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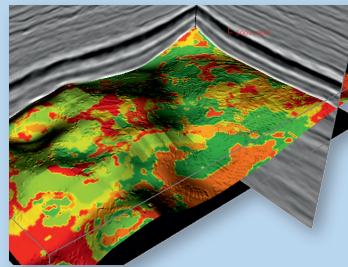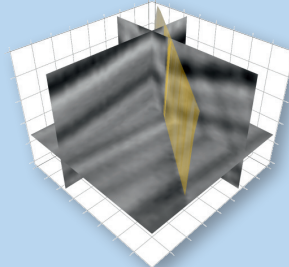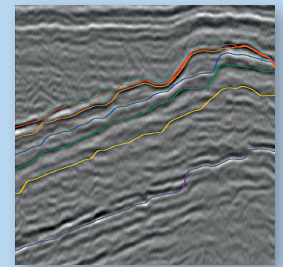**2**

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1 *Auto-muting depth-angle gathers*

2 *AVO clustering*

3 *Fault detection*

4 *Horizon tracking*

DEEP LEARNING FOR SEISMIC APPLICATIONS: DLseis Research

- Simplified processing workflows and interpretation of seismic stacks and gathers
  - Auto-muting
  - Trimstatics
  - Well-tie
  - AVA classification
  - Identification of geological objects

- Transfer learning from synthetic to field and between field data sets

- ALOMA-Execution framework for scalable training of models on large prestack data sets

- -

Phase 2 starting now

- -

- Image-to-Image gather processing for parameter-free Trimstatics/Align and Demultiple

- Generative Adversarial Networks (GANs) for Timelapse seismic

- AVO inversion

- Seismic data interpolation

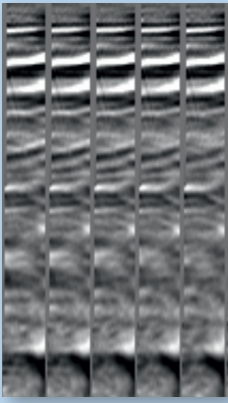**Fraunhofer-Institut für Techno- und Wirtschaftsmathematik ITWM**

Fraunhofer-Platz 1
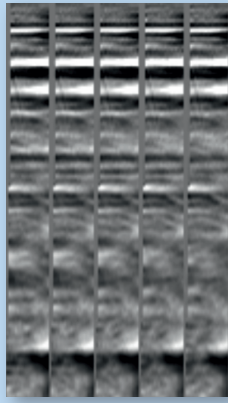67663 Kaiserslautern
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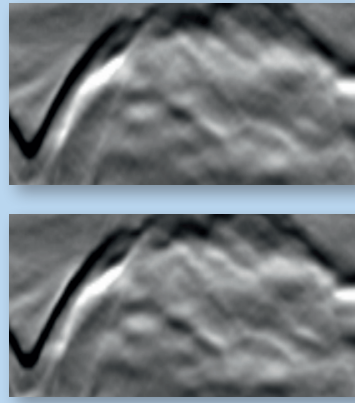Prof. Dr.-Ing. Janis Keuper
janis.keuper@itwm.fraunhofer.de
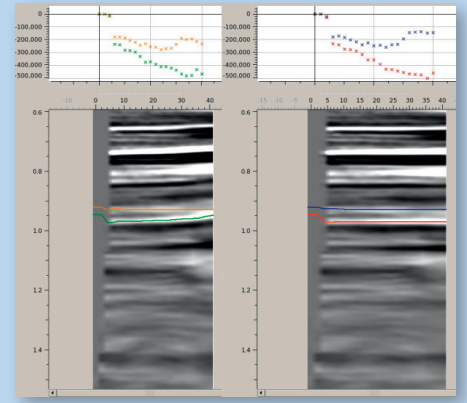
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Example Application: Machine-Learning Trimstatics (Align)

- Pure synthetic training:
  - · Excellent transfer to all tested real data applications
  - · Challenging situations built into training data set, e. g.
    - – Non-flattening of peg-leg multiples
    - – Polarity reversals

- Results:
  - · Well-flattend primaries
  - · Preserved amplitude versus offset (AVO) trend
  - · Unchanged "character" of background seismic

- Compared to conventional correlation-based Align:
  - · Artefact-free stacking of gathers by preservation of event-stacking time/depth
  - · Free of parameters, thus, easy to use
  - · Ability to address challenging cases by explicitly presenting pairs of input and desired output to the network for training
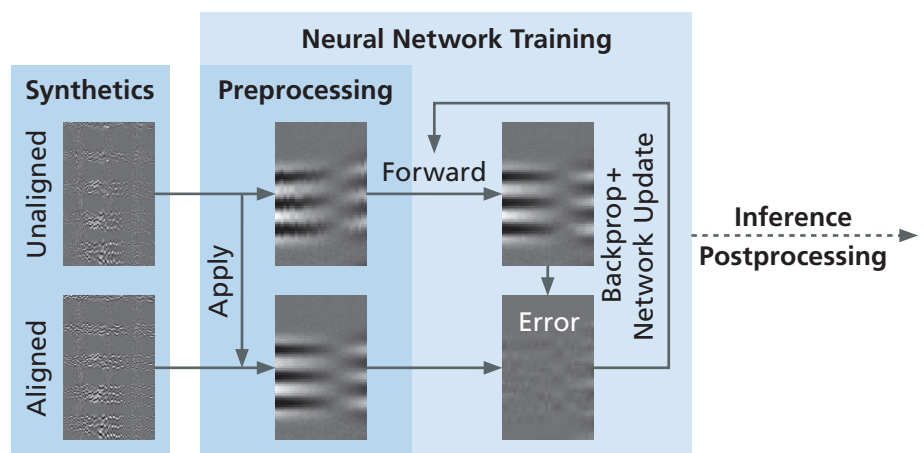
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