



HUAWEI CLOUD



# [M]<sup>s</sup>indSpore Challenge 21

## Pathology Diagnosis

Deadline: 30 SEP 2021

[Register Now](#)**Computer Vision Identifying Cancer Cells**

### BRIEF INTRODUCTION

MindSpore is an **Open AI framework** that supports the best Ascend matching and multi-processor architecture **for all scenarios**.

Your team's goal is to **develop and design an AI model** with the assistance of MindSpore to **locate and classify cancer cells** in pathological images.

### WHO & WHY TO PARTICIPATE

Student/ Startups/ Corporation/ Researcher

1. Win a chance to cooperate with Huawei.
2. Attend a series of workshops for free.
3. A Great chance to interact with experts.

### WINNER PRIZE

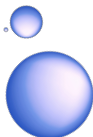
Total Prize up to HKD 345,000!!

[More Information](#)[Join Discord](#)

# The Challenge - Pathology Diagnosis

In the competition, participants are invited to use **MindSpore** as the AI training and inference framework, for developing trustworthy AI pathology diagnosis models that ensures **privacy**, **explainable** and **high accuracy**.

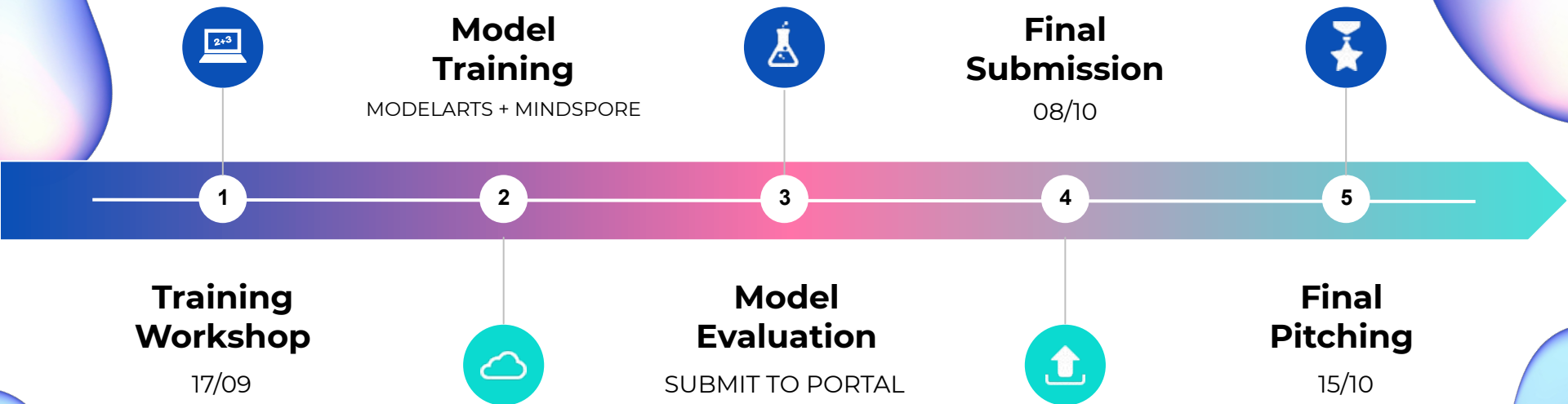
Quota	30 Teams
Team size	1 - 3 Members
Events	Workshops, Pitching, Award Ceremony
Competition Rounds	Qualification and Final Rounds
Organizers:	



HUAWEI CLOUD



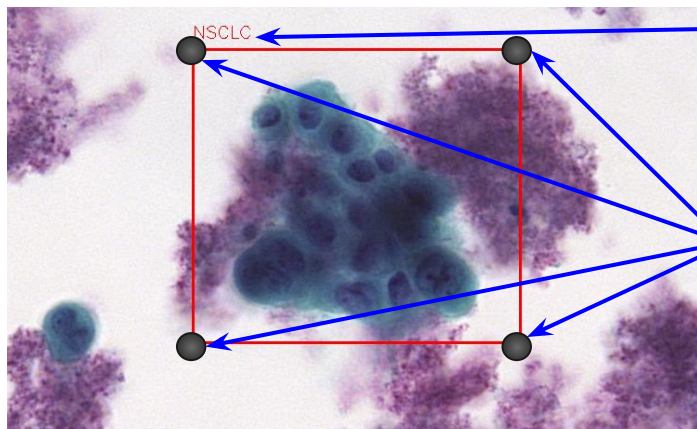
# Competition Timeline



# Qualification Round - Problem Statement

Training a **MindSpore** AI model to **identify locations and classifications** of cancer cells in pathological images. The AI Models will **assist pathologists** in the diagnosis of **peripheral pulmonary diseases**.

This is a form of multi-label object detection.

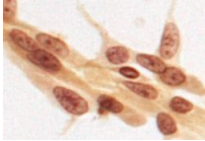

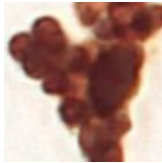
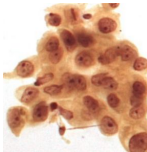


## Classification:

- Class of diagnosed cell

## Location:

- Bounding Boxes

Class	English Name	Subclass	Example
SCC	<i>Squamous Cell Carcinoma</i>	NSCLC	
AC	<i>Adenocarcinoma</i>	NSCLC	
SCLC	<i>Small Cell Lung Cancer</i>	-	
NSCLC	<i>Non-Small Cell Lung Cancer</i>	-	

# Qualification Round - Evaluation

$$\text{Classification Score} = \frac{1}{|M|} \sum_{i \in M} \text{FROC}_i$$

$$\text{AUC} = \frac{1}{M \times N} \sum_{i \in \text{positive class}} \text{rank}_i - \frac{M(1 + M)}{2}$$

## Accuracy - FROC

- The trained MindSpore AI models should **accurately locate** and **classify** cancer cells.

## Explainability (Bonus) - AUC

- The trained MindSpore AI models should provides **pixel level feature attribution** as an explanation for the task!

$$\text{Model Score} = \text{Accuracy Score} * 0.8 + \text{Explainable Score} * 0.2$$

The *top 6 highest model score* teams are invited to enter the **FINAL ROUND**

# ***Final Round & Ceremony***

## ***Pitching***

Date      **15 October 2021**

Venue     **Charles K Kao Auditorium HKSTP**

Time      2 - 6pm

Agenda

- Welcoming Speech
- Solution Pitching
- On-site Evaluation
- Result Announcement

## ***Award Ceremony***

Event     **Huawei Cloud Summit 2021**

Date      **26 October 2021**

Venue     TBD

Time      Afternoon



Charles K Kao Auditorium HKSTP

# Prizes!

Winning Teams Award	Prizes per Team
<i>Model Score Winner</i>	<b>HKD 70,000</b>
<i>Model Score Runner-up</i>	<b>HKD 50,000</b>
<i>Pitching Score Winner</i>	<b>HKD 50,000</b>
<i>Pitching Score Runner-up</i>	<b>HKD 35,000</b>
<i>Special Price for Explainability</i>	<b>HKD 2,000 (max: 30 winners)</b>

# ***Register Now!***

OFFICIAL WEBSITE  
**Sign Up!**



  
DISCORD  
**Get Connected**

  
GITHUB  
**Get Resources**



RULE BOOK & GUIDELINES  
**Get Informed**





MindSpore

Introduction and Examples

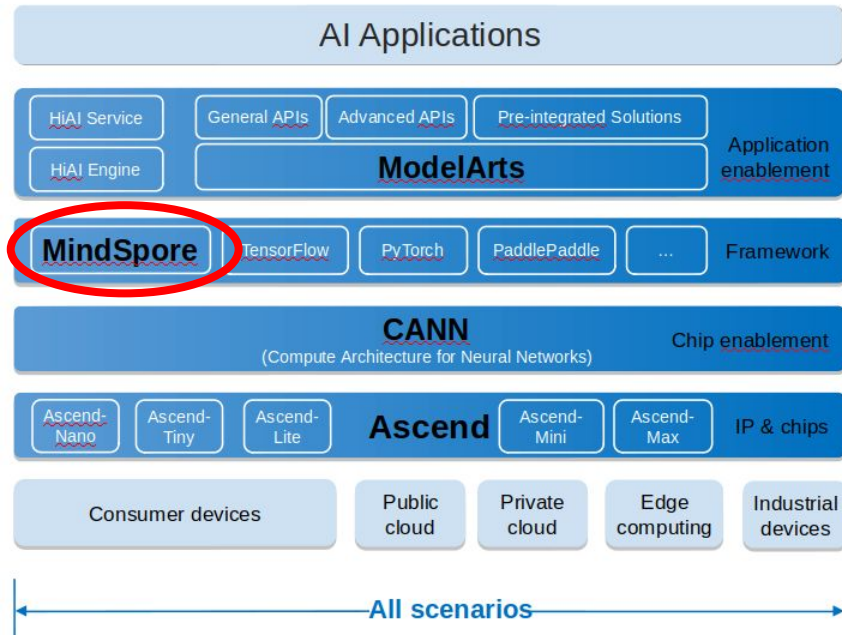


# What is MindSpore?



An **Open AI-framework** that supports the multi-processor architectures developed by Huawei.

It provides a unified APIs and end-to-end AI capabilities for AI model development, execution and deployment in all scenarios, including cloud, edge and devices.



Friendly Development Experience



Flexible Debugging





Fully Unleashing Hardware Performance



Quick Deployment in All Scenarios

# DL Python Modules

	Dataset Preparation and Preprocessing	Network Construction and Training	Explainable XAI
<p>MindSpore Modules</p>  <p>MindSpore</p>	<p><code>mindspore.dataset:</code> Complete solution equipped with vision and text operators.</p>	<p><code>mindspore.nn:</code> network constructions</p> <p><code>mindspore.ops:</code> common operators in neural networks</p> <p><code>mindspore.model:</code> defining model, optimizers and loss function</p> <p><code>mindspore.train:</code> provides common training utilities</p>	<p><b>mindspore.explainer:</b> Provides methods to evaluate generate saliency maps/other explainable figures from inputs.</p>
<p>Tensorflow Pytorch Modules</p> 	<p><code>tf.data</code> <code>torch.utils.data</code></p>	<p><code>tf.keras.Model</code> <code>torch.nn</code></p>	<p>-</p>

# MindSpore Model Design and Training

## Dataset

```
dataset = ms.dataset.MnistDataset()

dataset.batch # batching data
dataset.map # preprocessing data
```

## Network

```
class Net(ms.nn.Cell):
    def __init__(self):
        super(Net, self).__init__()
        self.flatten = ms.nn.Flatten()
        self.dense = ms.nn.Dense(1024, 10)

    def construct(self, x):
        x = self.flatten(x)
        x = self.dense(x)
        return x

net = Net()
```

```
import mindspore as ms
```

## Model

```
loss = ms.nn.SoftmaxCrossEntropyWithLogits()
optimizers = ms.nn.Adam(
    net.trainable_params(),
    learning_rate=0.01
)

model = ms.Model(
    net,
    loss,
    optimizers,
    metrics={"Accuracy": ms.nn.Accuracy()})

model.train(epoch=10, dataset)
```

AI APPS

# Huawei Cloud



Elastic Cloud Server

## ELASTIC CLOUD SERVICE (ECS)

A powerful compute engine for you to deploy any application



ModelArts

## MODELARTS

A one-stop **development platform** for AI developers



HUAWEI CLOUD

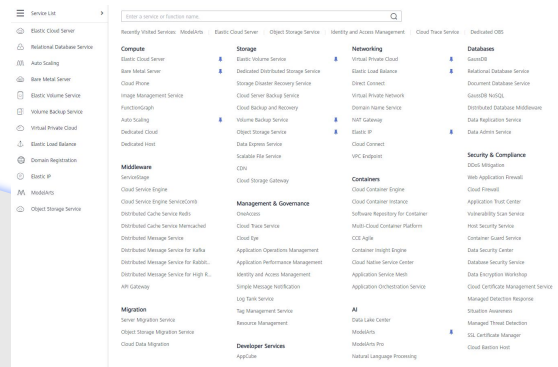


Object Storage Service

## OBJECT STORAGE SERVICE (OBS)

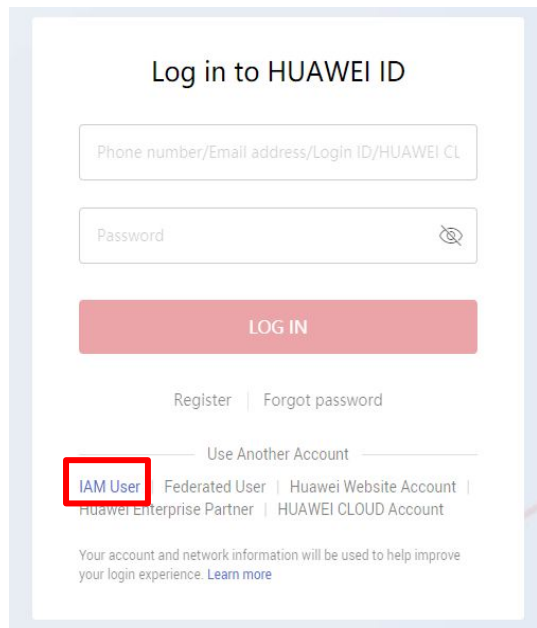
A **cloud storage service** optimized for storing massive amounts of data

AND MANY MORE...



# Hands on time!

Get your user\_id from Discord !



Log in to HUAWEI ID

Phone number/Email address/Login ID/HUAWEI CL

Password

LOG IN

Register | Forgot password

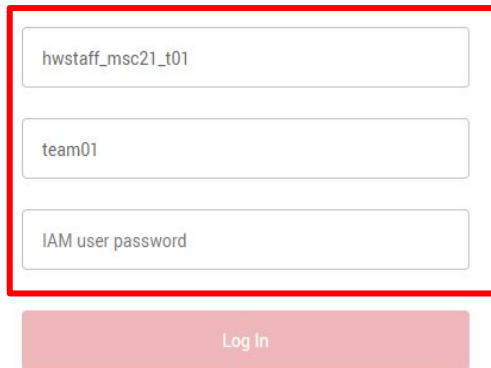
Use Another Account

**IAM User** | Federated User | Huawei Website Account | Huawei Enterprise Partner | HUAWEI CLOUD Account

Your account and network information will be used to help improve your login experience. [Learn more](#)

Press IAM User in Login Page

## IAM User Login



hwstaff\_msc21\_t01

team01

IAM user password

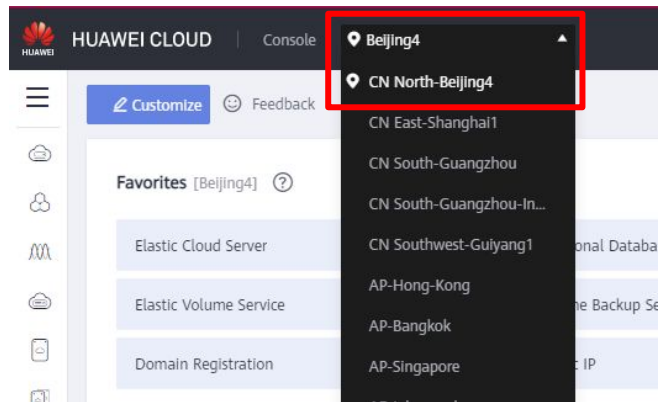
Log In

[Forgot Password](#)

☐ Remember me

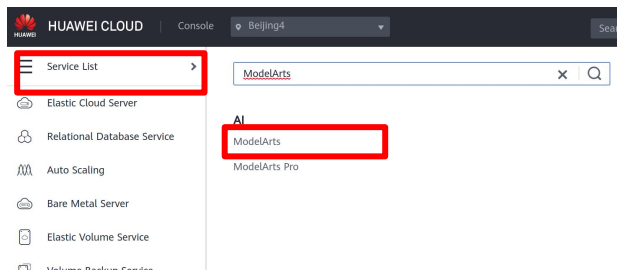
[Use Another Account: HUAWEI ID](#) | [Federated User](#)

**Login with Credentials!**  
Username: hwstaff\_msc21\_tutor  
lam: user\_XX  
Password: **msc2021!**

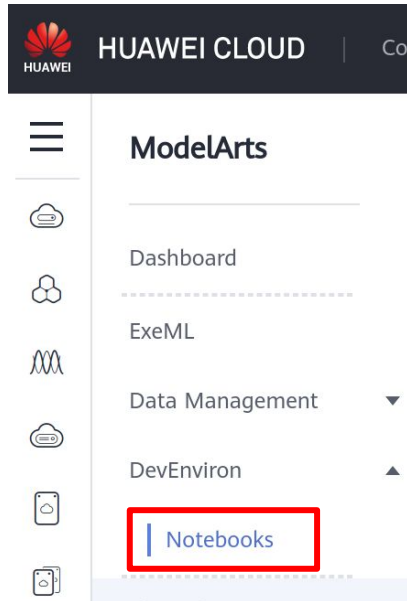


**Change the Region to  
CN-North-Beijing4**

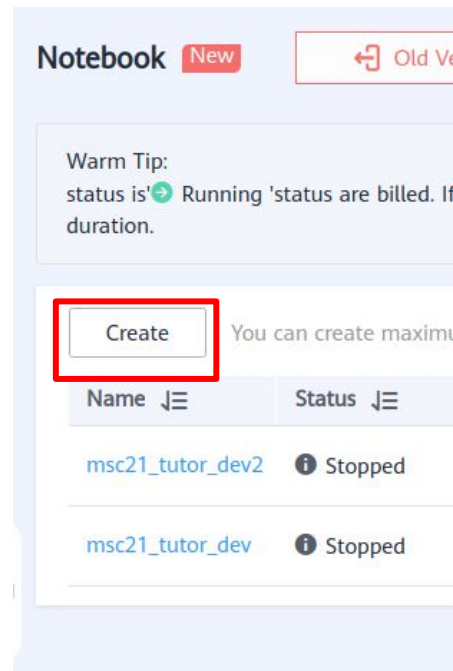
# Hands on time!



**Go to Service List,  
Search ModelArts**



**Click DevEnviron > Notebooks**



**Create your own notebook**

# Hands on time!

★ Name

user\_09

Change to your user\_id

★ Auto Stop



ℹ If you enable auto stop, the notebook instance automatically stops when th

☐ 1Hour

☒ 2Hour

☐ 4Hour

☐ 6Hour

☐ Customize

★ Work Environment

Public Image

Dedicate Image

Name	Description
<input type="radio"/> pytorch1.4-cuda10.1-cudnn7-ubuntu18.04	CPU and GPU general algorithm development and training, preconfigured with ...
<input type="radio"/> tensorflow1.2-cuda10.1-cudnn7-ubuntu18.04	CPU and GPU general algorithm development and training, preconfigured with ...
<input type="radio"/> mindspore1.2.0-openmpi2.1.1-ubuntu18.04	CPU algorithm development and training, preconfigured with the AI engine Min...
<input type="radio"/> mindspore1.2.0-cuda10.1-cudnn7-ubuntu18.04	GPU algorithm development and training, preconfigured with the AI engine Min...
<input type="radio"/> mlstudio-pyspark2.3.2-ubuntu16.04	CPU algorithm development and training, including the MLStudio tool for graph...
<input type="radio"/> mindstudio3.0.1-ascend910-cann3.3.0-ubuntu18.04-aarch64	Ascend operator development. The professional operator development tool Min...
<input checked="" type="radio"/> tensorflow1.15-mindspore1.2.0-cann20.2-euler2.8-aarch64	Ascend+ARM algorithm development and training. TensorFlow and MindSpore ...
<input type="radio"/> modelbox-tensorrt5.1.5.0-tf1.15-pytorch1.6-cuda10.1-cudnn7-eu	AI Inference application development, preconfigured ModelBox, AI engine PyTor...
<input type="radio"/> cyp1.4-cbcpy2.10-ortools9.0-cplex20.1.0-ubuntu18.04	CPU operations research development, preconfigured with cyp, cbcpy, ortools, c...
<input type="radio"/> rlstudio1.0.0-ray1.3.0-cuda10.1-ubuntu18.04	CPU and GPU algorithm development and training, preconfigured with AI engin...

Name : user\_XX

Work Environment:  
Choose, Ascend + ARM ....

Flavour:  
Ascend: 1\*Ascend 910|CPU: 24vCPUs  
96GB

★ Resource Pool

Public Resource Pool

Dedicated Resource Pool

★ Type

ASCEND

★ Flavor

Ascend: 1\*Ascend 910|CPU: 24vCPUs 96GB

Ascend: 2\*Ascend 910|CPU: 48vCPUs 192GB

Ascend: 1\*Ascend 910|CPU: 24vCPUs 96GB

★ Storage

50GB free, for experience or experiment only

Created	Operations
2021/08/27 13:55:33 GMT+08:00	Open   Start   Stop   Delete
2021/08/27 13:51:52 GMT+08:00	Open   Start   Stop   Delete

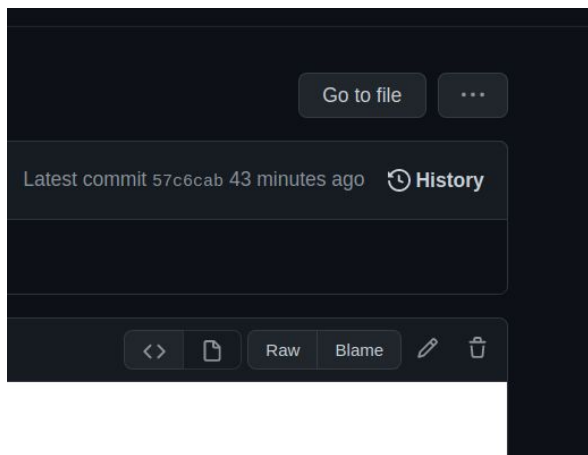
Wait for the creation to finish and you  
can click Open



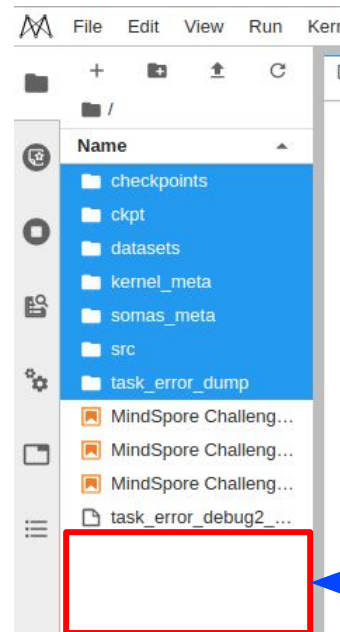
# Hands on time!

<https://github.com/MindSporeChallenge21/resources>

**Download required notebooks**  
In **notebooks** folder.



**Right Click RAW > save link as ....**



EMPTY  
REGION

**Drag and drop the file into the  
empty region to upload!**

# ***Agenda***

## **Part I - Beginner Tutorial**

- MindSpore Dataset
- MindSpore Neural Network Design
- MindSpore Model Training

## **Part II - Intermediate Tutorial**

- Training a YoloV3 model
- Using ModelArts, OBS and Moxing Framework
- Submission to Portal