KI IN DER FERNERKUNDUNG – EVOLUTION UND AKTUELLE TRENDS

Nationales Forum für Fernerkundung und Copernicus 2026

Dr. Thorsten Höser | DLR - Deutsches Fernerkundungsdatenzentrum (DFD)

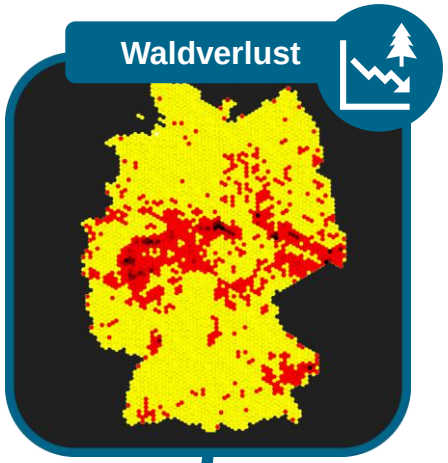
DLR

DLR-DFD

Dynamiken der Landoberfläche


Ottinger et al. 2017

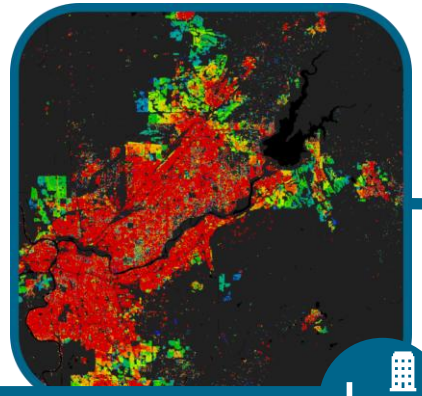
Onshore Aquakultur


Thonfeld et al. 2022

Waldverlust


Hoeser et al. 2026

Hecken u. lineare Gehölze

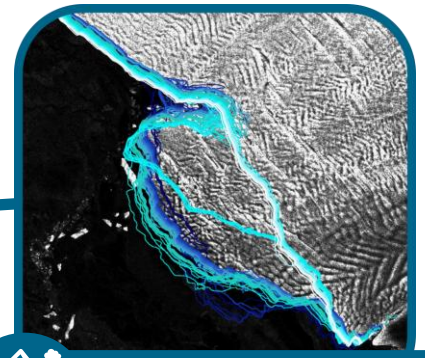

Marconcini et al. 2020

Globale Urbanisation

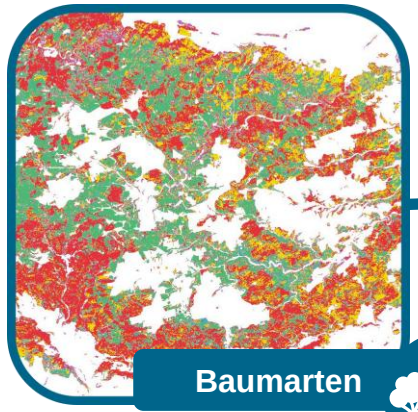
KI/AI
Artificial Intelligence

ML
Machine Learning

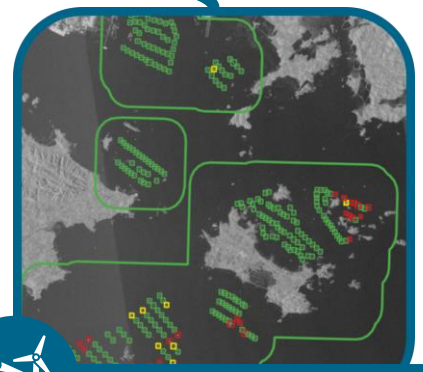
DL
Deep Learning


Baumhoer et al. 2023

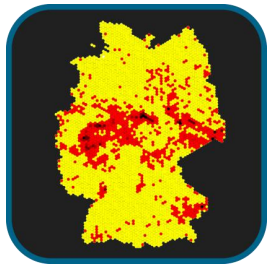
Antarktischer Eisschelf


Wegler et al. 2025

Baumarten

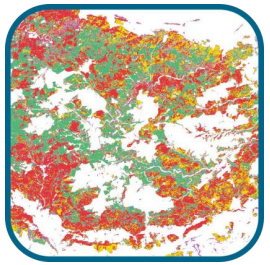
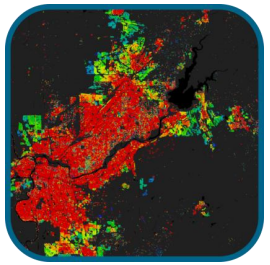

Hoeser et al. 2022

Offshore Windparks

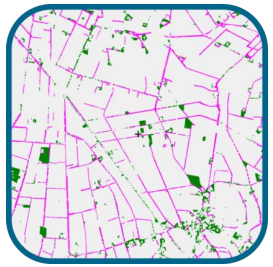
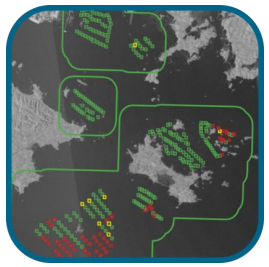
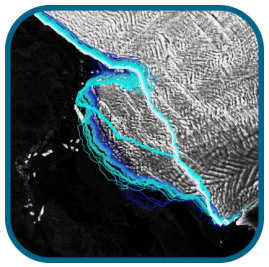



Ansätze zur automatisierent Datenprozessierung

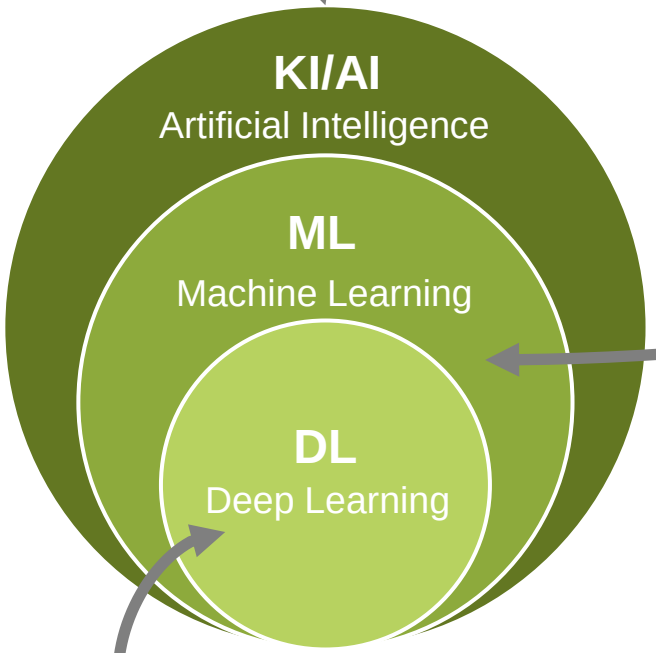
z.B. “Hand-crafted” oder explizit **programmierte Regeln**

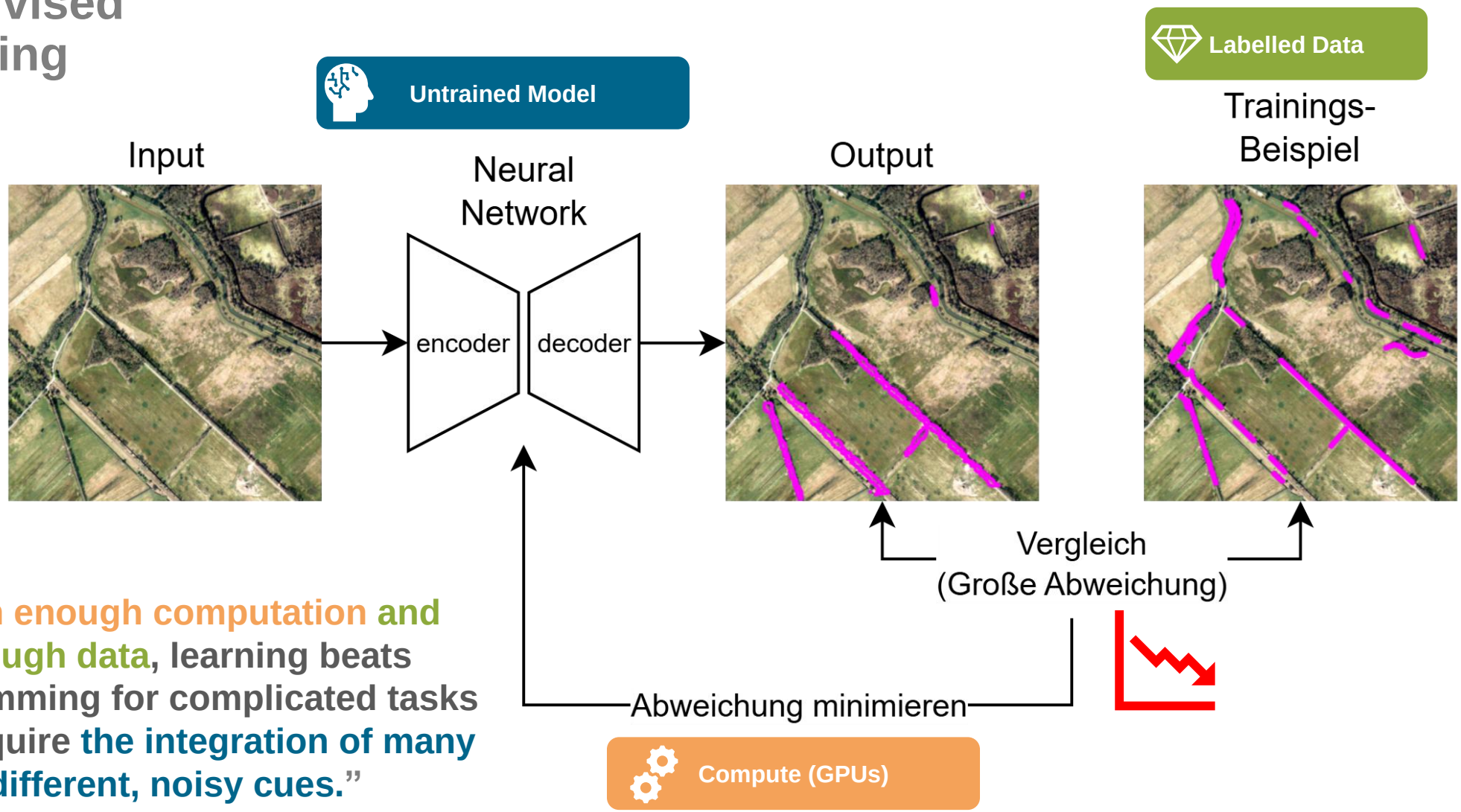
Regeln werden nicht explizit programmiert, sondern von einem Model aus Daten erlernt.

Regeln werden nicht explizit programmiert, sondern von einem mehrschichtigen (tiefen) Model aus Daten erlernt.



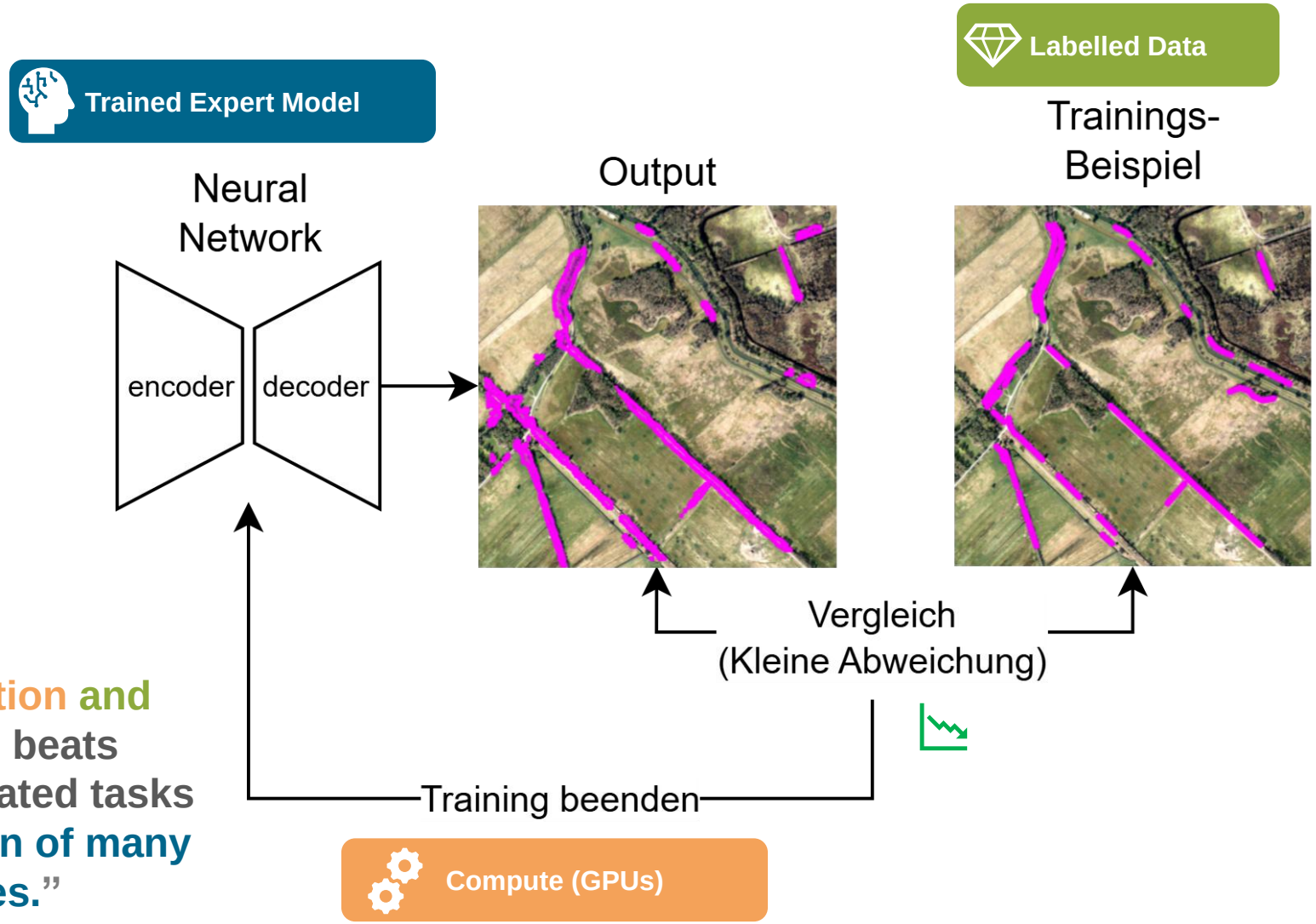
Supervised Learning



“With enough computation and enough data, learning beats programming for complicated tasks that require the integration of many different, noisy cues.”

(Alex Krizhevsky, Ilya Sutskever, and Geoffrey Hinton 2017, p. 84)

Supervised Learning

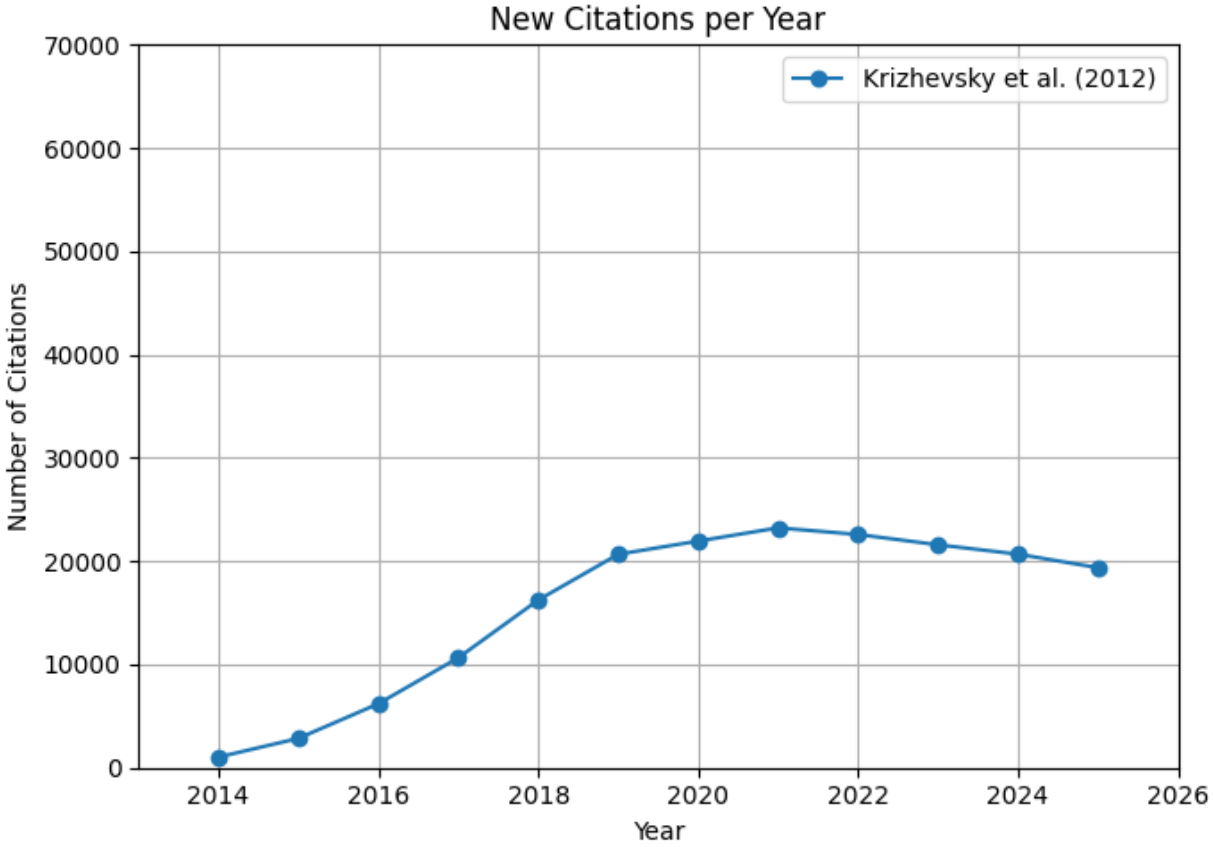


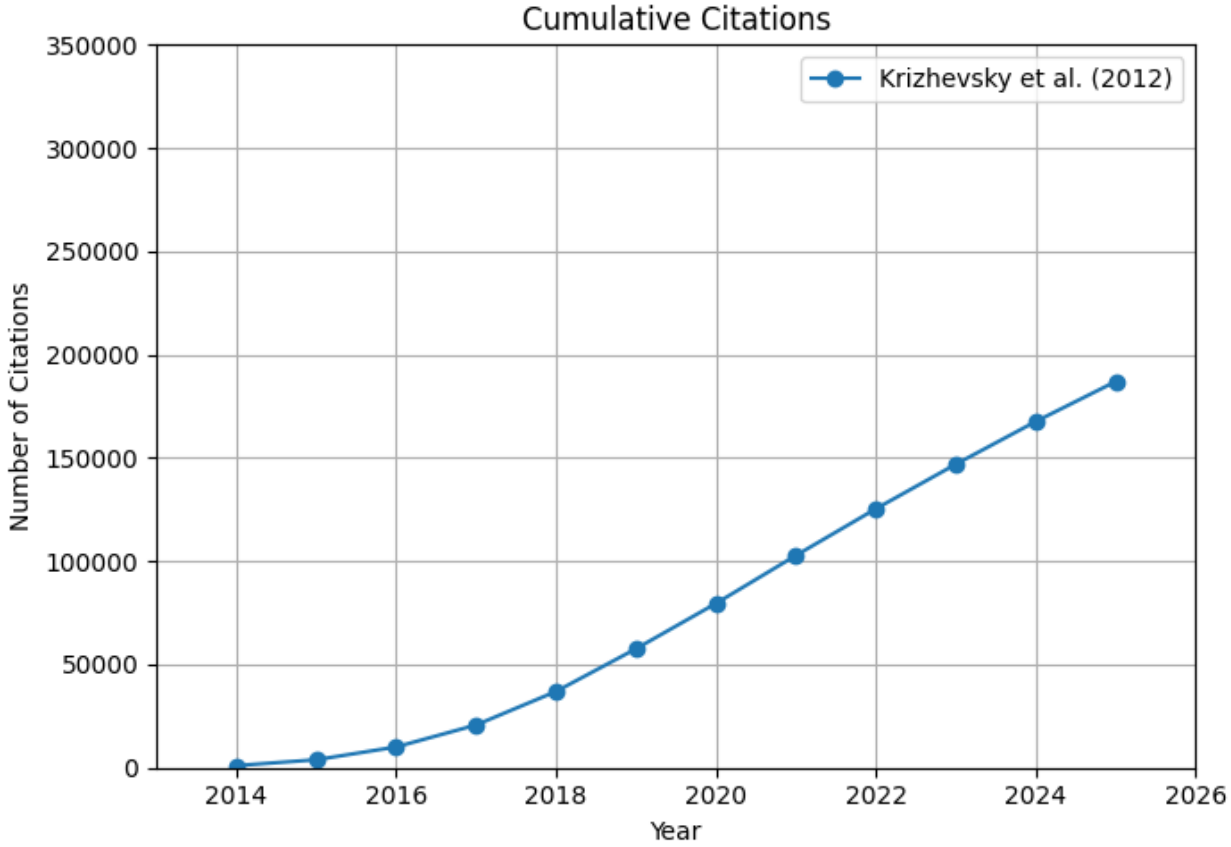
“With enough computation and enough data, learning beats programming for complicated tasks that require the integration of many different, noisy cues.”

(Alex Krizhevsky, Ilya Sutskever, and Geoffrey Hinton 2017, p. 84)

Imagenet classification with deep convolutional neural networks

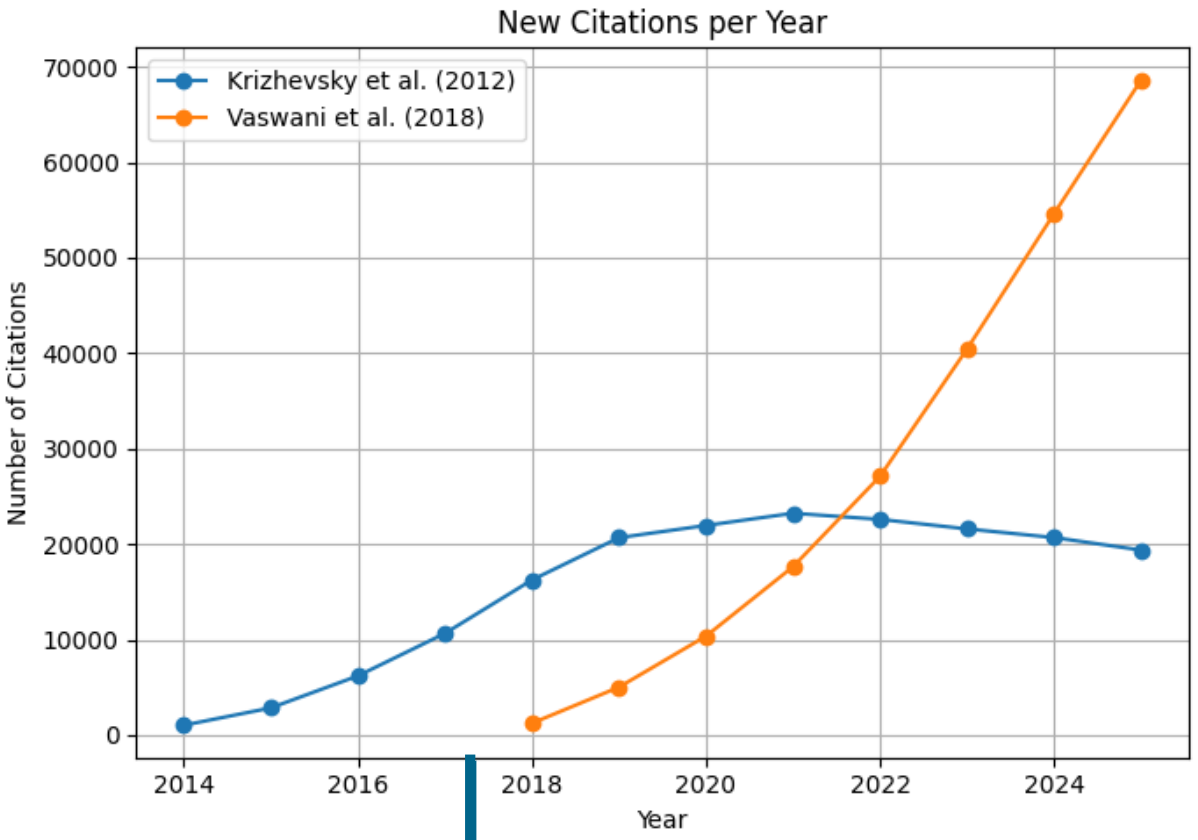
A. Krizhevsky, I. Sutskever and G. Hinton, 2012

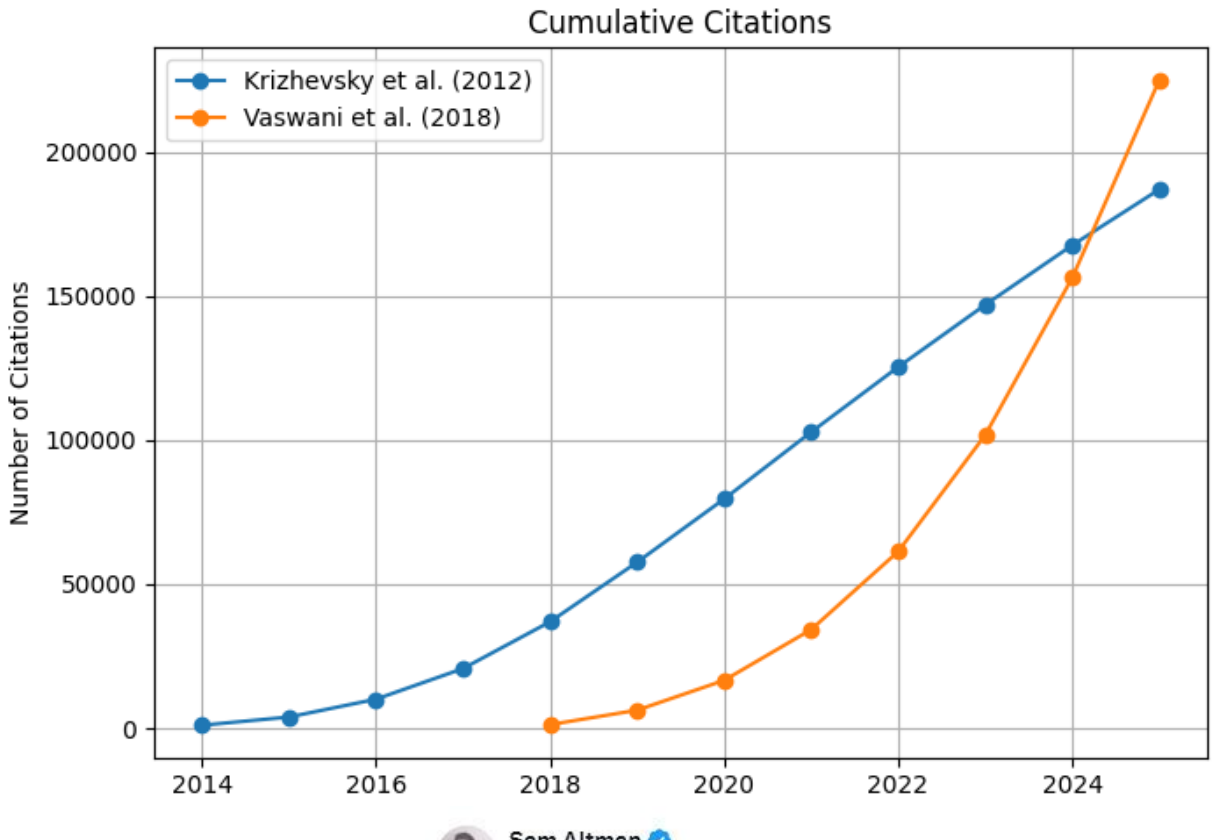




Evolution und aktuelle Trends

Attention is all you need, Vaswani et al. 2017





06/2017 “Attention Is All You Need” Vaswani et al.

06/2018 GPT-1

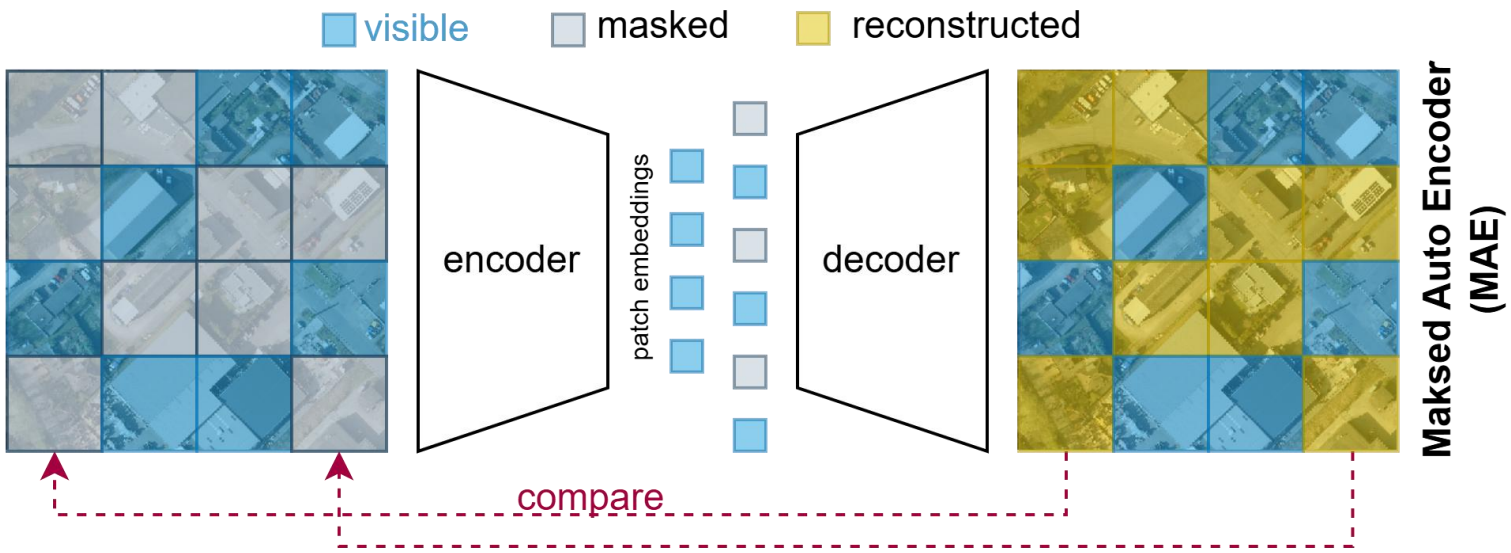
OpenAI



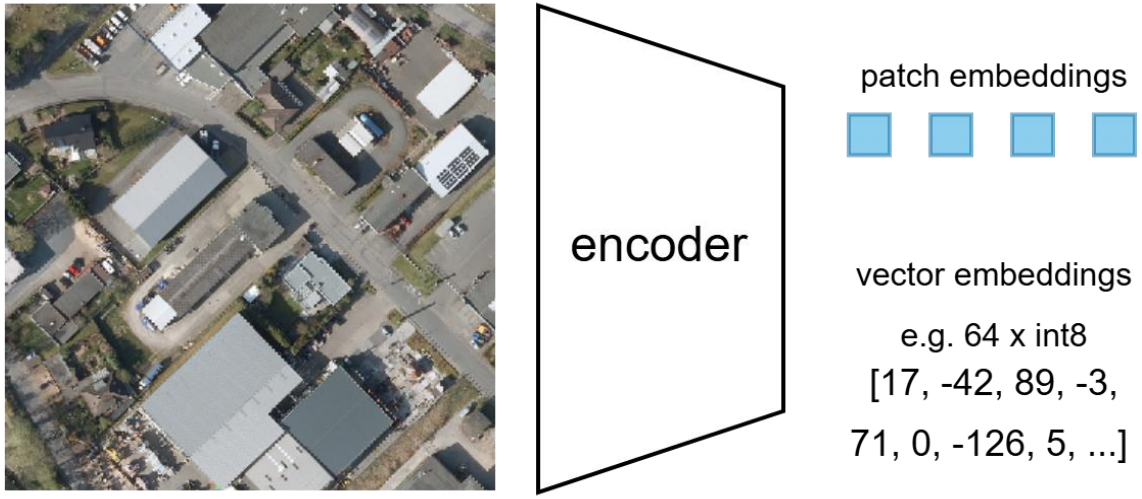
(GPT-3.5)

Self Supervised Learning für Foundation Model Training

Pizza ist lecker → Masked language modeling



Self Supervised Learning für Foundation Model Training



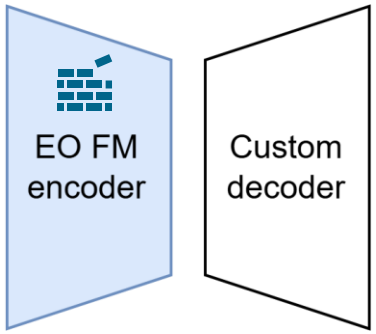
[…] an embedding […] model yielding a highly general, geospatial representation that assimilates spatial, temporal, and measurement contexts across multiple sources […]

Brown et al, 2025: AlphaEarth Foundations: An embedding field model for accurate and efficient global mapping from sparse label data

Anforderungen an Compute

Menge an Labelled Data

1
Modellerweiterung + Training



=

Fine Tuned Expert Model

2
Embeddings als Input für Supervised Learning

Pre-computed Embeddings

+

z.B. Random Forest / XGBoost

=

Expert Model

3
Embeddings als Input für Unsupervised Learning

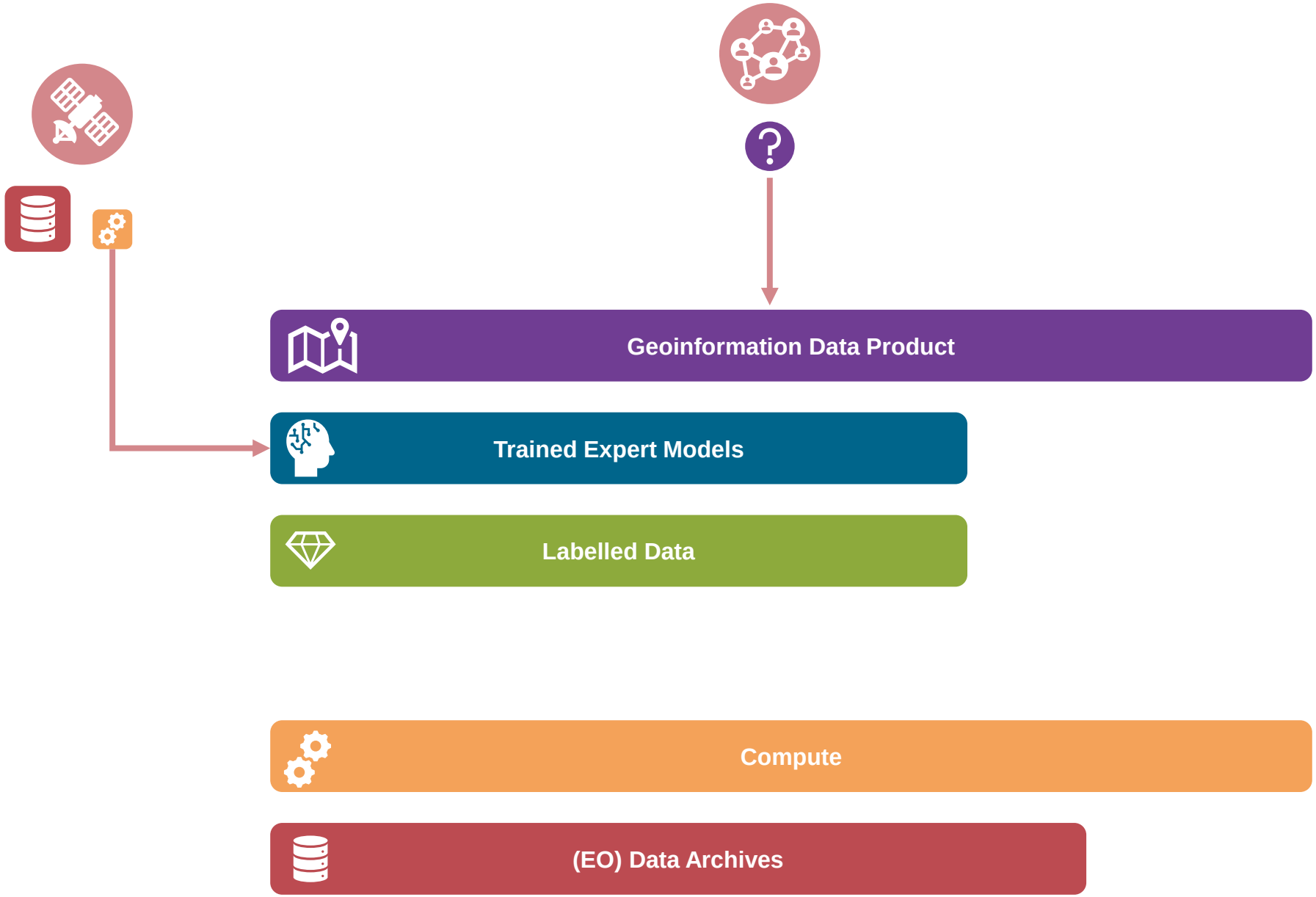
Pre-computed Embeddings

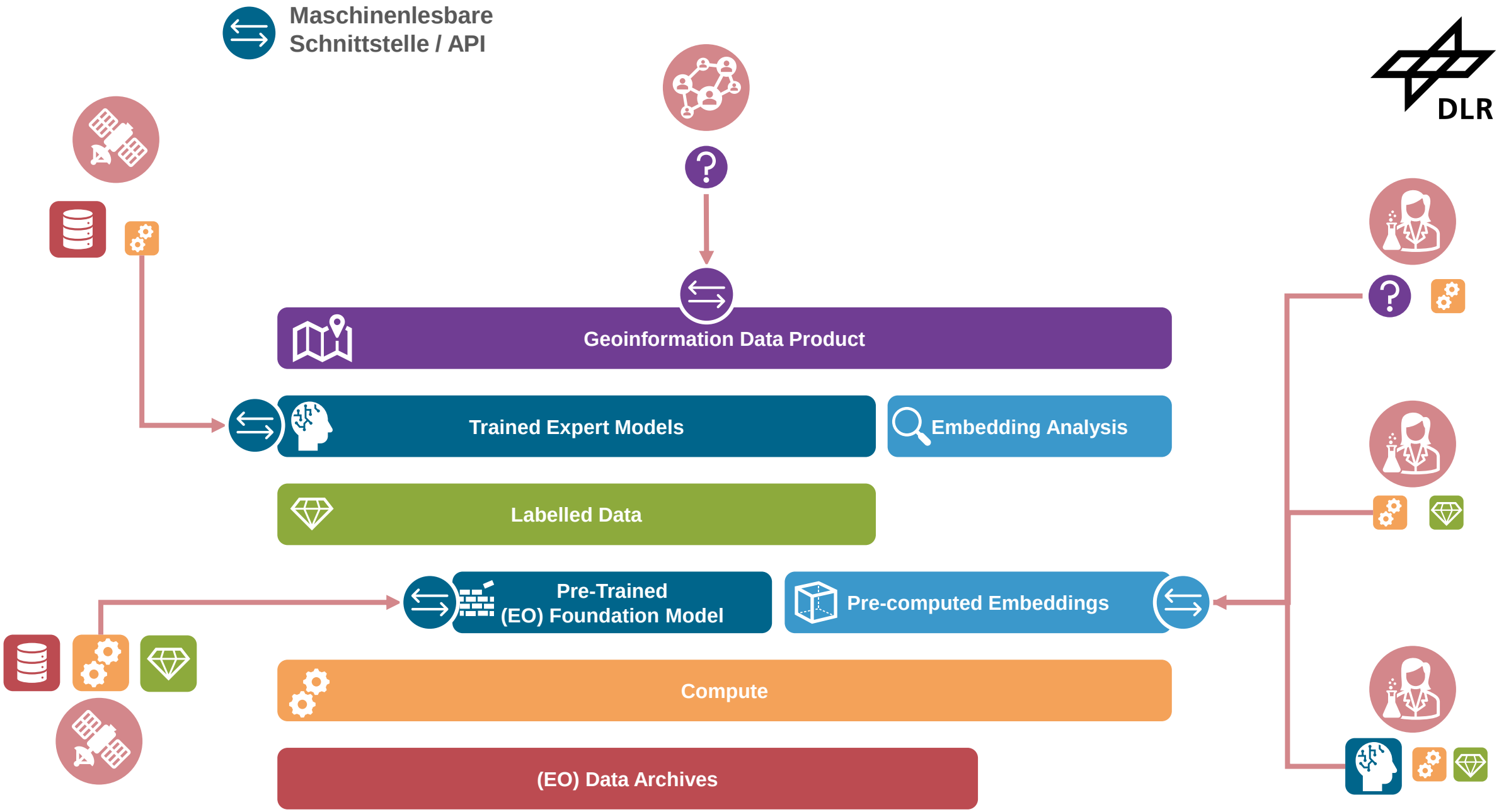
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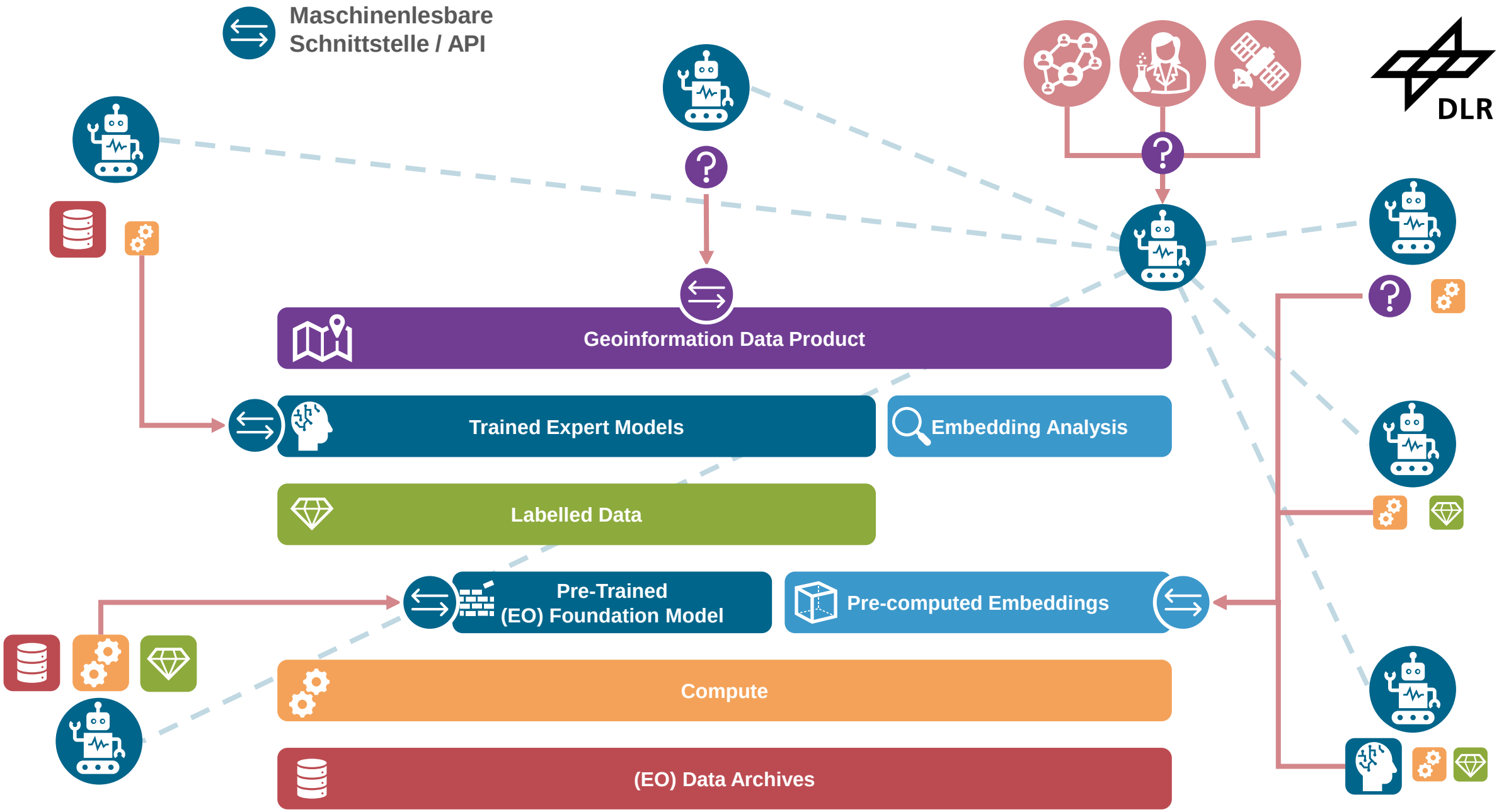
Embedding Analysis

=

Geoinformation Data Product


Geoinformation Data Product
Trained Expert Models
Labelled Data
Compute
(EO) Data Archives


Maschinenlesbare
Schnittstelle / API
Geoinformation Data Product
Trained Expert Models
Embedding Analysis
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