



## FetReg 2021 – Placental Vessel Segmentation and Registration in Fetoscopy Challenge

Part of the Endoscopic Vision Challenge – MICCAI2021

FetReg 2021 challenge details are available on the challenge website:

<https://www.synapse.org/#!/Synapse:syn25313156>

For any query, write to us: [endovis-weiss-vision@ucl.ac.uk](mailto:endovis-weiss-vision@ucl.ac.uk)

## Submission Guidelines – Test Phase

This document covers the technical details on preparing and submitting the docker submissions for the two sub-tasks of the FetReg 2021 challenge. Please also visit [FetReg - Placental Vessel Segmentation and Registration in Fetoscopy - syn25313156 - Wiki \(synapse.org\)](#) and follow the writeup instructions for making a complete and valid submission.

Testing data will not be accessible during the testing phase. The participants must create a valid docker file, following the guidelines in this document and upload it to the synapse platform. The challenge organisers will evaluate the docker submissions on the test data.

### 1. Submission Docker Image Format

The docker image must read data from /data/input and output the resulting segmentation mask (for task 1) or txt file with the transformation matrix (for task 2) into /data/output.

All the images to be tested by the container will be copied into /data/input, the container will process them and store the results in /data/output.

***Follow the instructions in 'Testing docker image locally' to verify that your docker image is functioning as desired before submitting it on the Synapse.***

#### 1.1. Task 1 (Placental semantic segmentation) Submission

For Task 1, the submitted docker will be used for testing in the following way:

- All test images will be copied into /images/input in 'png' format.
- The submitted docker will scan all images from the /images/input folder with '.png' extension
- The submitted docker will process each image and output a single channel mask with value [0, num\_classes].
- The submitted docker will store the output mask in /images/output folder. The output mask will have the exact same name and extension as of its input image.

For example,

**INPUT:** /images/input/Video001\_frame00500.png

**OUTPUT:** /images/output/Video001\_frame00500.png

## 1.2. Task 2 (Placental RGB frame registration for mosaicking) Submission

For Task 2, the submitted docker will be used for testing in the following way:

- All test frames from a video clip will be copied into `/images/input` in 'png' format.
- The submitted docker will scan all frames from the `/images/input` folder with '.png' extension and ensure they are in ascending order.
- The submitted docker will process each consecutive pair of frames ( $k$ ,  $k+1$ ) and output the transformation matrix that defines the warping from  $k$  to  $k+1$  frame.
- The submitted docker will store the output transformation as a txt file in `/images/output` folder.

```
0.9867 -0.0151 -4.4883
-0.0154 1.0020 4.4437
0.0000 0.0000 1.0000
```

- The output txt file will have the exact same name as  $k+1$  frame name with a txt extension.

For example,

```
INPUT: /images/input/Video001_CLIP01_0001.png
       /images/input/Video001_CLIP01_0002.png
       /images/input/Video001_CLIP01_0003.png ...

OUTPUT: /images/output/Video001_CLIP01_0002.txt
        /images/output/Video001_CLIP01_0003.txt ...
```

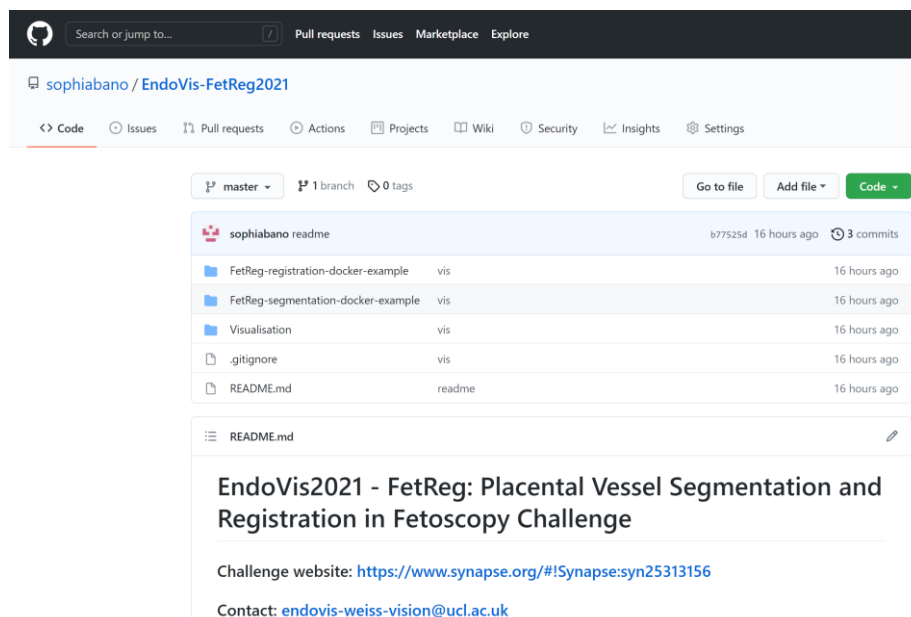
## 1.3. Docker image format – Dummy Examples for Task 1 and Task 2

To facilitate the submission, we have provided dummy docker images for both Task 1 and Task 2, which shows the path to set for the input and output folders and the format of the output mask ('png' for Task 1) and homography matrix ('txt' for Task 2).

Visit the EndoVis-FetReg2021 Github page (below mentioned link) for accessing these docker dummy examples

<https://github.com/sophiabano/EndoVis-FetReg2021>

This Github repository also contains scripts for visualising the output masks (Task 1) and mosaics obtained from the homography matrices (Task 2).



## 2. Submission instructions

Each team/participant needs to fulfil the following submission criteria to qualify in the challenge leaderboard.

- A **docker container** for each subtask uploaded to Synapse along with its writeup on its WIKI page. (Complete docker submission instructions are provided in this document)
- **Writeup of the method** used (for each task), submitted via the WIKI as a public Synapse Project.
  - o Please visit [THIS LINK](#) for the method writeup guidelines.
  - o For submitting the writeup, follow the following two steps:
    1. In the project that you created, create a Wiki for the project: Tools > Edit Project Wiki.
    2. Register to the challenge to submit your writeup
- **Pre-recorded short presentation:**  
MICCAI2021 and Endovis2021 challenge will be virtual this year. Each team/participant must submit a pre-recorded video presentation of their methods. Further details on the duration of the talk will be published closer to the challenge day.

### 1.4. Becoming a certificate user

**IMPORTANT:** To use all docker functionality on Synapse, you must be a certified user. You can become a certified user by filling out the following quiz:

<https://www.synapse.org/#!Quiz:>

## 2. Building and testing docker images

### 2.1. Building docker images

Ensure that you are in the top level directory of the project where the Dockerfile is located.

Build the image using the command:

```
docker build -t <image_name> .
```

```
/fetreg-seg-docker$ docker build -t fetreg2021_task1_sbtest:v1 .
```

**Note:** Use the format fetreg2021\_<task\_name>\_<team\_name>:<version>

where,

<task\_name> is either *task1* or *task2* depending on the task you are submitting to

<team\_name> is the acronym of your team that you specified at the time of team registration. In the above example, it is *sbtest*

<version> is the version number

### 2.2. Testing docker image locally

To test the docker image locally, you will need a directory with example input images and an empty directory to output resulting image/txtfiles.

You can test your image using the following command

```
docker run -gpus all -it -rm -v "$PWD/images:/data" <image_name> /data/input /data/output
```

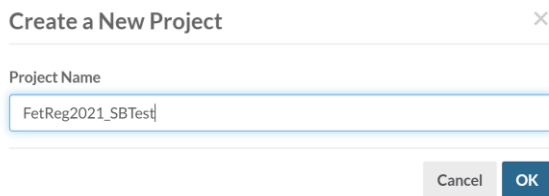
```
/fetreg-seg-docker$ docker run --gpus all -it --rm -v "$PWD/images:/data" fetreg2021_task1_sbtest:v1 /data/input data/output
```

## 4. Docker submission on the synapse platform

### 4.1. Create a new project on synapse

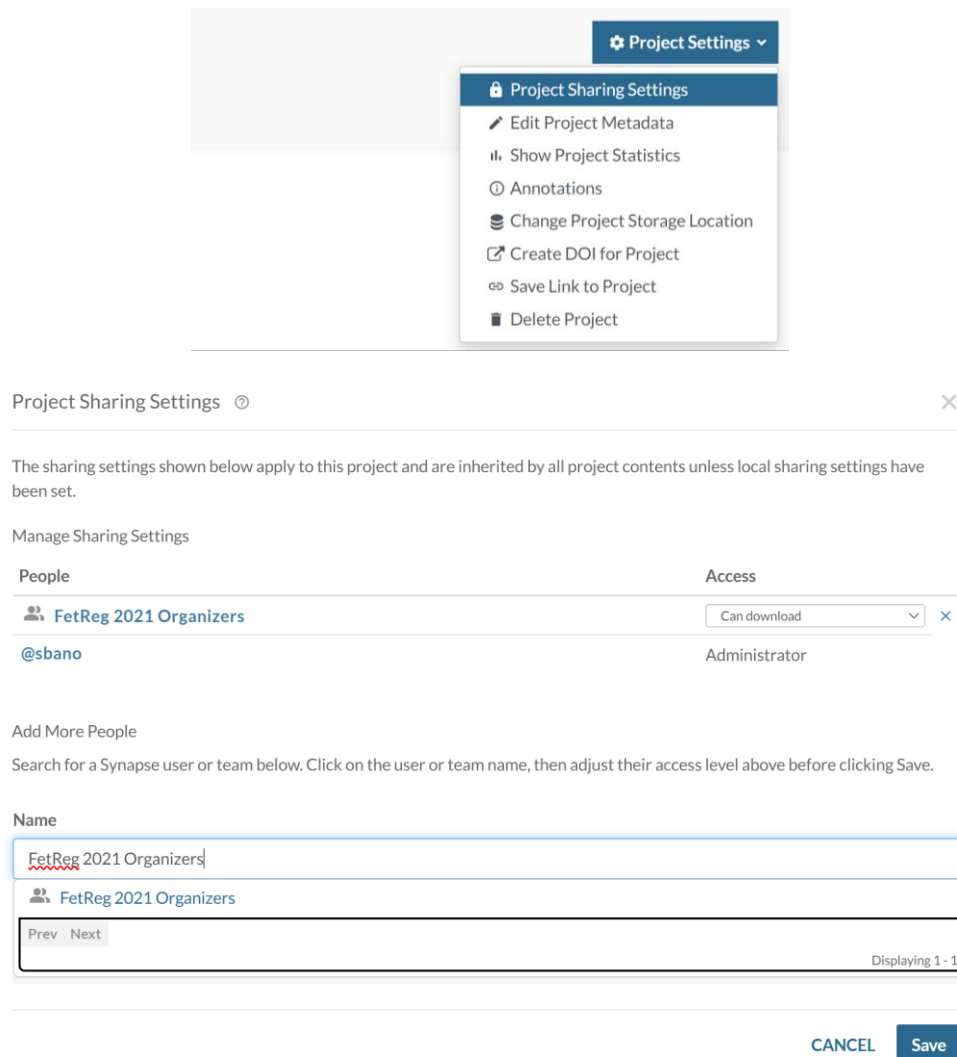
In order to submit a docker file, you first need to create a new project on the Synapse platform with the challenge name and your team:

FetReg2021\_<team\_name>



Once the project is created,

- Note its Synapse ID (e.g. syn26041645)
- Give download permission of the project to the FetReg organising team (FetReg 2021 Organizers)



People	Access
FetReg 2021 Organizers	Can download
@sbano	Administrator

### 4.2. Login to Synapse with docker

docker login docker.synapse.org (Enter Synapse username and password)

```

/fetreg-seg-docker$ docker login docker.synapse.org
Username: sbano
Password:
WARNING! Your password will be stored unencrypted in /home/sophiabano/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
/fetreg-seg-docker$

```

### 4.3. Tag the submission docker image

Please note the synapse ID highlighted in blue in the screenshot.

```
docker tag <imagename_local> docker.synapse.org/<Synapse ID>/<imagename_synapse>
```

```

/fetreg-seg-docker$ docker tag fetreg2021_task1_sbtest:v1 docker.synapse.org/syn26041645/fetreg2021_task1_sbtest:v1
/fetreg-seg-docker$

```

### 4.4. Push the docker image to Synapse

```
docker push docker.synapse.org/<Synapse ID>/<imagename_synapse>:<version>
```


```

/fetreg-seg-docker$ docker push docker.synapse.org/syn26041645/fetreg2021_task1_sbtest:v1
The push refers to repository [docker.synapse.org/syn26041645/fetreg2021_task1_sbtest]
0bec278056fc: Pushed
0f8f9a1425ab: Pushed
1ed0e2617ffd: Pushed
fbf231877aa6: Pushed
4923b3a899cf: Layer already exists
b2c054647c06: Layer already exists
3e57cc4e79f7: Layer already exists
28ba7458d04b: Layer already exists
838a37a24627: Layer already exists
a6ebef4a95c3: Layer already exists
b7f7d2967507: Layer already exists
latest: digest: sha256:b671c3888a2dfe0b796491eec0b78af52e79cb55117950c6e27d76864c4931 size: 2633
/fetreg-seg-docker$

```

### 4.5 Verify the docker image push

You can verify on the Synapse website if the push was successful. If the download fails, it might be because you are not a **certified user**.



**FetReg2021\_SBtest** ☆

Synapse ID: syn26041645 ⓘ    Storage Location: Synapse Storage

Wiki ⓘ    Files ⓘ    Tables ⓘ    Discussion ⓘ    **Docker ⓘ**

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**Docker**


[docker.synapse.org/syn26041645/fetreg2021\\_task1\\_sbtest](https://docker.synapse.org/syn26041645/fetreg2021_task1_sbtest)  
 Last Updated: 2021-08-09 17:22

### 4.6 Submit the docker image to the challenge

There are two ways in which you can submit the docker image to the challenge.

1. **Method 1:** To make a submission, go to the challenge website → Submission → Submit your docker

Click on the subtask to which you want to submit.

Then, select the docker entity that you would like to submit.

Under the submission name, mention the challenge name followed by task name (task1 or task2) and team name:

Fetreg2021\_<task\_name>\_<team\_name>

Submit to Challenge

Select the Entity that you would like to submit:

Submitting to the following challenge

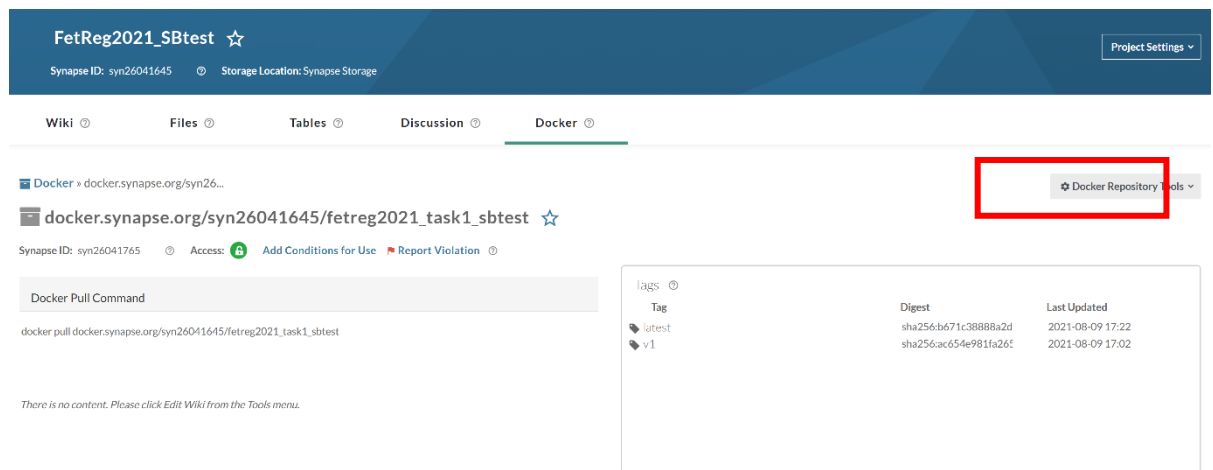
Task 1 - Placental semantic segmentation

Submission name (optional)

CANCEL
Next

2. **Method 2:** Under your project FetReg2021\_<team\_name>, press the 'Docker' tab

Click on the docker that you wish to submit to the challenge



FetReg2021\_SBtest ☆

Synapse ID: syn26041645 Storage Location: Synapse Storage

Wiki Files Tables Discussion Docker

Docker » docker.synapse.org/syn26041645/fetreg2021\_task1\_sbtest ☆

Synapse ID: syn26041765 Access: Add Conditions for Use Report Violation

Docker Pull Command

```
docker pull docker.synapse.org/syn26041645/fetreg2021_task1_sbtest
```

There is no content. Please click Edit Wiki from the Tools menu.

Tag	Digest	Last Updated
latest	sha256:b671c38888a2d	2021-08-09 17:22
v1	sha256:ac654e981fa26f	2021-08-09 17:02

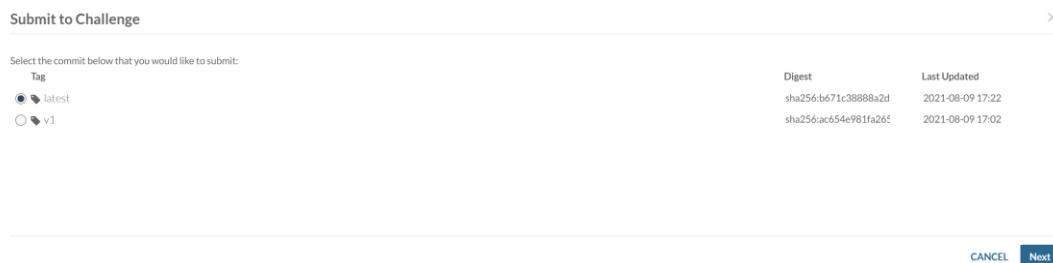
Then, click on 'Docker Repository Tools' → 'Submit Docker Repository to Challenge'



Docker Repository Tools

- Docker Repository Sharing Settings
- Annotations
- Edit Docker Repository Wiki
- View Wiki Source
- Edit Docker Repository Provenance
- Submit Docker Repository to Challenge**
- Create DOI for Docker Repository
- Save Link to Docker Repository
- Delete Docker Repository

Select the docker 'Tag' you would like to submit.



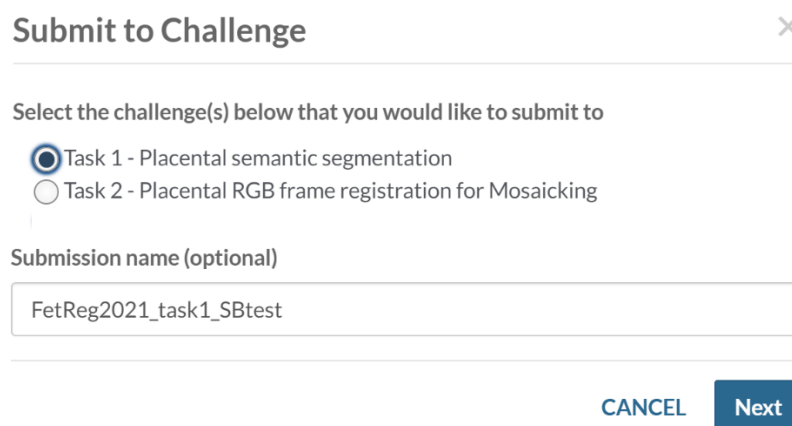
Submit to Challenge

Select the commit below that you would like to submit:

Tag	Digest	Last Updated
<input checked="" type="radio"/> latest	sha256:b671c38888a2d	2021-08-09 17:22
<input type="radio"/> v1	sha256:ac654e981fa26f	2021-08-09 17:02

CANCEL Next

Next, select the 'Challenge task' you would like to submit.



Submit to Challenge

Select the challenge(s) below that you would like to submit to

<input checked="" type="radio"/> Task 1 - Placental semantic segmentation
<input type="radio"/> Task 2 - Placental RGB frame registration for Mosaicking

Submission name (optional)

FetReg2021\_task1\_SBtest

CANCEL Next

Next, select 'I am submitting as an individual'.

Note that team registration is taking place through a separate email. On the Synapse Challenge website, **only the lead participant of the team can make the submission** to avoid voiding the [Participation Policy](#).

×

☒ I am submitting as an individual

☐ I am submitting as part of a team

CANCEL

Submit

You will receive an email within 12 hours confirming if the submission made is valid.

×

Thank you for your submission!

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We have received your submission! You will receive a confirmation email once it will be validated.

OK

Your submission will appear in the Submissions table for the specific task.

Submissions - Task 1 - Semantic Placenta Segmentation

Docker	Submitter ID	Team ID	Last Update	Name	Status
	@sbano		08/09/2021 5:05 PM	fetreg2021_task1_sbtest	RECEIVED
docker.synapse.org/syn26041645/fetreg2021_task1_...	@sbano		08/09/2021 5:27 PM	fetreg2021_task1_sbtest	RECEIVED

For any query, write to us: [endovis-weiss-vision@ucl.ac.uk](mailto:endovis-weiss-vision@ucl.ac.uk) or post on the [EndoVis-FetReg2021 Slack forum](#).