



**HAL**  
open science

## Enhancing stroke lesion detection and segmentation through nnU-net and multi-modal MRI Analysis

Lounès Meddahi, Stéphanie s Leplaideur, Arthur Masson, Isabelle Bonan, Elise Bannier, Francesca Galassi

► **To cite this version:**

Lounès Meddahi, Stéphanie s Leplaideur, Arthur Masson, Isabelle Bonan, Elise Bannier, et al.. Enhancing stroke lesion detection and segmentation through nnU-net and multi-modal MRI Analysis. WCNR 2024 - 13th World Congress for Neurorehabilitation, World federation for Neurorehabilitation, May 2024, Vancouver, Canada. pp.1-1. hal-04546362

**HAL Id: hal-04546362**

**<https://hal.science/hal-04546362>**

Submitted on 15 Apr 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



Vancouver  
22–25 May 2024  
CANADA



Your presentation at the WCNR 2024

Oral presentation on Fri, 24 May 2024. 18:15 – 18:24

#### Title

Enhancing stroke lesion detection and segmentation through nnU-net and multi-modal MRI Analysis  
Stéphanie Leplaideur (Rennes / FR), Francesca Galassi (Rennes / FR), Elise Bannier (Rennes / FR),  
Arthur Masson (Rennes / FR), Lounes Meddahi (Rennes / FR)

#### 1.Introduction

Accurate delineation of chronic stroke lesions is crucial for many research and clinical applications. Indeed, all neuroimaging research after stroke require a segmentation process. Moreover, the segmentation is implemented in algorithms discussing prognostic elements. However, manual segmentation from T1-w MR images is time-consuming and prone to errors.

#### 2.Objectives

This work aimed to automate chronic stroke lesion detection and segmentation using the nnU-Net framework and a combination of datasets. The nnU-Net framework is widely recognized for its state-of-the-art performance in medical image segmentation. We have previously successfully adapted the nnU-Net framework to multiple sclerosis lesion segmentation within the Longiseg4ms tool.

#### 3.Materials and Methods

We utilized the ATLAS v2.0 dataset and an in-house dataset of T1-w and FLAIR MRI scans from patients with chronic stroke lesions. We leveraged the nnU-Net framework and incorporated both T1-w and FLAIR MRI modalities

#### 4.Results

The target model achieved a mean Dice score of 0.730 and a mean lesion-wise F1 score of 0.684, demonstrating superior performance compared to the baseline model. The high correlation coefficient (Pearson correlation coefficient = 0.930) between the ground truth and model output volumes indicates a strong agreement between the two segmentation methods. This correlation highlights the accuracy of our volume prediction and highlights the reliability of our automated segmentation approach.

#### 5.Conclusion

Our nnU-Net-based model, trained on T1-w and FLAIR images, improved the segmentation of chronic stroke lesions, outperforming the baseline model. These findings highlight the potential of automated models for improving chronic stroke lesion segmentation and using FLAIR modality to enhance the results.