

OHIF-SAM2: Accelerating Radiology Workflows with Segment Anything Model 2

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Abstract. The release of Segment Anything Models (SAM1 and SAM2) by Meta has significantly influenced various domains, including medical imaging. However, existing implementations of SAM primarily focus on standalone tools that require local installation and configuration, limiting accessibility and ease of use. In this work, we present the web-based extension of SAM2 integrated into the Open Health Imaging Foundation (OHIF) viewer. Our solution supports all SAM2 prompt types, including points and bounding boxes, and enables multi-label predictions. This web-based integration eliminates installation requirements, offering a more user-friendly interface. The implementation is open-source and available at <https://github.com/CCI-Bonn/OHIF-SAM2>.

Keywords: Web-Based Medical Imaging · Foundation Model · Segmentation · Artificial Intelligence.

1 Introduction

The release of the Segment Anything Model (SAM) [4] has gained significant attention and impacted a broad range of fields, including the medical imaging. Building on SAM, numerous follow-up studies and tools were developed [9,12]. This includes adapting SAM for medical imaging applications[15,5,7,1,11].

Recently, Meta introduced Segment Anything Model 2 (SAM2) [8], expanding the model's capabilities from single-frame image segmentation to video processing. Early research has already demonstrated that SAM2 can also be effectively adapted for 3D medical imaging [16,13,6,3]. Although several SAM2-based tools have already emerged [6,14,10], only a few incorporate a web-based medical imaging viewer, such as OHIF Viewer [17].

Recently, the MONAILabel team integrated SAM2 into the MONAILabel framework and introduced an extension for OHIF. However, this extension has limitations from a UX perspective, such as the lack of bounding box support as a prompt and the inability to save or share predicted labels.

In contrast, our approach emphasizes an enhanced user experience tailored specifically to radiology workflows. We present a web-based medical imaging viewer powered by SAM2, designed to streamline radiology workflows using AI-driven tools within the MONAILabel framework [2]. Our key contributions are as follows:

- Support all types of prompts supported by SAM2.
- Integrate SAM2 into MONAI Label to enable interactive 3D medical image processing in OHIF.
- Enhance segmentation loading in OHIF to improve interactivity and user experience.
- Provide clear and straightforward instructions for deploying the integrated application via Docker, using a single command to enable seamless deployment on cloud services such as GCP or AWS.

2 Integrated Design

The whole application comprises three main components: the OHIF Viewer, Orthanc PACS, and the MONAI Label server, as illustrated in Figure 1. The OHIF Viewer serves as the primary user interface, enabling users to visualize medical images and utilize SAM2. Users can save DICOM files through the OHIF Viewer, which are then stored in Orthanc PACS. Orthanc PACS can also be substituted with other DICOM storage solutions, such as dcm4chee or Google DICOM Store. The MONAI Label server processes image requests received via API calls from the OHIF Viewer, performing inference using SAM2 and saving the predicted results back to Orthanc PACS. These components are interconnected through a Docker network and hosted within the same domain using Nginx.

3 Operational Workflow

From a user perspective, three types of prompts are available: a positive point to indicate areas to include, a negative point to mark areas to exclude, and a bounding box to define the target region. To add separate labels to an existing segmentation, the user must click the 'SaveAndNextObj' button. This clears all current prompts, allowing the user to input new prompts for the new label.

The next step involves invoking SAM2, which operates in two modes. The first mode, SAM2_one, applies SAM2 to the slices where the user has set prompts. The second mode propagates SAM2 across all slices, enabling 3D inference.

After the process is complete, the user can review the results. If only one slice contains the predicted segmentation, the "Jump to Segment" button allows quick navigation to that slice. Users can also toggle segmentation visibility to display only the image or overlay the segmentation onto registered images using OHIF.

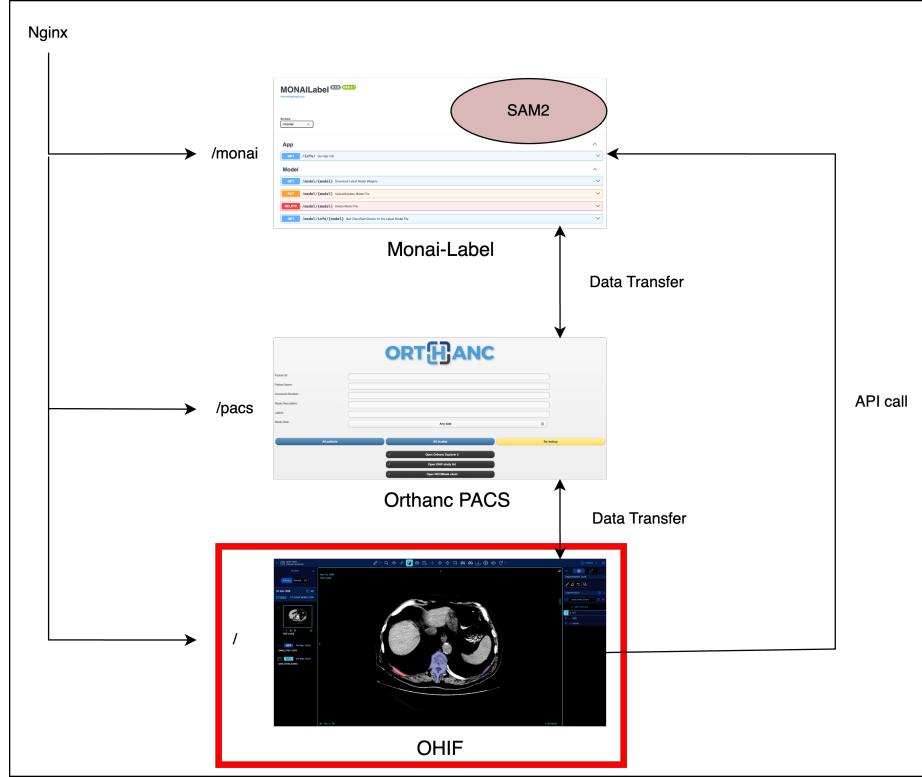


Fig. 1. Overview of OHIF-SAM2: OHIF serves as the main user interface. Orthanc PACS stores DICOM images, while Monai-Label performs segmentation inference. These distinct applications are hosted within the same domain using Nginx.

These steps are illustrated in Figure 2 and can be repeated as needed until the desired results are achieved.

Additionally, users can manually refine the segmentation using the 'Brush' and 'Eraser' tools in the right panel. This feature allows for precise adjustments before finalizing the segmentation. Once completed, users can rename each segment and export the updated segmentation file to PACS or download it locally.

4 Limitation and Future Work

For some DICOM files, orientation inconsistencies hinder the accurate mapping of segmentations onto the source images. This issue may be addressed through further investigation, possibly by enforcing specific orientation criteria in DICOM files or resampling the images to improve alignment. Alternatively, the problem may arise from the current data conversion pipeline (DICOM to NIfTI,

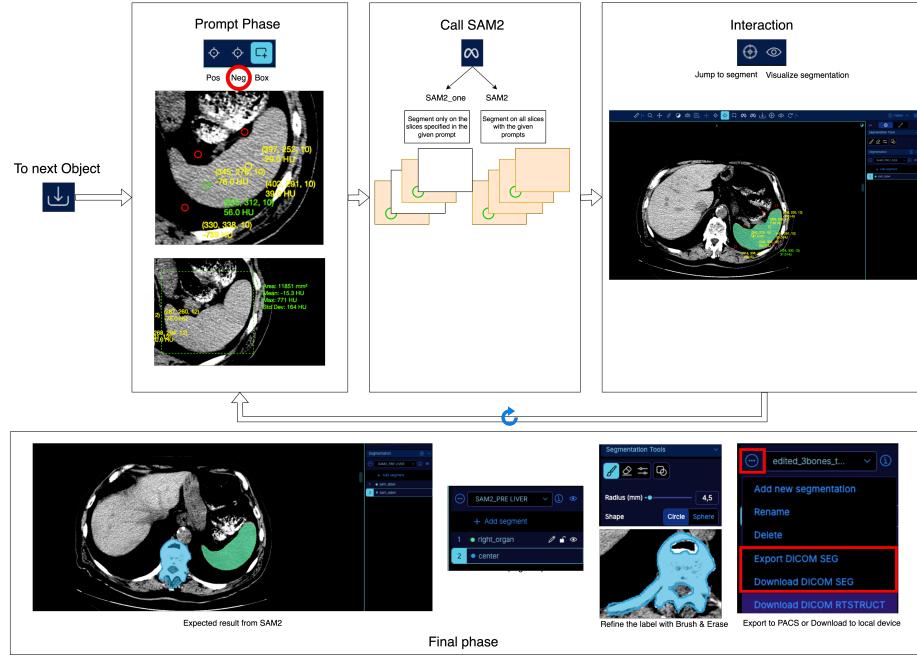


Fig. 2. OHIF-SAM2 Workflow: Begin by setting prompts. To add an additional label to the existing ones, the user should click the 'SaveAndNextObj' button. For each label, repeat the process of setting prompts, invoking SAM2, and refining through interaction until satisfactory results are achieved. In the final phase, users can further edit individual segments and save the segmentation.

inference, then NIfTI back to DICOM-seg), where information could be lost or distorted during these transformations.

Furthermore, in the current setup, once a user moves to the next object for segmentation, they can only manually correct previously segmented objects. This process is not semi-automated and can be tedious. As future work, we plan to enhance the extension that allows users to revisit and refine any label at any time using SAM2. This enhancement fully leverages SAM2's capabilities, streamlining radiology workflows and improving efficiency.

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