Starting MonaiLabel server in HUCVL and Connecting 3DSlicer

Key Points about MonaiLabel:

Pros:

- It offers a completely scriptable labelling process that gives access to the following:
  - inference of the selected models before/after the labelling
  - special image selection strategies (e.g. choose next image with the lowest confidence)
  - customized training process (with defined processes)
- Offers project based specialization. Kind of workspace with different configurations
- Online learning tools to help with the segmentation process for the labeller. E.g. After choosing the Region of Interest (ROI) and providing 3 scribbles over different axes, the algorithm outputs a 3D segmented part of the region, labeller then can post-process the mistakes the algorithm has done. Time stamped example from Monai 2021 Bootcamp , new from Monai channel
- Open source with a great number of resources available on using the tool
- Very active community
- Runs as a server, offering ease of use by using a computer with minimal hardware for labelling
- Setting a MonaiLabel is very easy, comparable to Django (personal opinion)

Cons:

- Security issues can arise as this server runs remotely and works on patient data. Might need to add extra security layers or contact an expert about it.
- Still in very active development, being an open-source application it does receive updates very regularly but this is also a downside for maintainability.
- Doesn't support every labelling tool available on the internet. Might be problematic for the labeller.

**Notes**: The learning curve seems to be very low for the labeller as there is little to no exposure to the application process when using the 3D slicer. 3DSlicer also offers a good manual and a rich amount of resources for learning it, hence making these two a very likeable duo. Though this is just a guess by us as we can't really experience the labelling by ourselves because of the lack of domain knowledge.

# Starting MonaiLabel server in HUCVL and Connecting with Labelling Application

Currently, a working way to start the MonaiLabel server in HUCVL servers:

1. Start MonaiLabel servers by running the following script in HUCVL:

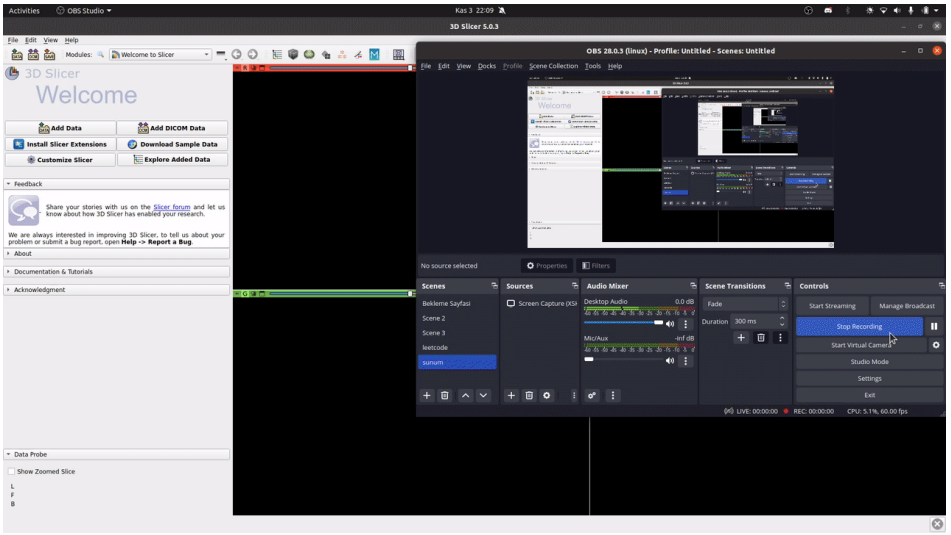
```
# Get GPU on the interactive terminal on an another terminal
srun --gres=gpu:1 --job-name monai_label --pty bash -i

# Activate conda (med_proj is the environment name)
source ~/.bashrc && source ~/miniconda3/etc/profile.d/conda.sh && conda activate med_proj

# Run MonaiLabel server (takes 4-5 minutes to start)
monailabel start_server --app . \
    --studies http://127.0.0.1:8042/dicom-web \
    --conf models deepedit \
    --port 8000 \
    --conf use_pretrained_model false
```

2. Start another terminal for port forwarding. Write the node name in $(node_name) and your username in $(user).

```
# This will port forward localhost:8000 to $(node_name):8000.
ssh -N -L 8000:$(node_name):8000 $(user)@hucvl
```

3. Open another terminal for the labelling application. We are going to use 3DSlicer here as an example. There are other labelling applications but the suggested one is 3DSlicer. However, according to the needs we can also switch to labelling applications that run on browsers. Do the steps here to prepare your 3D slicer for labelling with the MonaiLabel server.

4. Connect the 3DSlicer to localhost:8000 & check if localhost:8000 is working.



**NOTES:** The approach we described only works with an interactive bash requiring user access. An alternative approach is to use *sbatch* or *srun* for sending it is a job-like task to make this process completely automated, but we weren't able to start the labelling server with those commands. ***Update:*** *I noticed that after closing the terminal and not closing the node, the server runs indefinitely.*