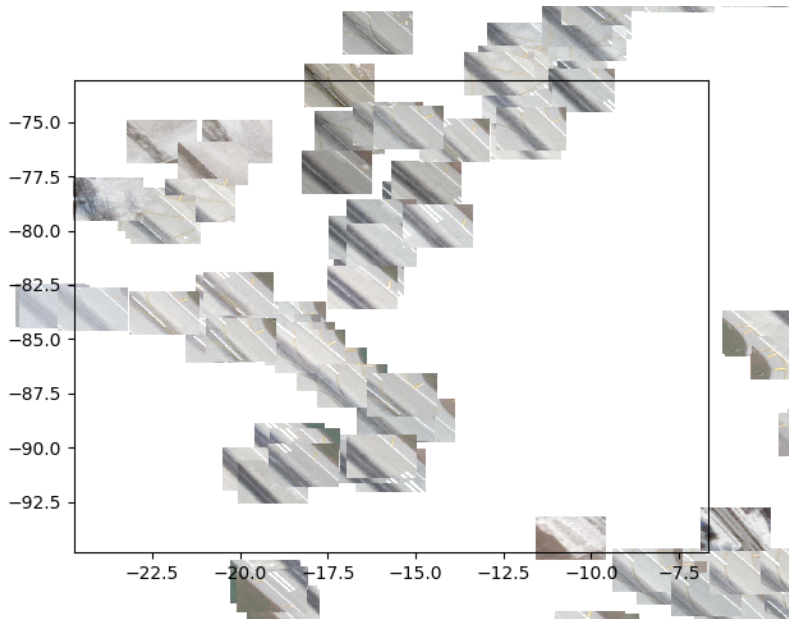


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images/figures/experimenthms_latent/convolutional_dim50_im





Fazit und wie es weiter gehen kann

- ▶ Der VAE lernt nach komplizierten Features zu clustern
- ▶ Mit t-SNE kann man die Cluster gut visualisieren
- ▶ Gute Rekonstruktionen vs. Guter Latenter Raum?
- ▶ Präzisere Methoden um Cluster zu Features zuzuordnen
- ▶ Als nächstes bei anderen Tasks als bei Autoencodern testen