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Deep learning solutions for domain-specific image segmentation

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Citation

Vadineanu, S. (2025, October 8). *Deep learning solutions for domain-specific image segmentation*. Retrieved from <https://hdl.handle.net/1887/4266937>

Version: Publisher's Version

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Downloaded from: <https://hdl.handle.net/1887/4266937>

Note: To cite this publication please use the final published version (if applicable).

Propositions

Propositions accompanying the thesis *Deep Learning Solutions for Domain-Specific Image Segmentation*.

1. The robustness of deep learning models to annotation errors depends significantly on the architecture of the model. (Chapter 2)
2. Models with few parameters and simple architectures should be preferred for tasks where the annotations are expected to be noisy. (Chapter 2)
3. Perturbation-based training pipelines enable neural networks to generalize from noisy annotations. (Chapter 3)
4. The effectiveness of few-shot learning for cell segmentation depends significantly on the structural similarity between the support set and the query samples. (Chapter 4)
5. Besides their role in interpretability, activation maps can also serve as effective proxies for segmentation annotations in settings with limited expert availability or annotation resources, such as archaeology. (Chapter 5)
6. Including domain knowledge in explainability techniques results in more accurate pseudo-annotations for segmentation compared to directly using their raw outputs. (Chapter 5)
7. The interpretability of deep learning models should be prioritized alongside accuracy to ensure its broader adoption, especially in specialized fields such as archaeology.
8. Synthetic data sets with perfect annotations are essential tools for evaluating the impact of annotation errors on deep learning models.
9. Approaches combining deep learning and traditional machine learning will become standard in annotation-scarce domains that require interpretability.
10. The success of machine learning in specialized fields requires interdisciplinary collaboration, where domain knowledge can compensate for the lack of annotated samples.
11. When submitting a new algorithm to a venue, the lack of a standardized interface (such as the interface of the pre-trained torchvision models) for training and evaluation should result in a desk reject.
12. Large conferences should split into smaller, more targeted events, reducing the need to rent large venues and distributing the workload for reviewers.

Șerban Vădineanu,
Leiden, 08-10-2025.