Contestant Briefing | 6 October 2020

Organiser

Participating Organisation

AI CHALLENGE

COMPUTER VISION – IDENTIFYING SURGICAL INSTRUMENT

Agenda

Item	Duration	Speaker
HKSTP Opening message	5 mins	Dr. Maggie Mai HKSTP
HA AI Lab Industry end-user sharing	10 mins	HA
Important Dates and Milestones	10 mins	HKSTP
Game Rules	10 mins	HKSTP
Model Submission	10 mins	Mr. Martin Liu HKSTP
Prize and Award	5 mins	HKSTP
Q&A	20 mins	HA & HKSTP

Overview

Computer vision has advanced considerably but is still challenged in matching the precision of human intelligence. **Could AI assist human to perform Surgical instrument counting go in and out of Hospital Operating Theatre** – A task that take place over hundred thousand times per year?

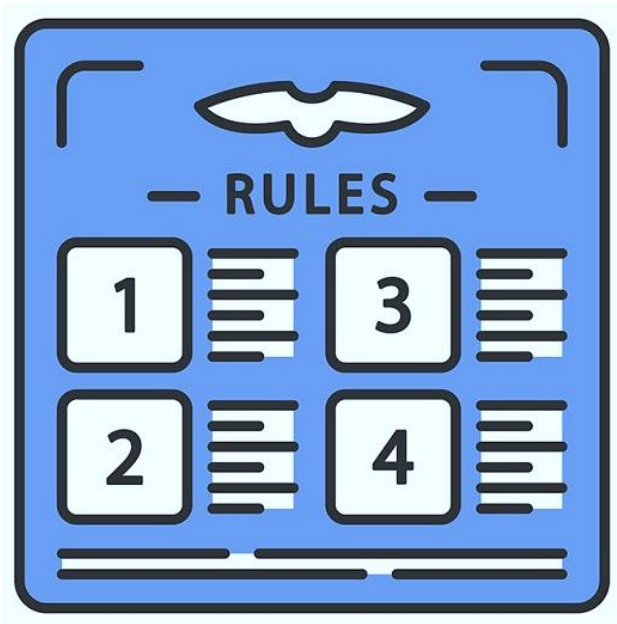
In this competition, you are challenged to build a **machine learning model** that **identifies the Ophthalmology surgical instrument** within an images dataset on HKSTP's latest service addition – **Technology Validation Platform** where Optimal Performance Metrics can be formed.

Phaco and Intraocular, two common instrument sets used in ocular surgery around 10,000 times annually, will be used for the competition. By automating this task, your participation could help free the time of health professionals.

Game Rules

Website for the latest updates and links
Click to enter

Game Rules of the Challenge
Click to enter



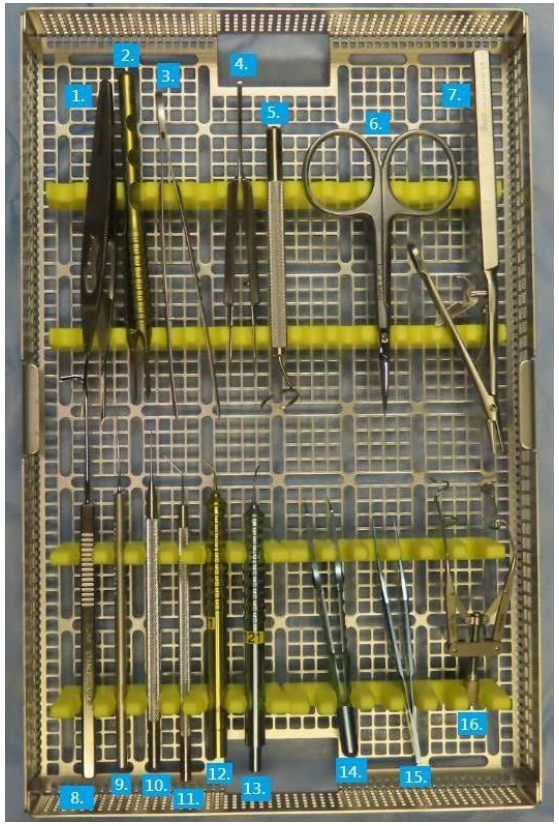
Data (What Where and How)

Instrument Trays

The surgical instruments will be placed on an **ophthalmic instrument sterilization tray**.
There will be around 100 questions in the Game, as shown in the image.

Surgical Instruments

There are **15 categories of surgical instruments** that contestants are expected to annotate the position, identify the category name, and count.



- Will data be provided?
  Model names and images are provided for each category to aid the data collection process.

- Where can the data be found?
  Contestants are expected to find the data to train their model.

- Will we have guidance on our data accuracy?
  Contestants are welcome to send it questions for later Q&A replies

What are the tasks?

Localisation

- Contestants are expected to **annotate the position of each surgical instrument** on the tray using bounding boxes. Intersection over Union (IoU) will be used to evaluate the localisation and contestants will be penalised for false-positive bounding boxes.

Classification

- Contestants are also expected to **name all the surgical instruments on the tray**. Precision per class will be used to evaluate classification performance. The classification result is considered correct when the precision is greater than 0.5.

Counting

- Contestants are expected to **count how many of each surgical instrument is on the tray**. The correct rate will be used to evaluate the counting accuracy and is considered most correct when the correct rate is 100%.

Overall

- The score from each evaluation criteria will be normalised, weighted, and combined, and the team with the **highest overall score** will be chosen.

Event timeline and Milestones

Sep 2020
Recruitment

Oct 2020
Contestant Briefing

6 Oct 2020

Oct - Nov 2020
Model Training
Model Testing

Nov 2020
Model Submission

23 Nov 2020

Dec 2020
Evaluation
& Award Ceremony

7 Dec 2020

Event timeline and Milestones

Timeline	
6 Oct	Competition Briefing to enrolled companies by HKSTP and HA
Oct **Nov**	Model training by enrolled companies - Collect Data - Labelling
23 Nov	Model Submission Deadline onto Technology Validation Platform
2 weeks	HKSTP & HA Evaluation
7 Dec	Seminar and Award Presentation Ceremony at HKSTP

Testing and Final Submission

Model Testing

Please sign up for your testing slots after this briefing session, each slots can accommodate maximum 19 teams on a **first come first served** basis.

- Model Testing (Late Oct): 24 hours within 4 days **only**
- Final Testing prior Submission: 4 hours

REMINDER:

- Turn off the GPU after each use.
- Accumulative of 24 hours within the period only.
- You may be logged out without notice if you exceed the designated testing hours.

Submission

The Submission

Each contestant's model will be tested by the Hospital Authority. Contests shall submit their model on to the HKSTP Validation Platform no later than:

- Date: **23 Nov 2020, 12noon**

Contestants will output results to a pre-defined format (csv).

Results will be announced on the Official Award Ceremony in early December.

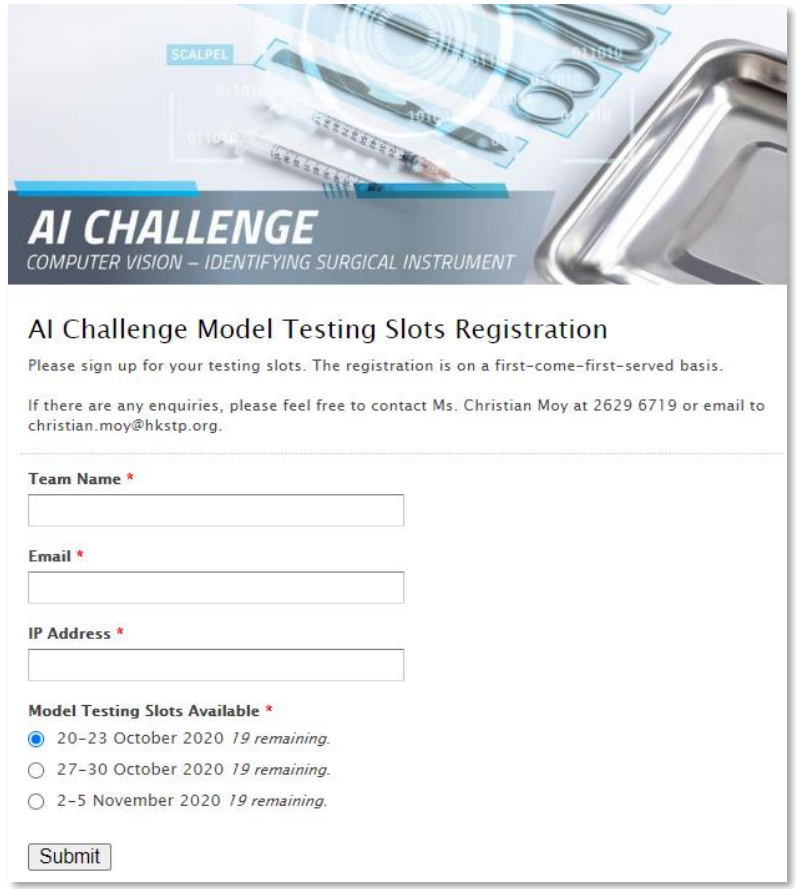
Submission procedure

Submission procedure

Send us your IP (12 – 15 Oct)

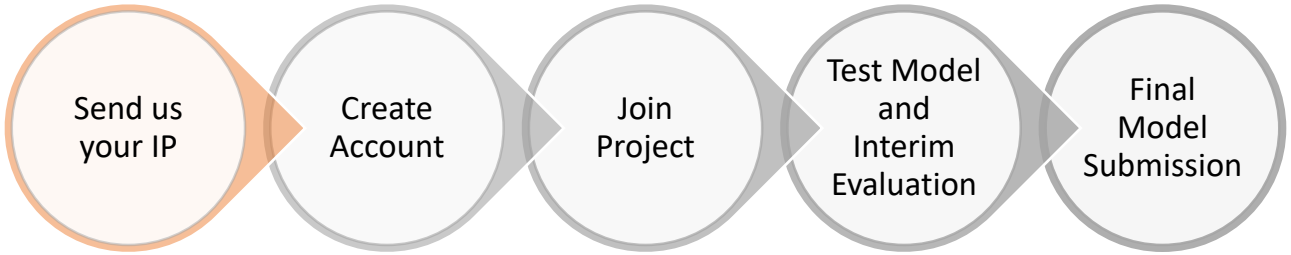
Owing to security reasons, we are providing a dedicated access for you to connect to the platform. Please enter your IP address in the Model Testing Slots Registration Form.

Check your public IP address: https://whatismyipaddress.com/



Remarks

- **You are preferred to provide static IP**. Dynamic IP also works however if it changes later, please contact christian.moy@hkstp.org immediately and we will record your new IP address accordingly for continuous connection to the platform.
- If you are connecting through a co-working/shared network (e.g. outsiders share the network with you), please kindly provide your local machine MAC address to allow us to further restrict the channel.



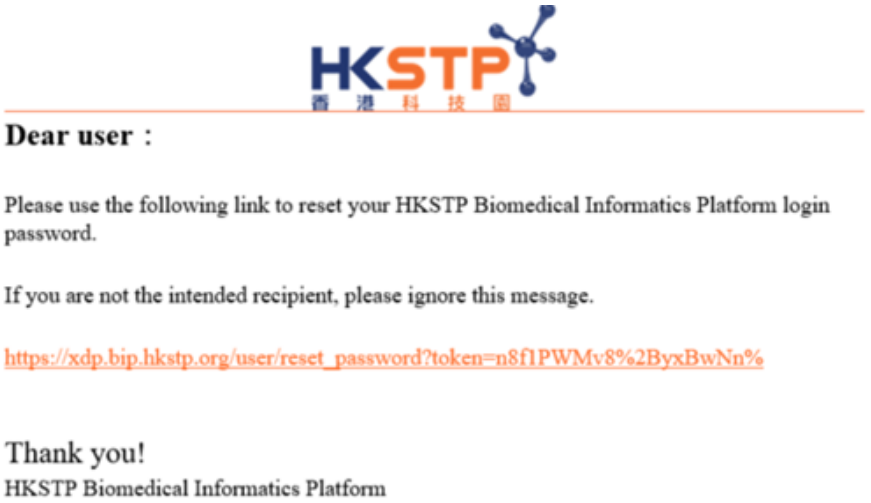
Submission procedure

Create Account (16 – 19 Oct)

1. You should receive an email to reset password on the platform on or before **19 Oct.**

2. Click on link to change your password.

3. Login https://bip.hkstp.org/ with your new password.



HKSTP 香港科技園

Dear user：

Please use the following link to reset your HKSTP Biomedical Informatics Platform login password.

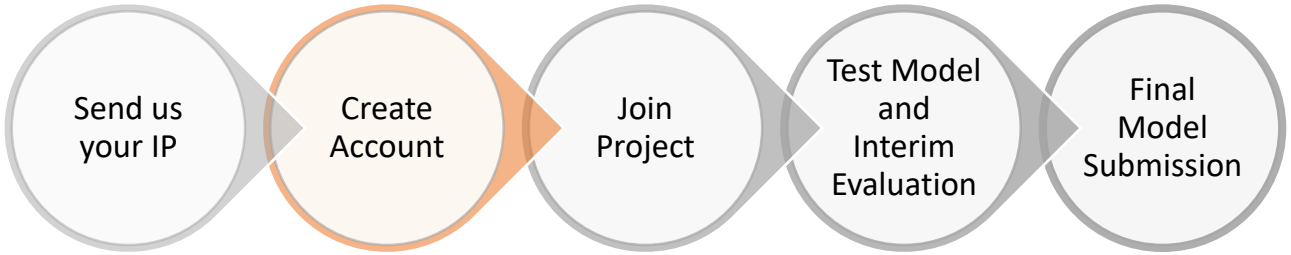
If you are not the intended recipient, please ignore this message.

https://xdp.bip.hkstp.org/user/reset_password?token=n8f1PWMv8%2ByxBwNn%

Thank you!
HKSTP Biomedical Informatics Platform

Remarks

- You could only login to the platform during period of your registered model testing slots, and the final submission period (16 – 23 Nov before 12noon).

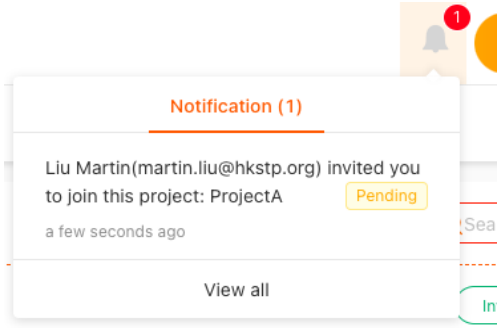


Submission procedure

Join Project (During your model testing slot)

(20-23 Oct / 27-30 Oct / 2-4 Nov)

1. Your account will be activated on **start day @ 10am (HKTime)**
2. Log in to the platform.
3. You will receive an invitation to join the project on the platform at the notification icon (top right hand corner).
4. The project name will be **HA AI Challenge - <ID> - <your company name>**
5. Accept project invitation.



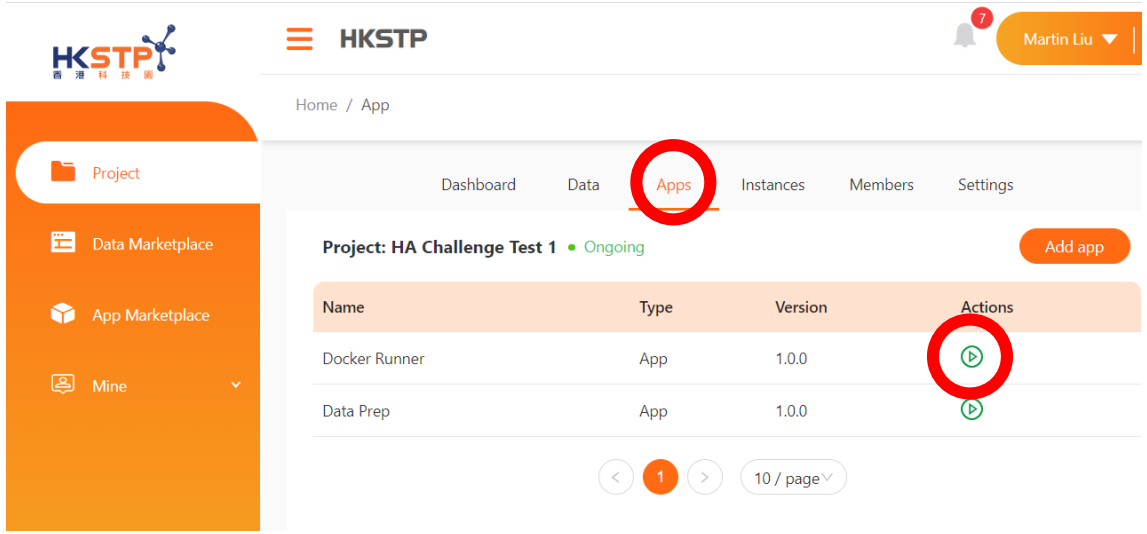
Submission procedure

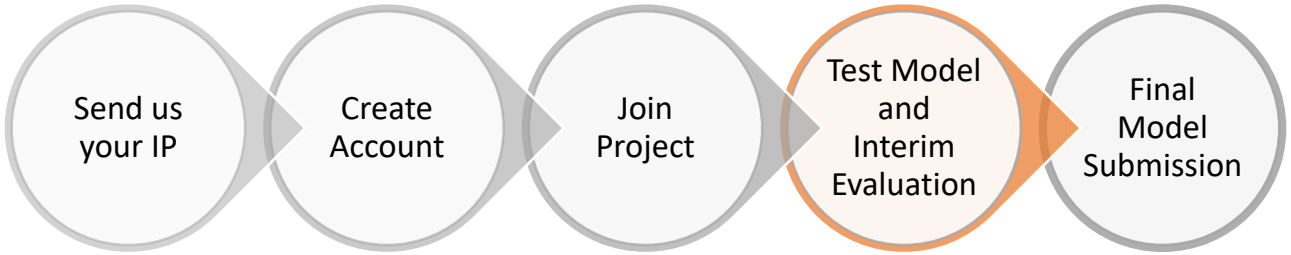
Test Model and Interim Evaluation (During your model testing slot)

(20-23 Oct / 27-30 Oct / 2-4 Nov)

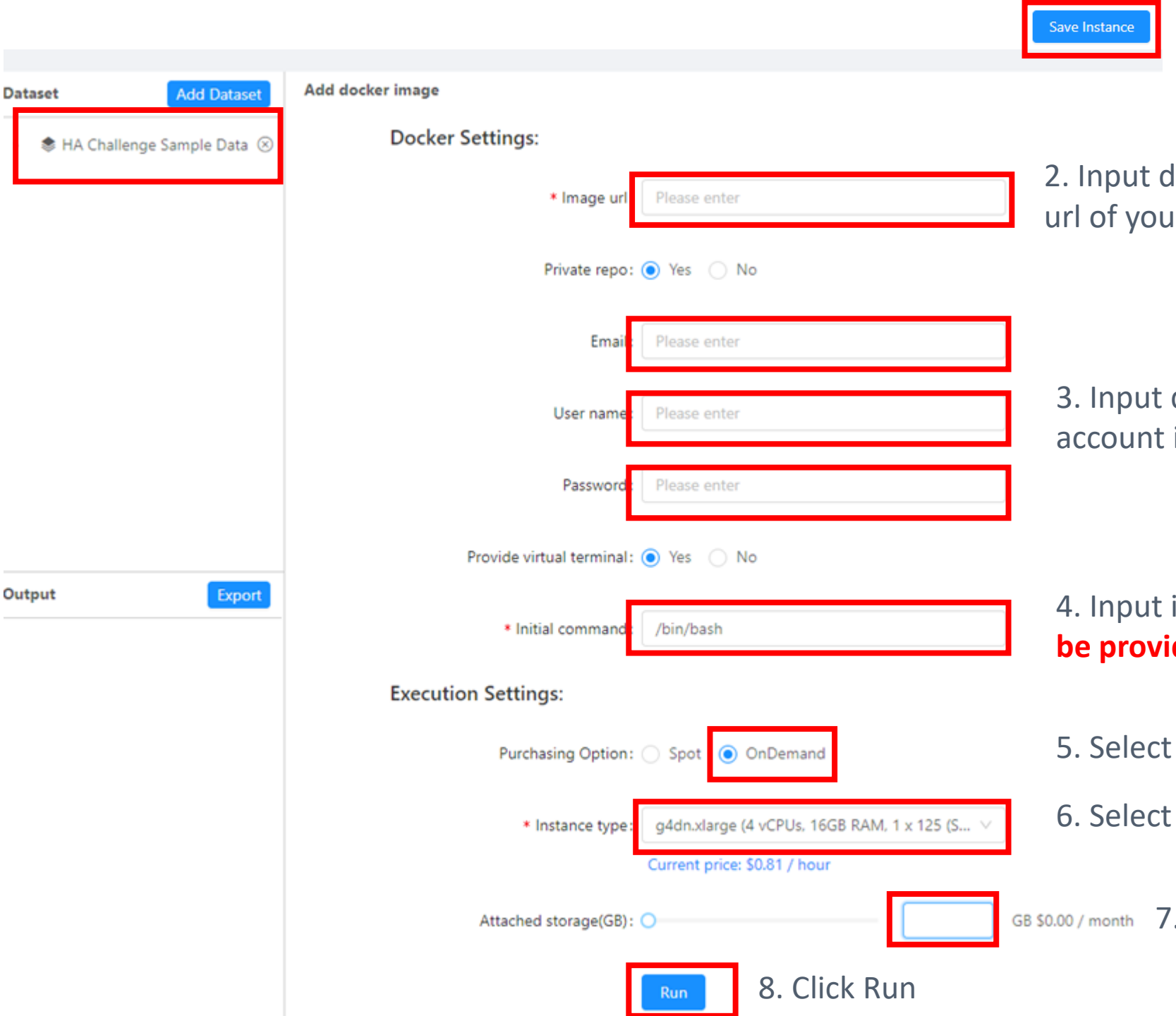
1. Uploaded your model in docker image to Docker Hub.

2. Open Docker Runner by clicking ▷ and specify your Docker Settings





1. Make sure sample dataset is imported



8. Save the instance name as **Final**.

2. Input docker hub url of your model

3. Input docker hub account info

4. Input initial command **(to be provided in guideline)**

5. Select OnDemand

6. Select **g4dn.xlarge**

7. Type 20GB

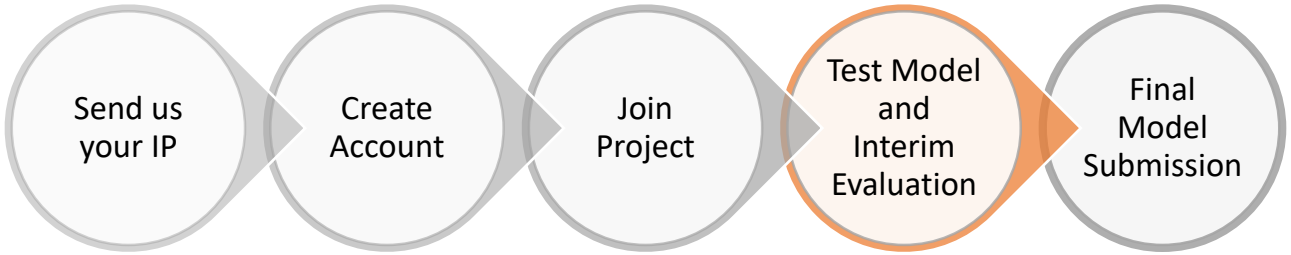
8. Click Run

Submission procedure

Test Model and Interim Evaluation (During your model testing slot)

(20-23 Oct / 27-30 Oct / 2-4 Nov)

3. Test your model with the sample dataset the Docker Runner
   - Your program should be placed to this directory
     - ~/submission
   - Your program should be able to executed by the following command:
     - python ~/submission/main.py /enigma/datasets/HA-Sample/input_data.csv \ /enigma/local_storage/result/prediction_result.csv /enigma/local_storage/result/counting_result.csv
   - You should create a folder, namely result. Your result files should be placed to directory
     - /enigma/local_storage/result/prediction_result.csv
     - /enigma/local_storage/result/counting_result.csv
4. Make sure no error in running the model. You should be able to see the result file(s) in the left output column.



Submission procedure

Test Model and Interim Evaluation (During your model testing slot)

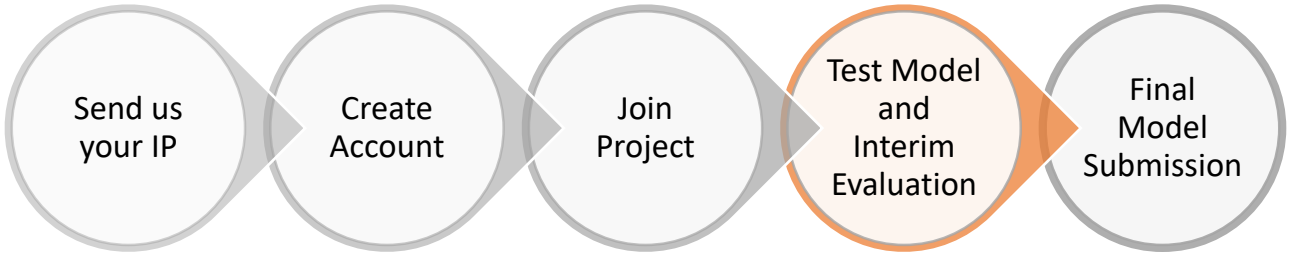
(20-23 Oct / 27-30 Oct / 2-4 Nov)

5. Test your output format of output result using evaluation script.

    - ./enigma/datasets/HA-Sample/eval /enigma/local_storage/result/ \
      /enigma/datasets/HA-Sample/annotation/

6. Make sure no error in running the evaluation script. You should be able to see the evaluation result file(s) in the left output column.

7. Your account will be deactivated on **end day @ 5pm (HKTime)**



Submission procedure

Final Model Submission (16 – 23 Nov)

1. All contestant accounts will be activated on **16 Nov @ 10am HKT.**

2. You will be invited back to the project. Please refer to the “Join Project” Step.

3. Upload your latest version of your docker image to Docker Hub. Please double check the docker image on Docker Hub is your final submission version, and make sure the Image URL of docker image on Docker Hub is consistent with Docker Runner Instances setting.

4. You have **4 hours** computation time to test your model on platform.

5. All contestant accounts will be disabled after deadline (**23 Nov @ 12noon HKT**).

Prize

Overall Winner

Cloud credits worth of **HKD$15,000**

1st in Counting Accuracy

Cloud credits worth of **HKD$5,000**

1st in Classification Accuracy

Cloud credits worth of **HKD$5,000**

1st in Localisation Accuracy

Cloud credits worth of **HKD$5,000**

*Invitation to Presentation to Hospital Authority for collaboration opportunity

FAQ

Few questions gathered：

1. Any guidance or person to confirm correct or wrong image reference?

Contestants are advised to refer to the Rulebook. HA will not confirm correct or wrong individually with the contestant.

2. Where could I find the raw images of surgical instruments for training the model?

No training data will be provided by the Organisers The 15 categories of surgical instrument photos and public reference links are given in the Rulebook.

FAQ

3. Are there any hardware machines accessible to all contestants?

No Computing resources are provided for training purposes. However, we offer cloud HPC for testing purposes. Details will be announced in the Briefing session on 6 Oct 2020.

4. Are there any APIs or source codes about evaluation steps for reference?

Contestants will output results to a pre-defined format (csv) and we will evaluate the result on the platform. Details will be announced in the Briefing session on 6 Oct 2020.

Thank you

Enquiries:

Please kindly contact Ms Christian Moy at **26296719** or **christian.moy@hkstp.org.**

AI Challenge Website:

Briefing materials and updates will be announced on website

Email containing the testing slots registration link will be sent at 10am on 7 Oct