COMPUTER GRAPHICS NIGHT

DONNERSTAG 05.12.2024

BEST PAPER AWARD

PREISTRÄGER

»IMPACT ON SOCIETY«

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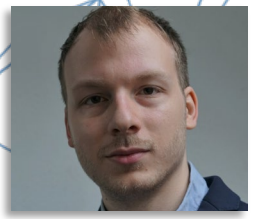
Best Paper Award

»Impact on Society«



»M3D-NCA: Robust 3D Segmentation with Built-In Quality Control«

PREISTRÄGER

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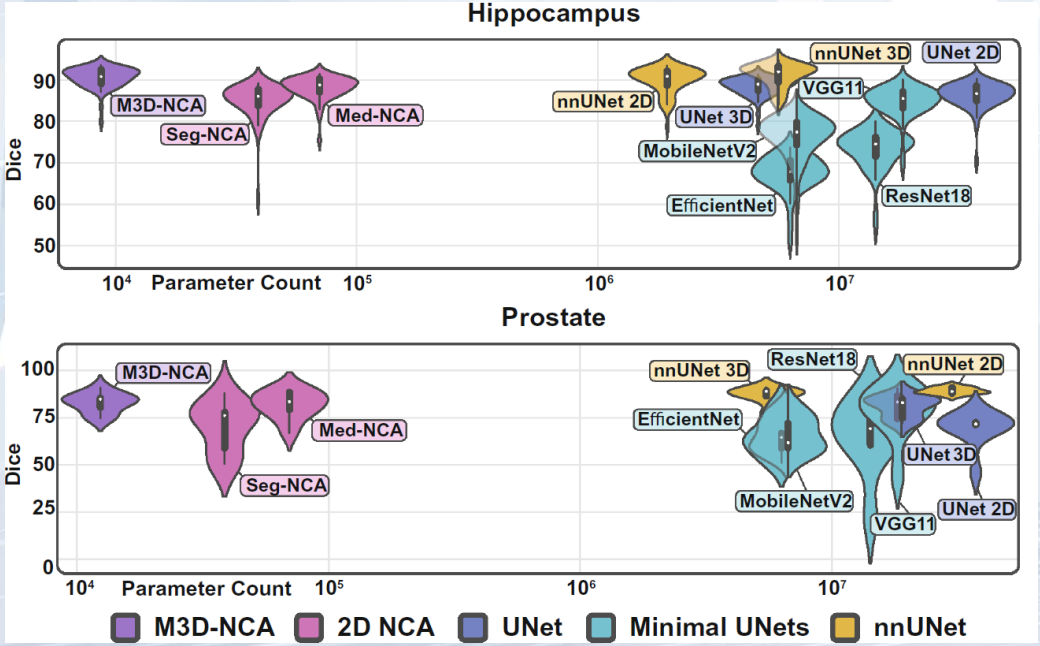
Medical Image Computing and Computer Assisted Intervention – MICCAI 2023

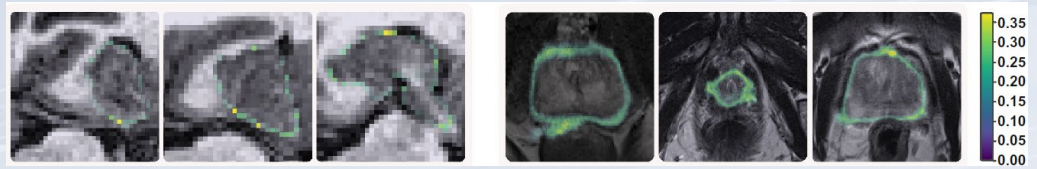
PREISTRÄGER

PROBLEM

Resource Constraints, Domain Shifts and Lack of Quality Control in Medical Image Segmentation:

- Traditional large-scale deep learning models, such as UNet, require substantial computational resources, limiting their applicability in resource-constrained environments like rural healthcare settings, primary care facilities, and conflict zones.
- Medical image segmentation models often perform poorly when there are domain shifts in imaging data, and existing approaches lack efficient automated mechanisms to detect segmentation errors, which can compromise patient safety.





Variance over 10 predictions on different samples of the hippocampus (left) and prostate dataset (right)

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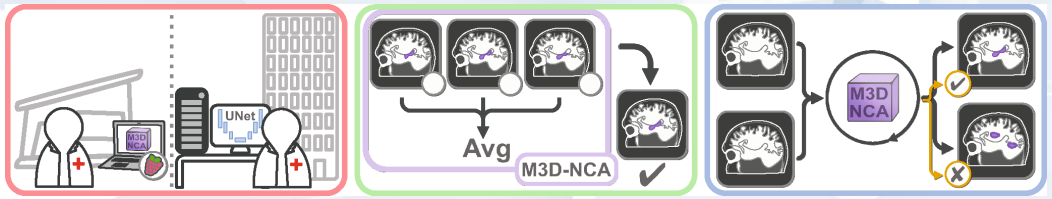
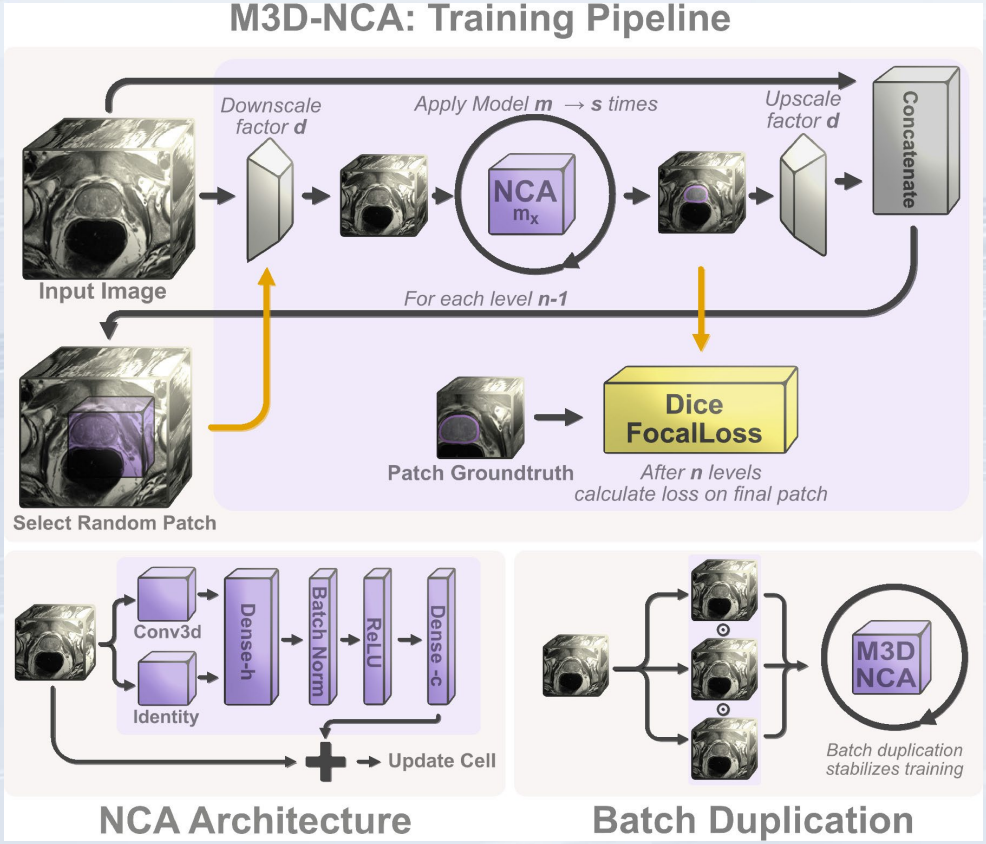
RESULT

Lightweight | Pseudo Ensemble | Automatic Quality Control



High-Performance, Lightweight 3D Segmentation with Quality Control

- Achieves up to 90.5% Dice score with a compact model (<13k params) on resource-constrained devices like Raspberry Pi 4.
- Detects up to 94.6% of failure cases using an innovative built-in quality metric, ensuring reliability under domain shifts and noisy data.



USP

- M3D-NCA enhances patient safety by facilitating high-accuracy 3D segmentation in regions with limited access to such technology. It is capable of running on low-resource devices like Raspberry Pi, thereby enabling access in rural healthcare settings, low-income countries, and conflict zones.