



HUAWEI CLOUD



[M]^SINDSPORE CHALLENGE

Pathology Diagnosis 2021

COMPUTER VISION IDENTIFYING CANCER CELLS

TIMELINE



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

Postgraduate Students / Researchers / AI Companies

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

WINNER PRIZE

Up to HKD 282,000

[Register Now](#)

DEADLINE: 2021.09.24

<https://mindsporechallenge.com>

More Information Join Discord



MindSpore Challenge 2021 - 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

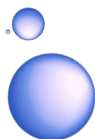
1 - 3 Members

Events

Workshops, Pitching, Award Ceremony

Competition Stage

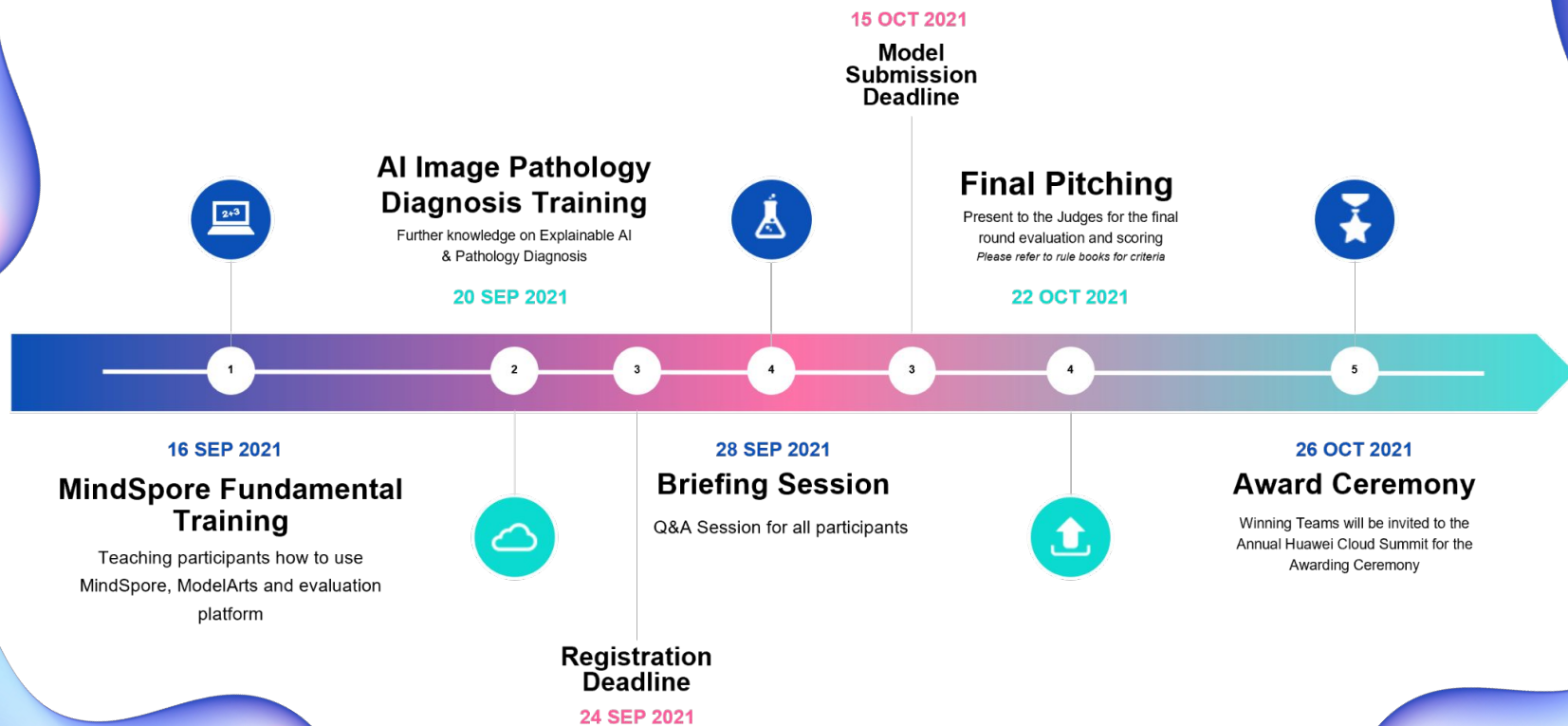
Model Evaluation and Pitching Stage



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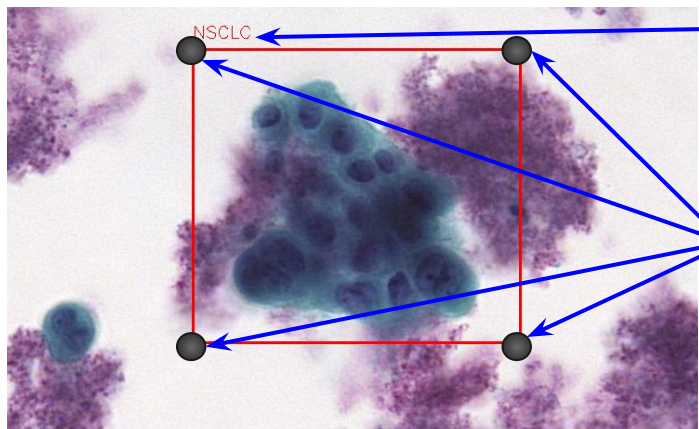
Competition Timeline



Model Evaluation - Problem Statement

Train 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.

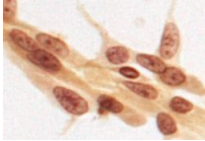
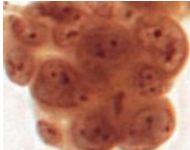
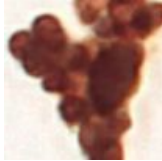
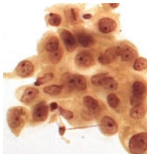


Classification:

- 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>	-	

Model Evaluation - Evaluation Criteria

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

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

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 Pitching & Award Ceremony

Final Pitching

Date **22 October 2021**

Venue **Inno2, 17W, Hong Kong Science Park**

Time **2:30pm**

Agenda

- Welcoming Speech
- Solution Pitching
- On-site Evaluation



Award Ceremony

Event **Huawei Cloud Summit 2021**

Date **26 October 2021**

Venue **Grand Hyatt Hong Kong**

Time **Afternoon**

Prizes!

Winning Teams Award	Prizes per Team
<i>Model Score Winner</i>	HKD 60,000 Cash + HKD 12,000 Huawei Cloud Credit
<i>Model Score Runner-up</i>	HKD 45,000 Cash + HKD 6,000 Huawei Cloud Credit
<i>Pitching Score Winner</i>	HKD 45,000 Cash + HKD 6,000 Huawei Cloud Credit
<i>Pitching Score Runner-up</i>	HKD 30,000 Cash + HKD 6,000 Huawei Cloud Credit
<i>Special Prize for Explainability</i>	Prizes worth HKD 500 + HKD 1,500 Huawei Cloud Credit (max: 30 winners)

Register Now!

OFFICIAL WEBSITE

Sign Up!



DISCORD

Get Connected



GITHUB

Get Resources



RULE BOOK & GUIDELINES

Get Informed



MindSpore

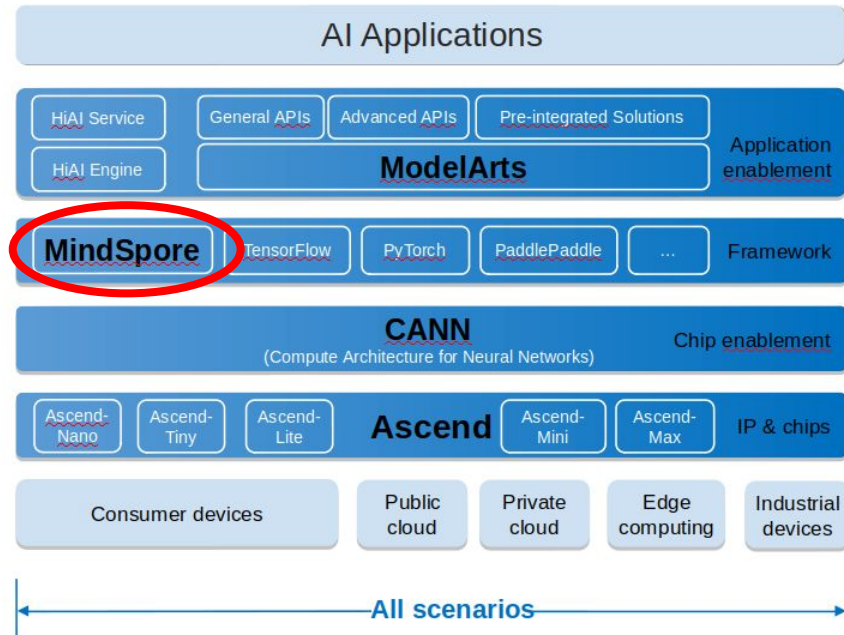
Introduction and Examples

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>mindspore.explainer: 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

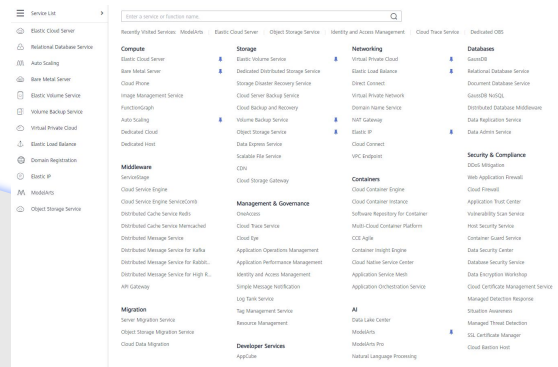


Object Storage Service

OBJECT STORAGE SERVICE (OBS)

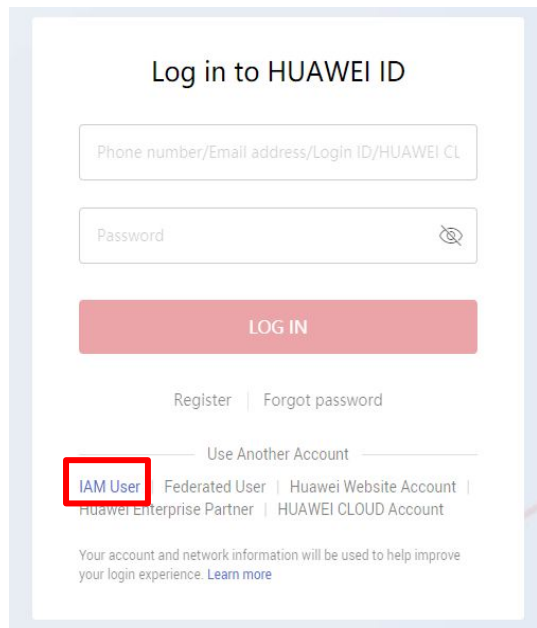
A **cloud storage service** optimized for storing massive amounts of data

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

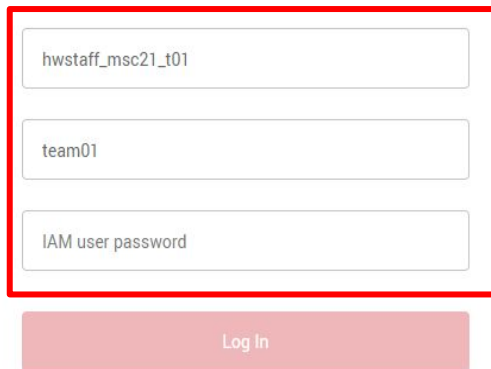
Use Another Account

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

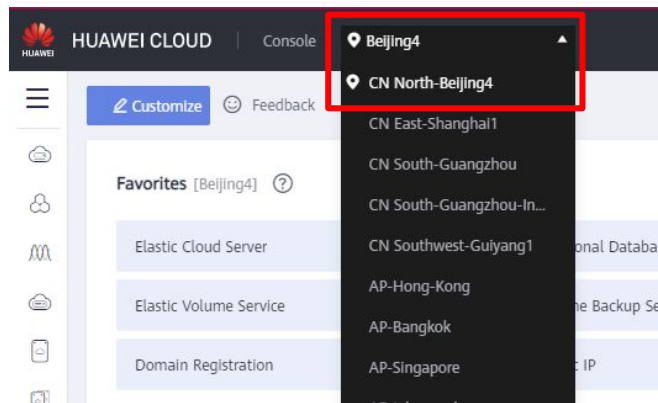
IAM user password

Log In

[Forgot Password](#) ☐ Remember me

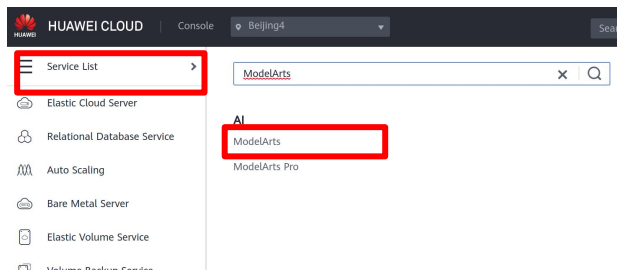
[Use Another Account: HUAWEI ID](#) | [Federated User](#)

Login with Credentials!
Username: hwstaff_msc21_tutor
Iam: user_XX
Password: **msc2021!**

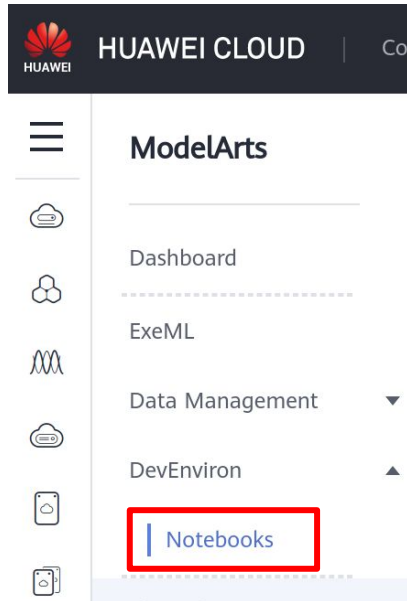


**Change the Region to
CN-North-Beijing4**

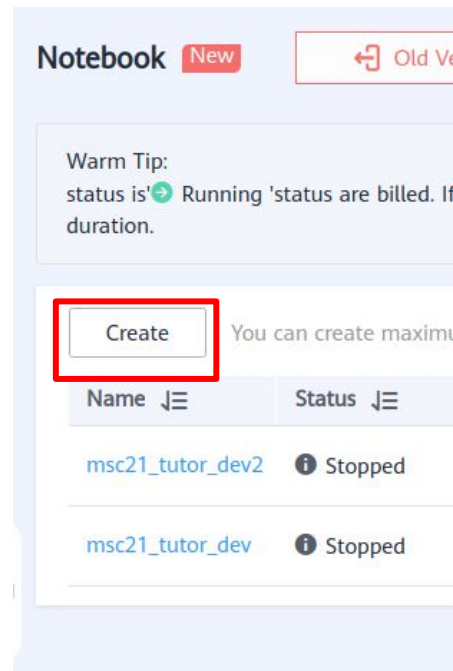
Hands on time!



**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"/> cyp0.91.4-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

★ Storage

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

50GB free, for experience or experiment only

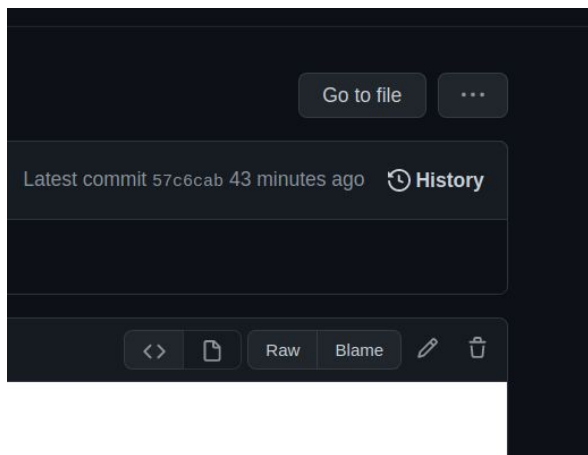
Created	Operations
2021/08/27 13:55:33 GMT+08:00	Open Start Stop Delete
2021/08/27 13:51:52 GMT+08:00	Open Start Stop Delete

Wait for the creation to finish and you
can click Open

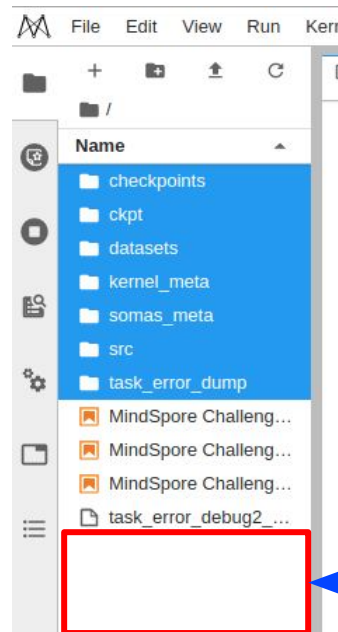
Hands on time!

<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