Chair of Computational Modeling and Simulation
TUM School of Engineering and Design
Technical University of Munich

Anomaly Detection with Generative Deep Learning

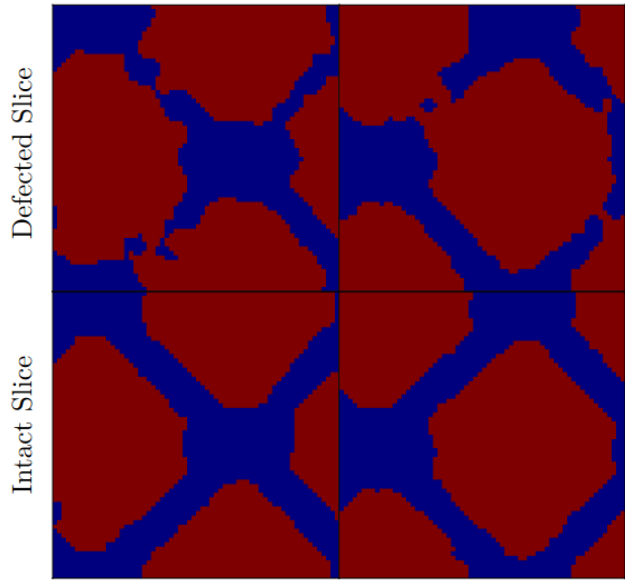
Project Characteristics

Modeling:
Mathematics:
Programming:
Science:

Task

Apply generative deep learning to learning material distributions enabling anomaly detection through reconstruction errors

- Perform a literature review to learn and understand most prominent generative algorithms.
- Implement a (variational) autoencoder and learn simple 1D and 2D material distributions.
- Implement a generative adversarial network and learn simple 1D and 2D material distributions.
- Implement a variational autoencoder generative adversarial network and learn simple 1D and 2D material distributions.
- Test the implemented methods on material coming from different material distributions. The reconstruction errors arising from the inability to match the material from the different distribution serve as spatial anomaly measure.



[1] Generative Deep Learning – Teaching Machines to Paint, Write, Compose, and Play, Foster, D. (2023)

[2] Deep Learning in Computational Mechanics: a review, Herrmann, L., Kollmannsberger, S. (2024)

[3] Deep Learning for Anomaly Detection: a review, Pang, G., Shen, C., Cao, L., Hengel, A. V. D. (2022)

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