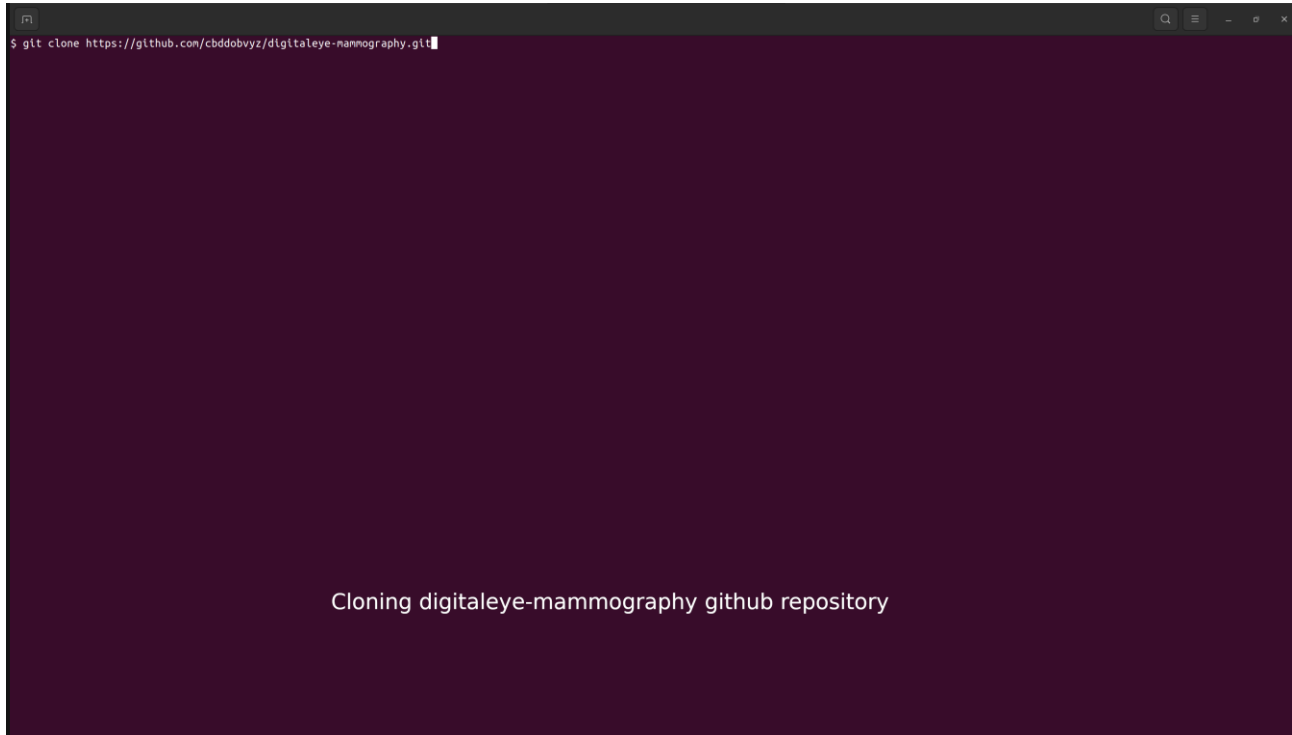


DIGITALEYE-MAMMOGRAPHY DOCKER TUTORIAL

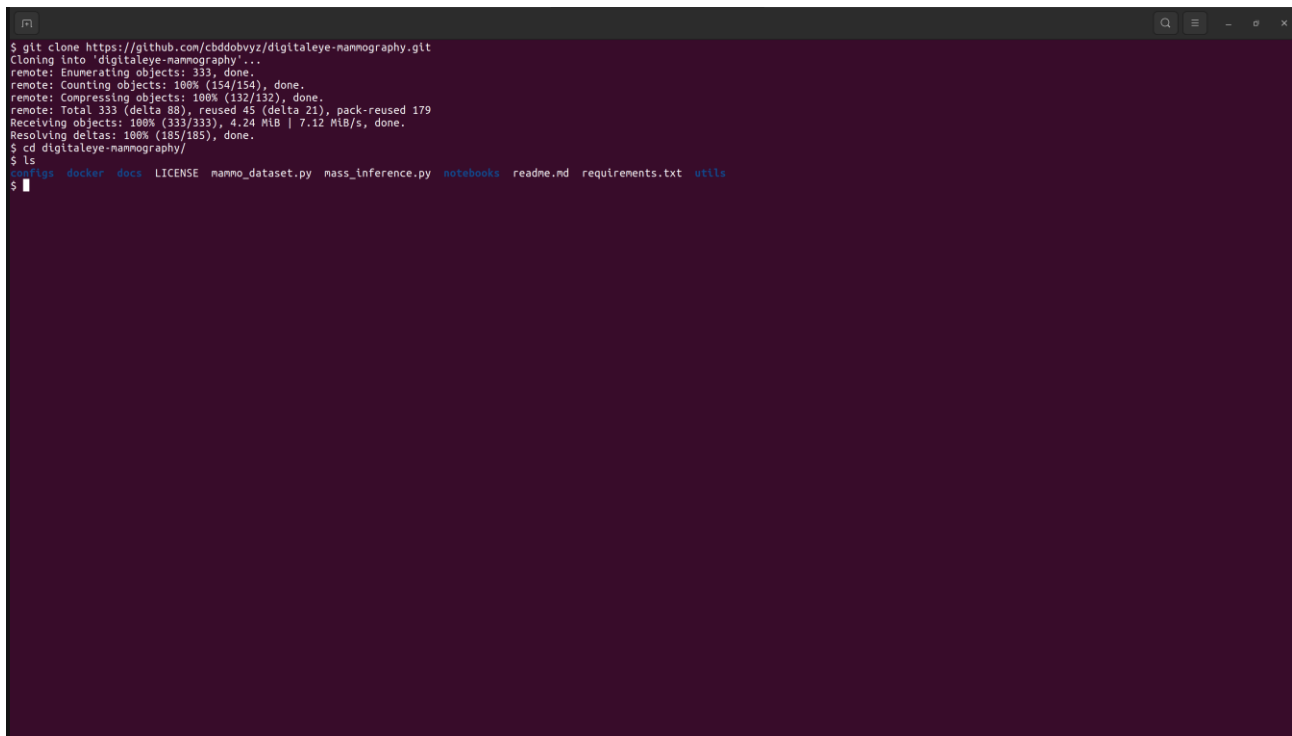
The steps you need to follow to run the application via Docker after cloning the repository are listed below.

STEP 1: Clone github repository.

A terminal window with a dark purple background. The command `$ git clone https://github.com/cbddobvz/digitaleye-mammography.git` has been entered. The output shows progress bars for cloning, counting objects, and compressing objects, all at 100% completion. The terminal window has a title bar with a search icon, a menu icon, and window control buttons (minimize, maximize, close).

```
$ git clone https://github.com/cbddobvz/digitaleye-mammography.git
Cloning into 'digitaleye-mammography'...
remote: Enumerating objects: 333, done.
remote: Counting objects: 100% (154/154), done.
remote: Compressing objects: 100% (132/132), done.
remote: Total 333 (delta 88), reused 45 (delta 21), pack-reused 179
Receiving objects: 100% (333/333), 4.24 MiB | 7.12 MiB/s, done.
Resolving deltas: 100% (185/185), done.
$ cd digitaleye-mammography/
$ ls
configs  docker  docs  LICENSE  mammo_dataset.py  mass_inference.py  notebooks  readme.md  requirements.txt  utils
```

Cloning digitaleye-mammography github repository

A terminal window with a dark purple background. The command `$ git clone https://github.com/cbddobvz/digitaleye-mammography.git` has been entered. The output shows progress bars for cloning, counting objects, and compressing objects, all at 100% completion. The terminal window has a title bar with a search icon, a menu icon, and window control buttons (minimize, maximize, close).

```
$ git clone https://github.com/cbddobvz/digitaleye-mammography.git
Cloning into 'digitaleye-mammography'...
remote: Enumerating objects: 333, done.
remote: Counting objects: 100% (154/154), done.
remote: Compressing objects: 100% (132/132), done.
remote: Total 333 (delta 88), reused 45 (delta 21), pack-reused 179
Receiving objects: 100% (333/333), 4.24 MiB | 7.12 MiB/s, done.
Resolving deltas: 100% (185/185), done.
$ cd digitaleye-mammography/
$ ls
configs  docker  docs  LICENSE  mammo_dataset.py  mass_inference.py  notebooks  readme.md  requirements.txt  utils
```

STEP 2: Change directory to the docker folder. Run “docker compose -f docker-compose-cpu.yml up” (for CPU) or “docker compose -f docker-compose-cuda.yml up” (for GPU) command.

```
$ git clone https://github.com/cbddobvyz/digitaleye-mammography.git
Cloning into 'digitaleye-mammography'...
remote: Enumerating objects: 333, done.
remote: Counting objects: 100% (154/154), done.
remote: Compressing objects: 100% (132/132), done.
remote: Total 333 (delta 88), reused 45 (delta 21), pack-reused 179
Receiving objects: 100% (333/333), 4.24 MiB | 7.12 MiB/s, done.
Resolving deltas: 100% (185/185), done.
$ cd digitaleye-mammography/
$ ls
conf.py  docker  docs  LICENSE  mammo_dataset.py  mass_inference.py  notebooks  readme.md  requirements.txt  utils
$ cd docker
$ ls
docker-compose-cpu.yml  docker-compose-cuda.yml  Dockerfile-cpu  Dockerfile-cuda
$ docker compose -f docker-compose-cpu.yml up
```

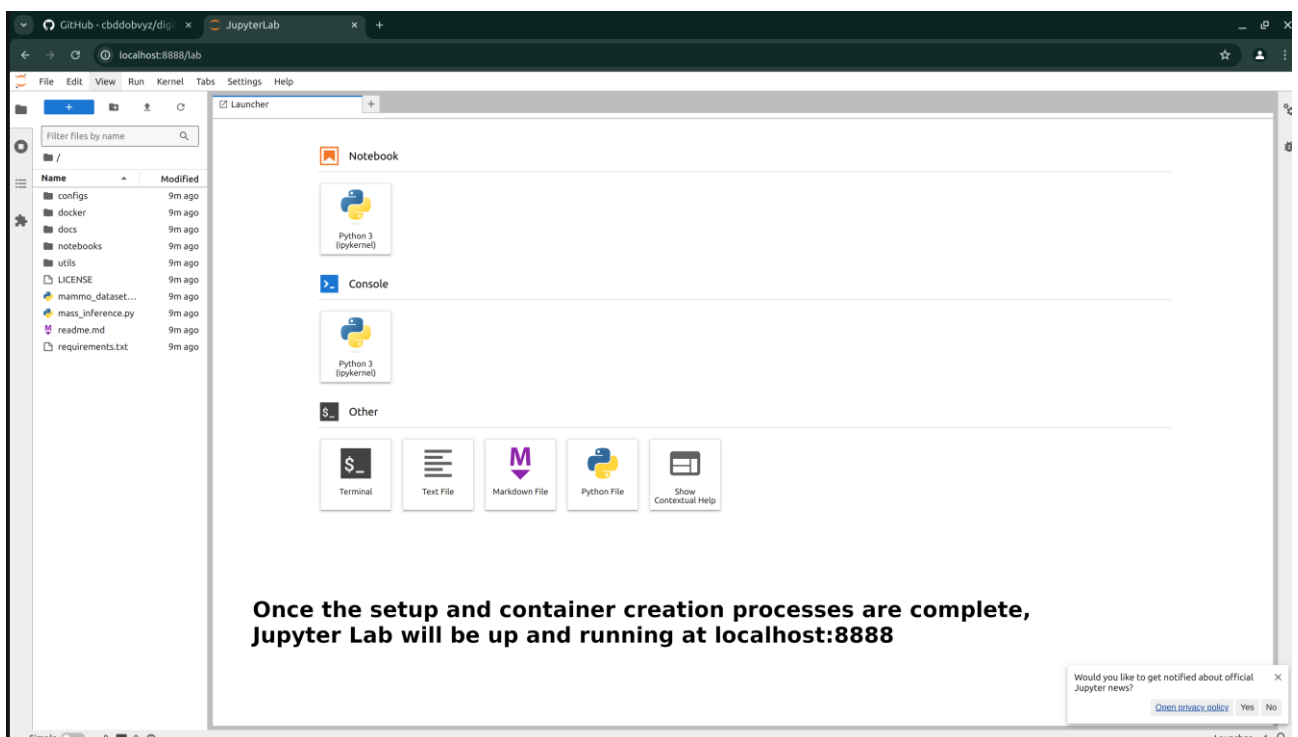
Builds, re(creates), starts and attaches to container for a service according to a Dockerfile.

```
[+] Building 240.3s (13/13) FINISHED
default
=> [digitaleye internal] load build definition from Dockerfile-cpu
0.0s
=> transferring dockerfile: 1.14kB
0.0s
=> [digitaleye internal] load metadata for docker.io/library/ubuntu:22.04
6.0s
=> [digitaleye auth] library/ubuntu:pull token for registry-1.docker.io
0.0s
=> [digitaleye internal] load .dockerignore
0.0s
=> transferring context: 2B
0.0s
=> [digitaleye 1/6] FROM docker.io/library/ubuntu:22.04@sha256:a6d2b38300ce017add71440577d5b0a90460d0e57fd7aec21dd0d1b0761bbfb2
0.0s
=> resolve docker.io/library/ubuntu:22.04@sha256:a6d2b38300ce017add71440577d5b0a90460d0e57fd7aec21dd0d1b0761bbfb2
0.0s
=> sha256:a6d2b38300ce017add71440577d5b0a90460d0e57fd7aec21dd0d1b0761bbfb2 1.13kB / 1.13kB
0.0s
=> sha256:2af372c1e2645779643284c7dc38775e3dbbc417b2d784a27c5a9eb784014fb8 424B / 424B
0.0s
=> sha256:52882761a72a06649edff9a2478835325d004fb640ea32a975e29e12a012025f 2.30kB / 2.30kB
0.0s
=> [digitaleye 2/6] RUN apt -y update && apt install -y sudo git python3-pip ca-certificates libssl-dev libffi-dev python3-dev build-essential && update-ca-certificates
42.6s
=> [digitaleye 3/6] RUN rm -rf /var/lib/apt/lists/*
0.2s
=> [digitaleye 4/6] RUN adduser --disabled-password --gecos '' cbddobvyz && usermod -s /usr/sbin/sudoedit cbddobvyz && echo '%sudo ALL=(ALL) NOPASSWD:ALL' >> /etc/sudoers
0.4s
=> [digitaleye 5/6] WORKDIR /workspace
0.0s
=> [digitaleye 6/6] RUN git clone https://github.com/cbddobvyz/digitaleye-mammography.git -b main /workspace
2.0s
=> [digitaleye 7/6] RUN python3 -m pip install --trusted-host pypl.org --trusted-host pypl.python.org --trusted-host files.pythonhosted.org --upgrade pip -r requirements.txt opencv-contrib-python==4.5.1.30
167.2s
=> [digitaleye 8/6] RUN pip install nncv_full==1.7.1
19.8s
=> [digitaleye] exporting to image
10.9s
=> exporting layers
10.9s
=> writing image sha256:3e1441f44294dc73af0e91983bc9435163199ab15023bc176df946c0fb0c02
0.0s
=> naming to docker.io/library/docker-digitaleye
0.0s
[+] Running 2/2
✔ Network docker_default Created
✔ Container docker-digitaleye-1 Created
Attaching to digitaleye-1
digitaleye-1 | [I 2024-05-15 08:04:04.751 ServerApp] jupyter_lsp | extension was successfully linked.
digitaleye-1 | [I 2024-05-15 08:04:04.754 ServerApp] jupyter_server_terminals | extension was successfully linked.
digitaleye-1 | [W 2024-05-15 08:04:04.755 LabApp] 'allow_origin' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.
```

```
[digitaleye 2/8] RUN apt -y update && apt install -y sudo git python3-pip ca-certificates libssl-dev libffi-dev python3-dev build-essential && update-ca-certificates
42.6s
=> [digitaleye 3/8] RUN python3 -m pip install --trusted-host pypl.org --trusted-host pypl.python.org --trusted-host=files.pythonhosted.org --upgrade pip -r requirements.txt opencv-contrib-
0.2s
=> [digitaleye 4/8] RUN adduser --disabled-password --gecos '' cbddobvyyz && usermod -s sudo cbddobvyyz && echo 'koudo ALL=(ALL) NOPASSWD:ALL' >> /etc/sudoers
8.4s
=> [digitaleye 5/8] WORKDIR /workspace
0.8s
=> [digitaleye 6/8] RUN git clone https://github.com/cbddobvyyz/digitaleye-nannography.git -b main /workspace
2.9s
=> [digitaleye 7/8] RUN python3 -m pip install --trusted-host pypl.org --trusted-host=files.pythonhosted.org --upgrade pip -r requirements.txt opencv-contrib-
167.2s
=> [digitaleye 8/8] RUN min install mncv_full=1.7.1
10.8s
=> exporting to image
10.9s
=> exporting layers
10.9s
=> writing image sha256:3e1441f44294dcb73afe9e919838c9435163199ab15023bc176df946c9fb8c82
0.8s
=> naming to docker.io/library/docker-digitaleye
0.8s
[+] Running 2/2
✔ Network docker_default Created
0.1s
✔ Container docker-digitaleye-1 Created

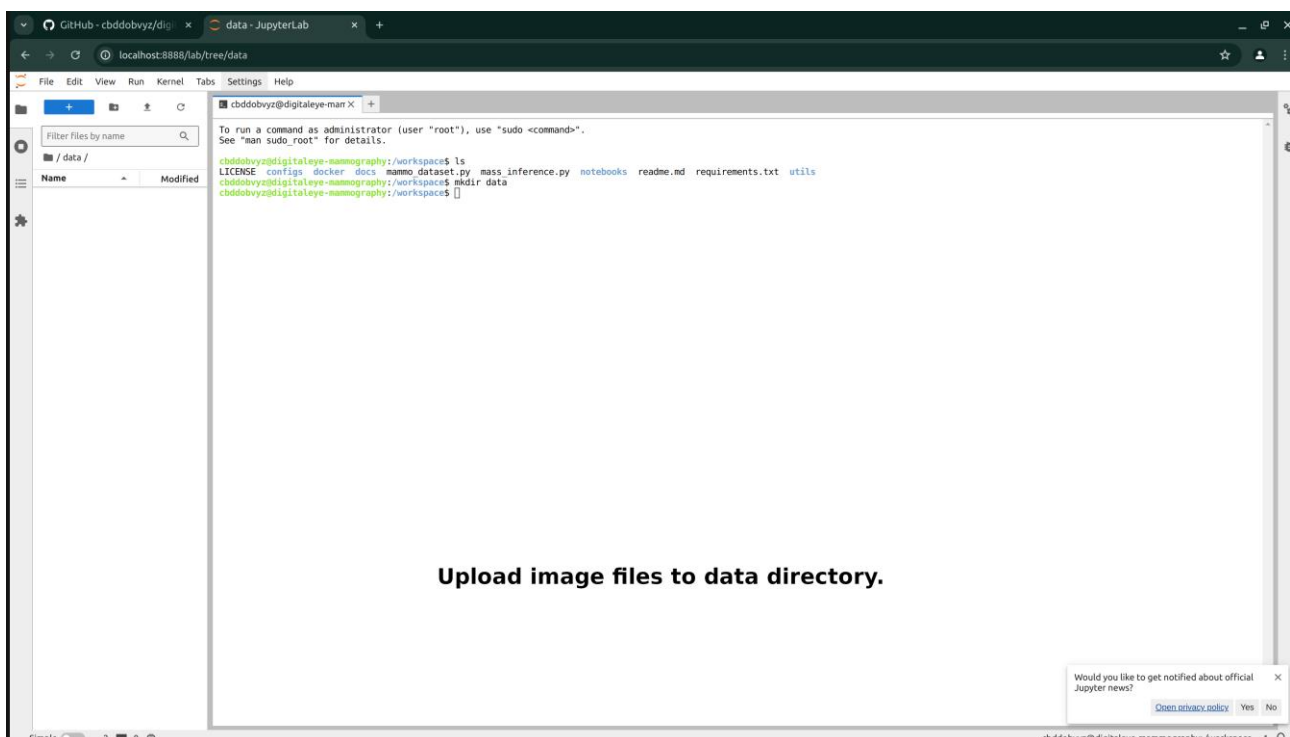
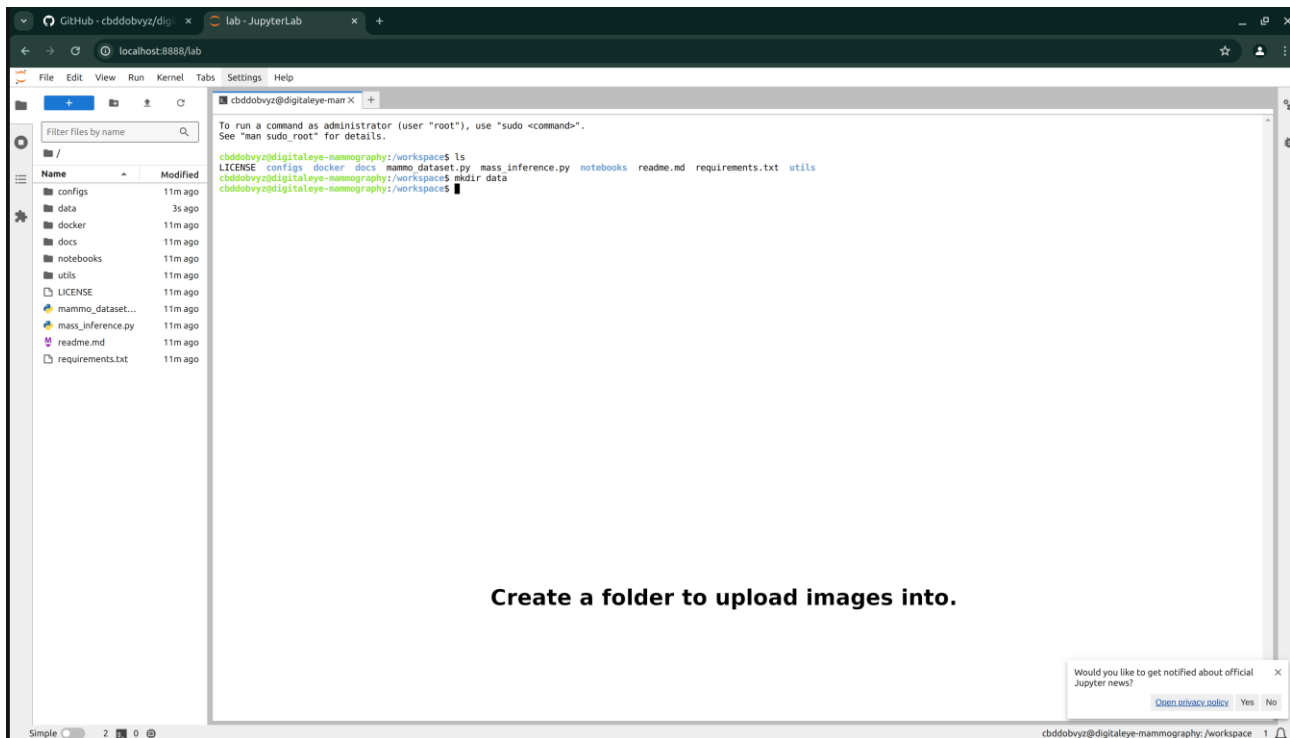
Attaching to digitaleye-1
digitaleye-1 | [I 2024-05-15 08:04:04.751 ServerApp] jupyter_lsp | extension was successfully linked.
digitaleye-1 | [I 2024-05-15 08:04:04.754 ServerApp] jupyter_server_terminals | extension was successfully linked.
digitaleye-1 | [W 2024-05-15 08:04:04.755 LabApp] 'allow_origin' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.
digitaleye-1 | [W 2024-05-15 08:04:04.755 LabApp] 'token' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.
digitaleye-1 | [W 2024-05-15 08:04:04.755 LabApp] 'password' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.
digitaleye-1 | [W 2024-05-15 08:04:04.757 ServerApp] ServerApp.token config is deprecated in 2.0. Use IdentityProvider.token.
digitaleye-1 | [I 2024-05-15 08:04:04.757 ServerApp] jupyterlab | extension was successfully linked.
digitaleye-1 | [I 2024-05-15 08:04:04.758 ServerApp] Writing Jupyter server cookie secret to /home/cbddobvyyz/.local/share/jupyter/runtime/jupyter_cookie_secret
digitaleye-1 | [I 2024-05-15 08:04:04.884 ServerApp] notebook_shim | extension was successfully linked.
digitaleye-1 | [W 2024-05-15 08:04:04.895 ServerApp] All authentication is disabled. Anyone who can connect to this server will be able to run code.
digitaleye-1 | [I 2024-05-15 08:04:04.895 ServerApp] notebook_shim | extension was successfully loaded.
digitaleye-1 | [I 2024-05-15 08:04:04.896 ServerApp] jupyter_lsp | extension was successfully loaded.
digitaleye-1 | [I 2024-05-15 08:04:04.897 ServerApp] jupyter_server_terminals | extension was successfully loaded.
digitaleye-1 | [I 2024-05-15 08:04:04.898 LabApp] JupyterLab extension loaded from /home/cbddobvyyz/.local/lib/python3.10/site-packages/jupyterlab
digitaleye-1 | [I 2024-05-15 08:04:04.898 LabApp] JupyterLab application directory is /home/cbddobvyyz/.local/share/jupyter/lab
digitaleye-1 | [I 2024-05-15 08:04:04.898 LabApp] Extension Manager is 'pypl'.
digitaleye-1 | [I 2024-05-15 08:04:04.931 ServerApp] jupyterlab | extension was successfully loaded.
digitaleye-1 | [I 2024-05-15 08:04:04.931 ServerApp] Serving notebooks from local directory: /workspace
digitaleye-1 | [I 2024-05-15 08:04:04.931 ServerApp] Jupyter Server 2.14.0 is running at:
digitaleye-1 | [I 2024-05-15 08:04:04.931 ServerApp] http://digitaleye-nannography:8888/lab
digitaleye-1 | [I 2024-05-15 08:04:04.931 ServerApp] http://127.0.0.1:8888/lab
digitaleye-1 | [I 2024-05-15 08:04:04.931 ServerApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
digitaleye-1 | [I 2024-05-15 08:04:04.943 ServerApp] Skipped non-installed server(s): bash-language-server, dockerfile-language-server-nodejs, javascript-typescript-languageserver, jedi-language-server, julia-language-server, pyright, python-language-server, python-lsp-server, r-language-server, sql-language-server, texlab, typescript-language-server, unified-language-server, vscode-css-languageserver-bin, vs-code-html-languageserver-bin, vscode-json-languageserver-bin, yaml-language-server
```

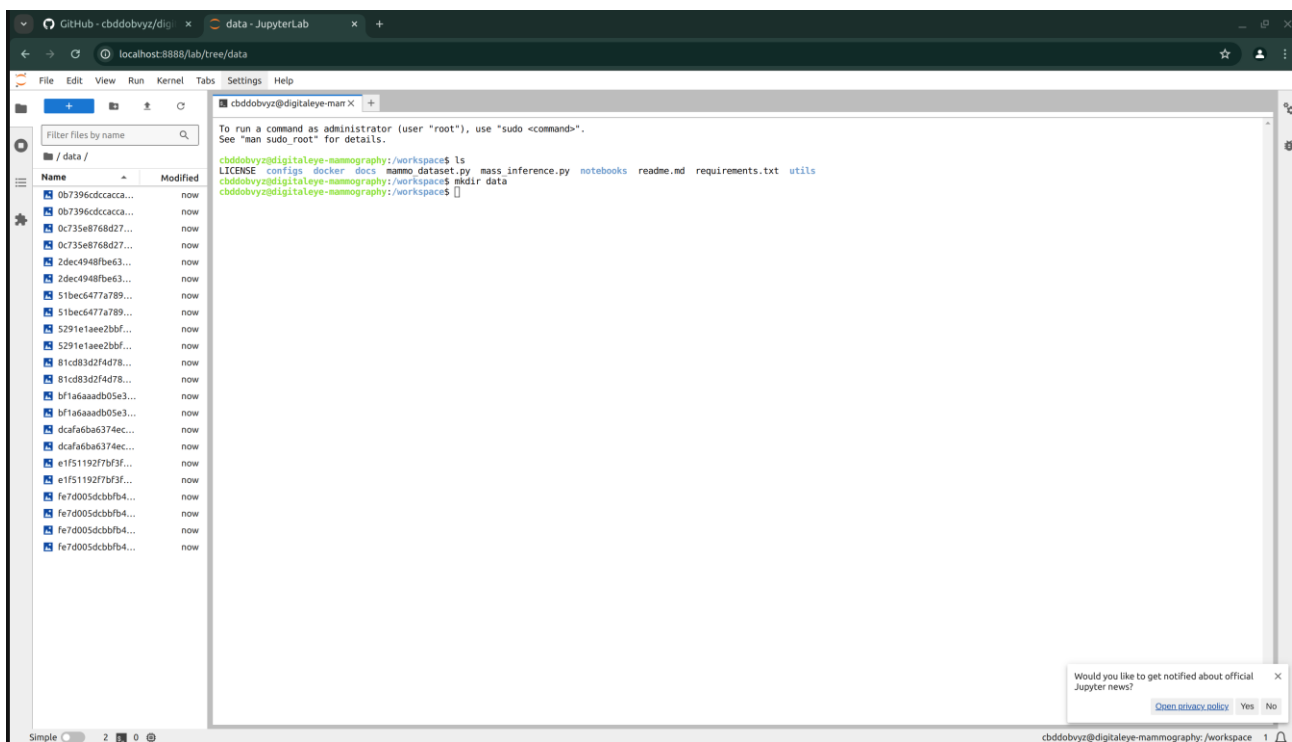
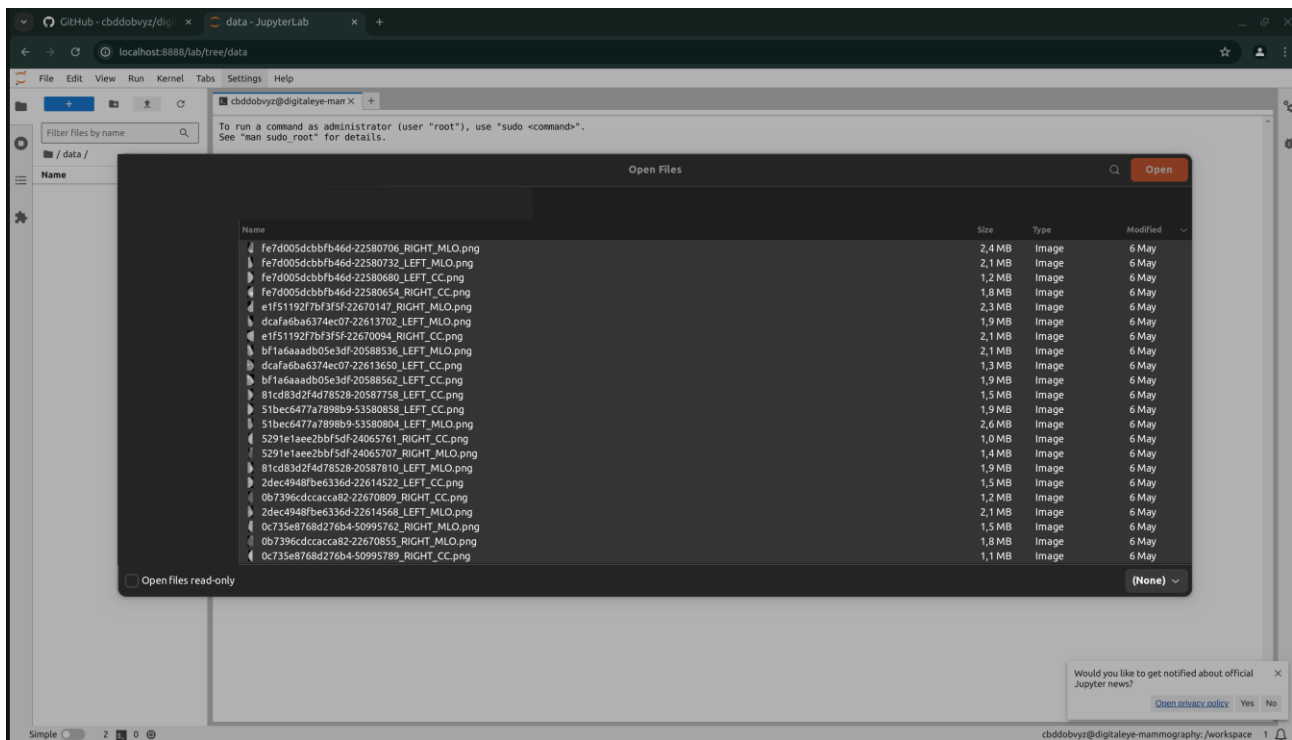
STEP 3: The Jupyter Lab interface opens at the specified `http://127.0.0.1:8888/lab` address or `localhost:8888/lab` address.



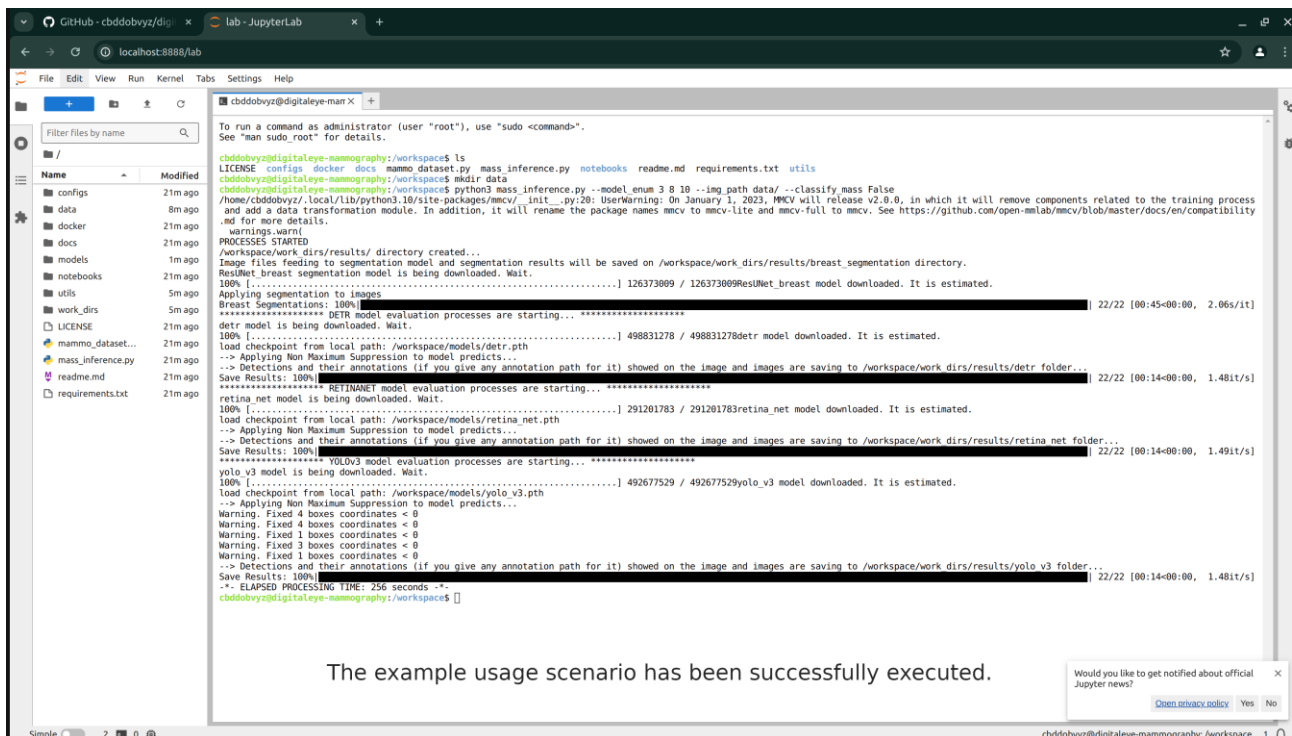
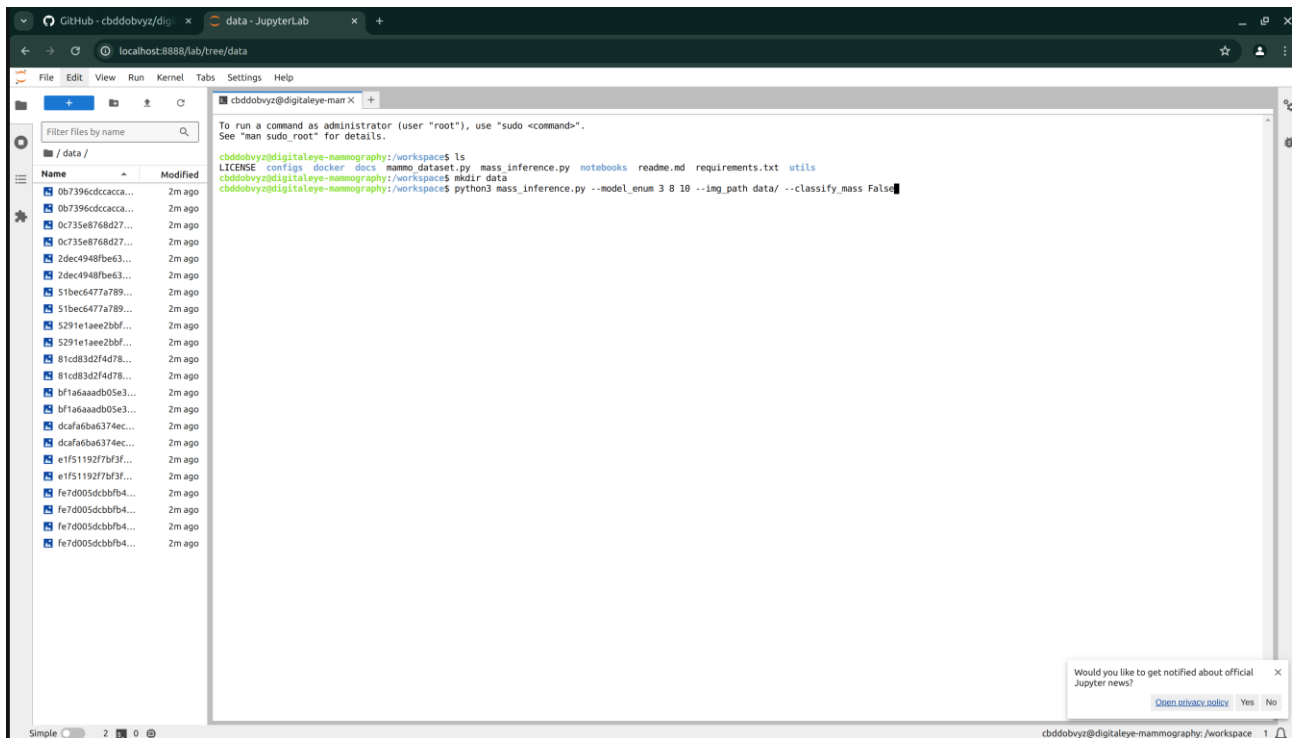
Jupyter Lab Container is up and running at localhost:8888

STEP 4: Creating data folder with “mkdir data” (different folder name can be chosen or selected instead of the data folder) command for uploading datas to that folder.

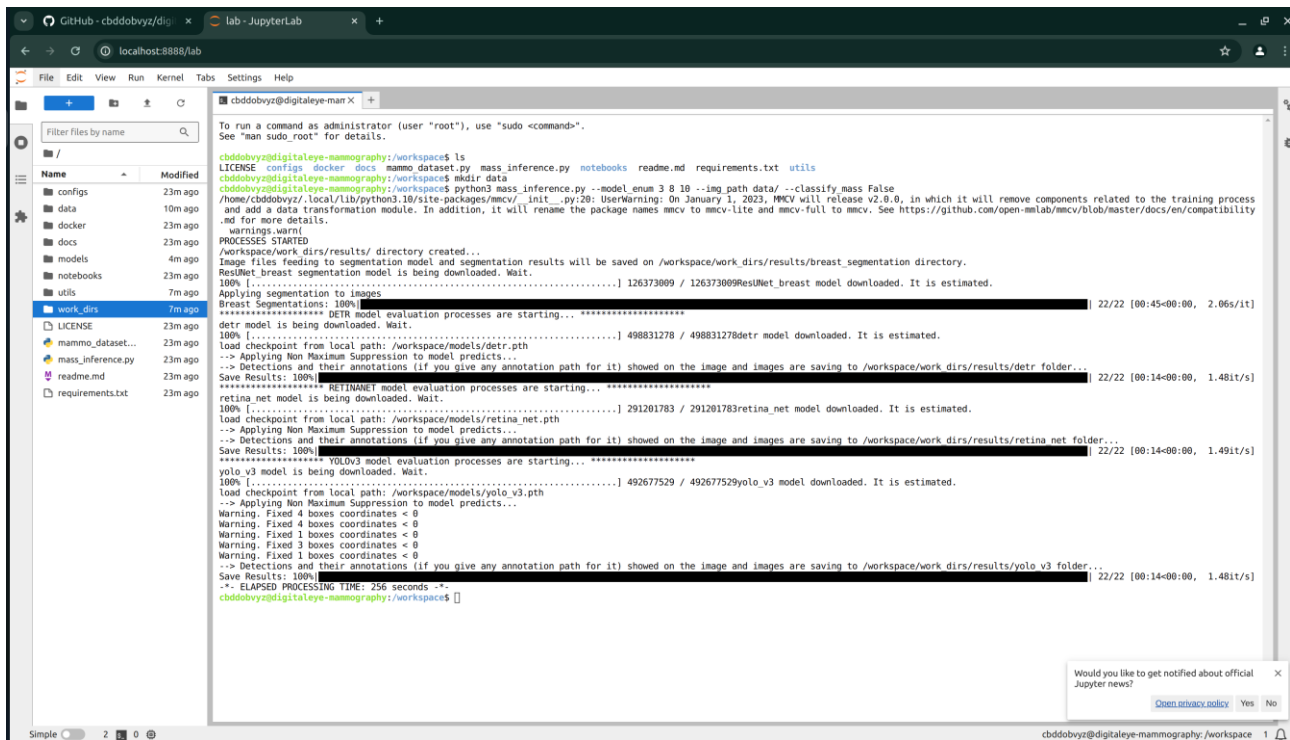




STEP 5: Running an example scenario from digitleye-mammography repo with “python3 mass_inference.py --model_enum 3 8 10 --img_path data/ --classify_mass False” command.

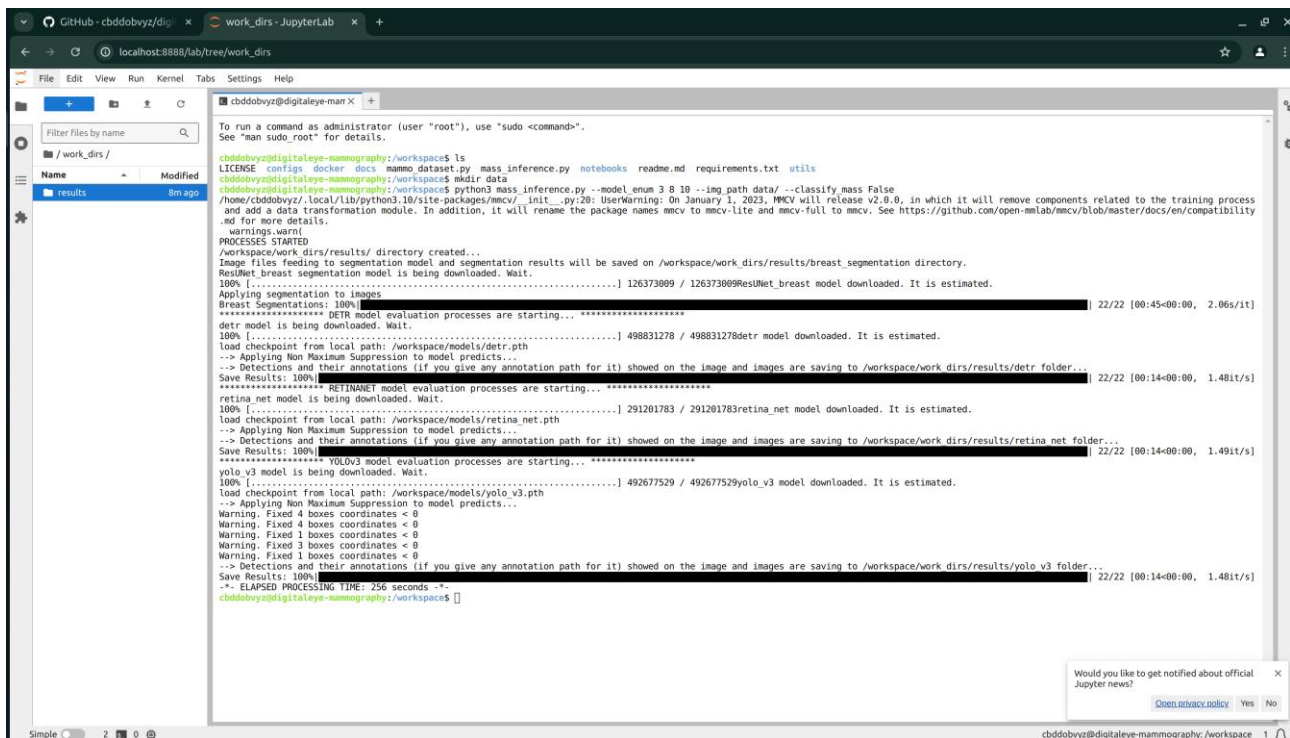


Step 6: Model outputs saved on workdirs directory.



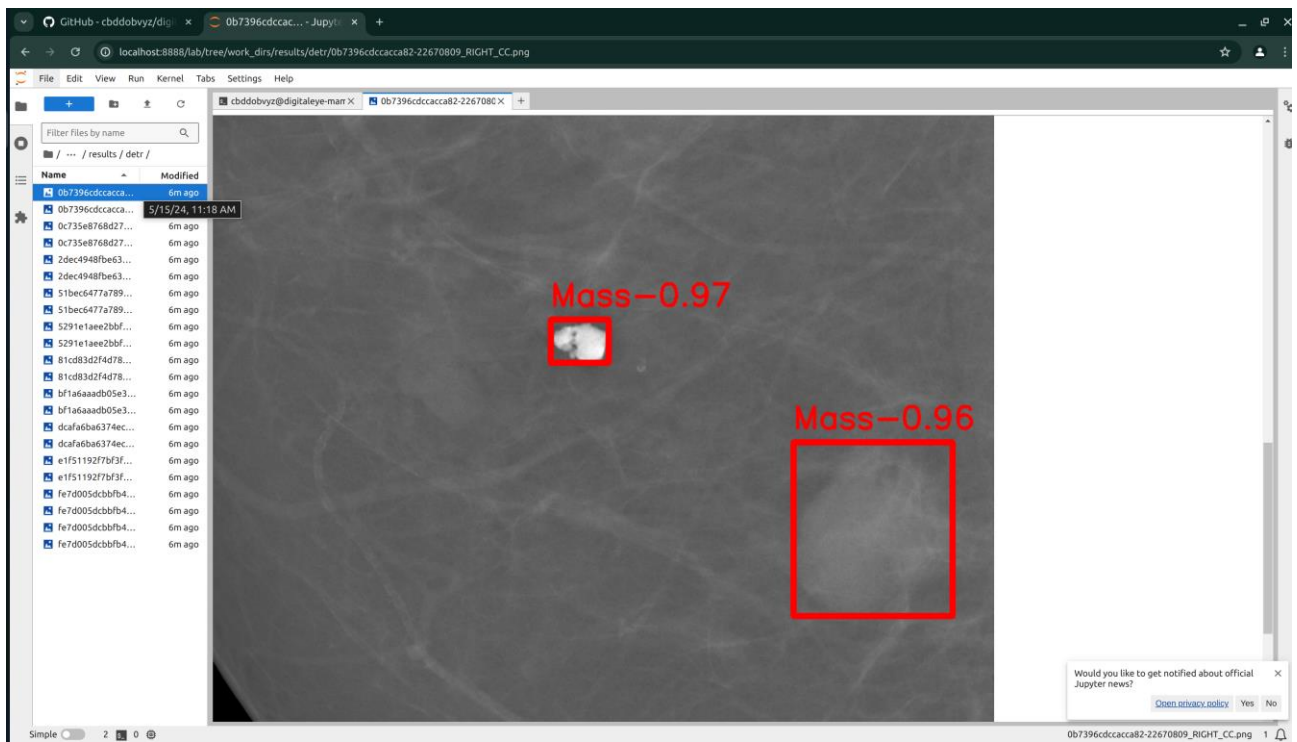
```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

cbbdbvz@digitaleye-man X
LICENSE configs docker docs mammo dataset.py mass inference.py notebooks readme.md requirements.txt utils
cbbdbvz@digitaleye-mammography:/workspace$ mkdir data
cbbdbvz@digitaleye-mammography:/workspace$ cd /workspace
/home/cbbdbvz/.local/lib/python3.10/site-packages/mmcv/_init_.py:20: UserWarning: On January 1, 2023, MMCV will release v2.0.0, in which it will remove components related to the training process
and add a data transformation module. In addition, it will rename the package names mmcv to mmcv-lite and mmcv-full to mmcv. See https://github.com/open-mmlab/mmcv/blob/master/docs/en/compatibility
.md for more details.
  warnings.warn(
PROCESSES STARTED
/workspace/work_dirs/results/ directory created...
Image files feeding to segmentation model and segmentation results will be saved on /workspace/work_dirs/results/breast_segmentation directory.
ResUNet breast segmentation model is being downloaded. Wait.
100% [.....] 126373009 / 126373009ResUNet breast model downloaded. It is estimated.
Applying segmentation to images
Breast Segmentations: 100% [.....] 22/22 [00:45:00:00, 2.06s/it]
DETR model is being downloaded. Wait.
100% [.....] 498831278 / 498831278detr model downloaded. It is estimated.
Load checkpoint from local path: /workspace/models/detr.pth
--> Applying Non Maximum Suppression to model predicts...
--> Detections and their annotations (if you give any annotation path for it) showed on the image and images are saving to /workspace/work_dirs/results/detr folder...
Save Results: 100% [.....] 22/22 [00:14:00:00, 1.481t/s]
RETINANET model evaluation processes are starting...
retina_net model is being downloaded. Wait.
100% [.....] 291201783 / 291201783retina_net model downloaded. It is estimated.
Load checkpoint from local path: /workspace/models/retina_net.pth
--> Applying Non Maximum Suppression to model predicts...
--> Detections and their annotations (if you give any annotation path for it) showed on the image and images are saving to /workspace/work_dirs/results/retina_net folder...
Save Results: 100% [.....] 22/22 [00:14:00:00, 1.491t/s]
YOLOv3 model evaluation processes are starting...
yolo_v3 model is being downloaded. Wait.
100% [.....] 492677529 / 492677529yolo_v3 model downloaded. It is estimated.
Load checkpoint from local path: /workspace/models/yolo_v3.pth
--> Applying Non Maximum Suppression to model predicts...
Warning: Fixed 4 boxes coordinates < 0
Warning: Fixed 4 boxes coordinates < 0
Warning: Fixed 1 boxes coordinates < 0
Warning: Fixed 3 boxes coordinates < 0
Warning: Fixed 1 boxes coordinates < 0
--> Detections and their annotations (if you give any annotation path for it) showed on the image and images are saving to /workspace/work_dirs/results/yolo_v3 folder...
Save Results: 100% [.....] 22/22 [00:14:00:00, 1.481t/s]
-*. ELAPSED PROCESSING TIME: 256 seconds -*.
cbbdbvz@digitaleye-mammography:/workspace$
```



```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

cbbdbvz@digitaleye-man X
LICENSE configs docker docs mammo dataset.py mass inference.py notebooks readme.md requirements.txt utils
cbbdbvz@digitaleye-mammography:/workspace$ mkdir data
cbbdbvz@digitaleye-mammography:/workspace$ cd /workspace
/home/cbbdbvz/.local/lib/python3.10/site-packages/mmcv/_init_.py:20: UserWarning: On January 1, 2023, MMCV will release v2.0.0, in which it will remove components related to the training process
and add a data transformation module. In addition, it will rename the package names mmcv to mmcv-lite and mmcv-full to mmcv. See https://github.com/open-mmlab/mmcv/blob/master/docs/en/compatibility
.md for more details.
  warnings.warn(
PROCESSES STARTED
/workspace/work_dirs/results/ directory created...
Image files feeding to segmentation model and segmentation results will be saved on /workspace/work_dirs/results/breast_segmentation directory.
ResUNet breast segmentation model is being downloaded. Wait.
100% [.....] 126373009 / 126373009ResUNet breast model downloaded. It is estimated.
Applying segmentation to images
Breast Segmentations: 100% [.....] 22/22 [00:45:00:00, 2.06s/it]
DETR model is being downloaded. Wait.
100% [.....] 498831278 / 498831278detr model downloaded. It is estimated.
Load checkpoint from local path: /workspace/models/detr.pth
--> Applying Non Maximum Suppression to model predicts...
--> Detections and their annotations (if you give any annotation path for it) showed on the image and images are saving to /workspace/work_dirs/results/detr folder...
Save Results: 100% [.....] 22/22 [00:14:00:00, 1.481t/s]
RETINANET model evaluation processes are starting...
retina_net model is being downloaded. Wait.
100% [.....] 291201783 / 291201783retina_net model downloaded. It is estimated.
Load checkpoint from local path: /workspace/models/retina_net.pth
--> Applying Non Maximum Suppression to model predicts...
--> Detections and their annotations (if you give any annotation path for it) showed on the image and images are saving to /workspace/work_dirs/results/retina_net folder...
Save Results: 100% [.....] 22/22 [00:14:00:00, 1.491t/s]
YOLOv3 model evaluation processes are starting...
yolo_v3 model is being downloaded. Wait.
100% [.....] 492677529 / 492677529yolo_v3 model downloaded. It is estimated.
Load checkpoint from local path: /workspace/models/yolo_v3.pth
--> Applying Non Maximum Suppression to model predicts...
Warning: Fixed 4 boxes coordinates < 0
Warning: Fixed 4 boxes coordinates < 0
Warning: Fixed 1 boxes coordinates < 0
Warning: Fixed 3 boxes coordinates < 0
Warning: Fixed 1 boxes coordinates < 0
--> Detections and their annotations (if you give any annotation path for it) showed on the image and images are saving to /workspace/work_dirs/results/yolo_v3 folder...
Save Results: 100% [.....] 22/22 [00:14:00:00, 1.481t/s]
-*. ELAPSED PROCESSING TIME: 256 seconds -*.
cbbdbvz@digitaleye-mammography:/workspace$
```



Example model output