



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

- 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

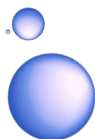
1 - 3 Members

Events

Workshops, Pitching, Award Ceremony

Competition Stage

Model Evaluation and Pitching Stage



HUAWEI CLOUD



Co-organizers



HUAWEI CLOUD



Huawei Cloud Hong Kong

- A leading cloud service provider, committed to bringing affordable, effective, and reliable cloud and AI services through technological innovation.

Huawei Hong Kong Research Center

- Conducting researches in AI, fundamental theory, chips microarchitecture, software engineering, trustworthy software and so on.
- 250+ researchers, >48% PhD



Hong Kong Science and Technology Parks Corporation

- A public corporation set up by the Hong Kong Government in 2001 to foster the development of innovation and technology in Hong Kong.
- Cultivated successful Innovation and Technology (I&T) companies, formed strong local and international partnership networks and created a thriving community

Guangzhou LBP Medicine Science & Tech. Co., Ltd

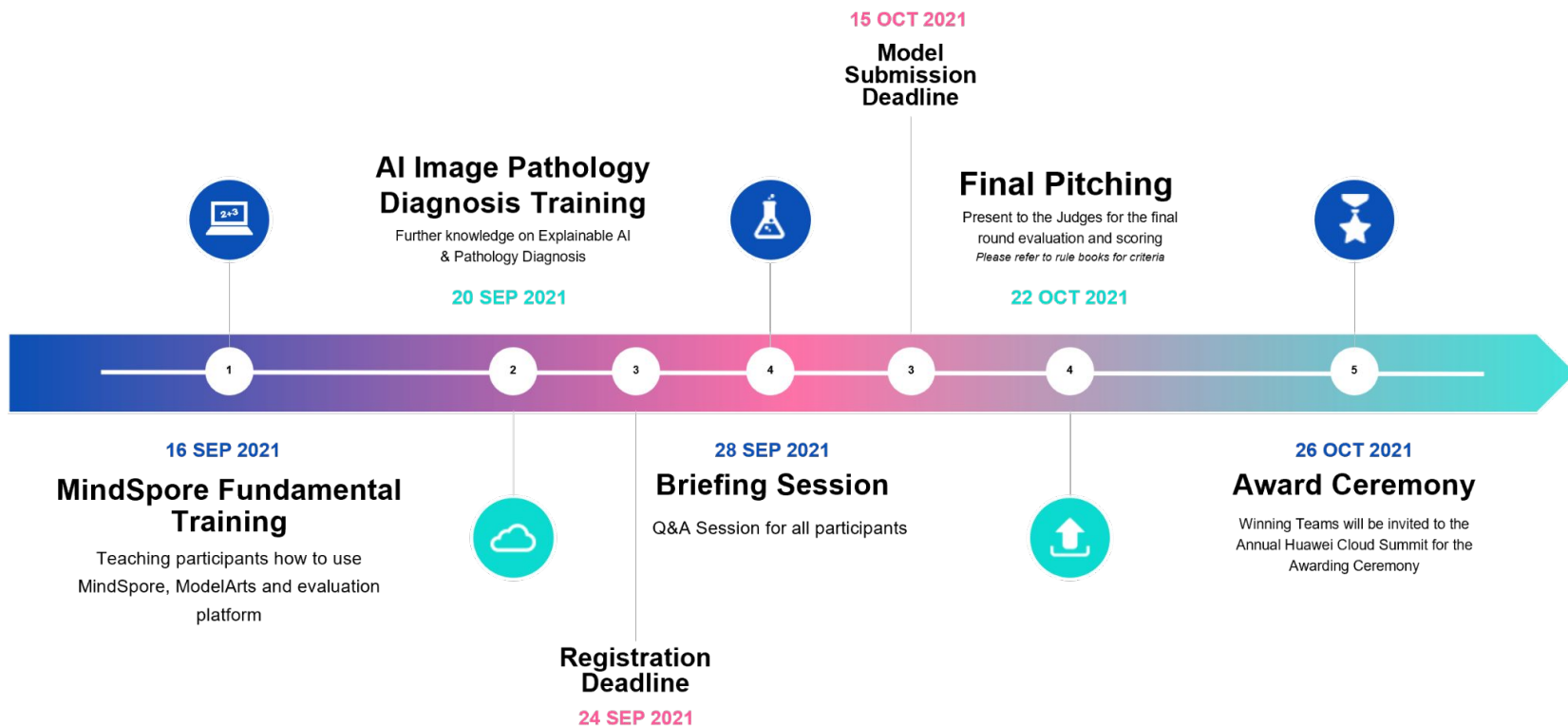
- Founded in 2005. The first listed company on the Science and Technology Board of the Shanghai Stock Exchange in the field of pathology diagnosis in China. (Securities Code: 688393)
- More than 500 registered/recorded products.
- Covering nearly 1,800 medical institutions in China.



Guangzhou Bingli Technology Co., Ltd.

- A subsidiary of LBP Medicine, founded in 2017.
- The real-time visual field sharing system and pathology medical image analysis and processing system are widely used in intelligent diagnosis, data management, and data quality control.

Competition Timeline



Final Pitching & Award Ceremony

Final Pitching

Date **22 October 2021 (Friday)**
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 (Tuesday)**
Venue **Grand Hyatt Hong Kong**
Time **Afternoon**

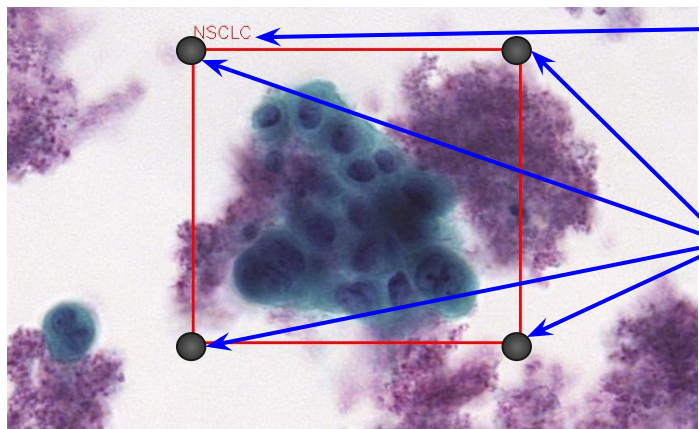
Prizes!

| 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> | Souvenirs up to HKD 900 + HKD 1,500 Huawei Cloud Credit (max: 30 winners) |

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

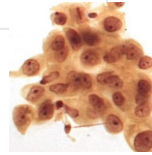
- The trained MindSpore AI models should provides **pixel level feature attribution** as an explanation for the task!

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

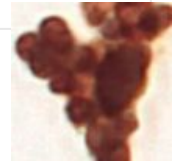
The *top 6 highest model score* teams are invited to enter the **FINAL PITCHING**

Brief Introduction of Lung Cancer

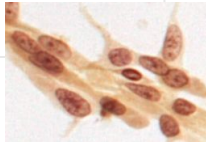
Non-small cell lung cancer (NSCLC)



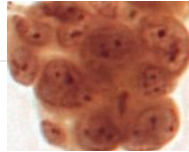
Small cell lung cancer (SCLC)



Squamous Cell
Carcinoma (SCC)

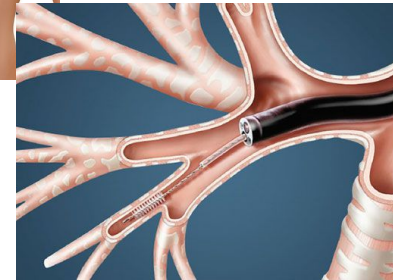
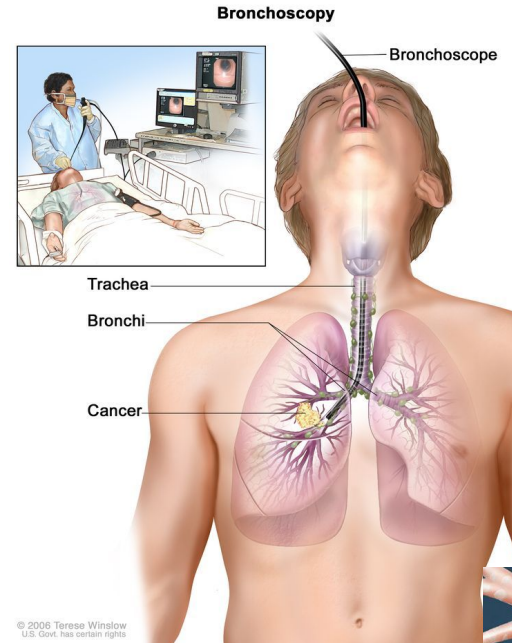


Adenocarcinoma
(AC)



Their treatment and prognoses (outlook) are often similar.

Brief Introduction of Bronchi Brushing



<https://www.youtube.com/watch?v=V4Y5U7UU27Y>

Learn more about Pathology Diagnosis and Explainable AI

Join the 2nd training workshop at 2:30pm on 20 SEP



Dr. Lawrence Chan
Associate Professor
Department of Health Technology and Informatics
The Hong Kong Polytechnic University



Dr. Yongxiang Huang
AI Researcher
Huawei Hong Kong Research Center

Register Now!

OFFICIAL WEBSITE

Sign Up!



DISCORD

Get Connected



GITHUB

Get Resources



RULE BOOK & GUIDELINES

Get Informed

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



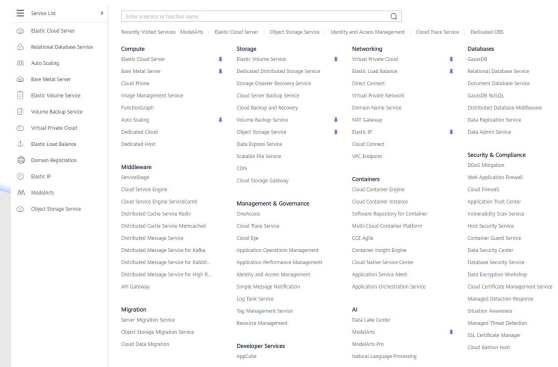
HUAWEI CLOUD

 Object Storage Service

OBJECT STORAGE SERVICE (OBS)

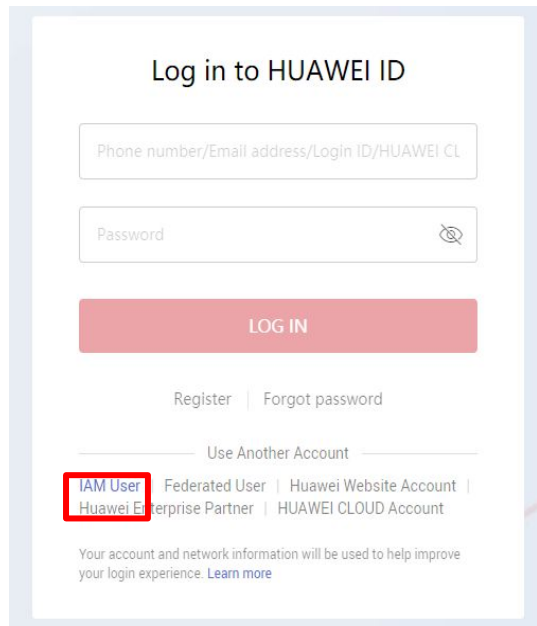
A **cloud storage service** optimized for storing massive amounts of data

AND MANY MORE...



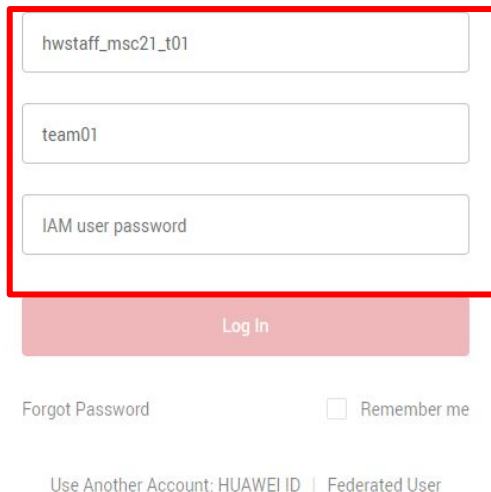
Hands on time!

Get your user_id from Discord !



Press IAM User in Login Page

IAM User Login

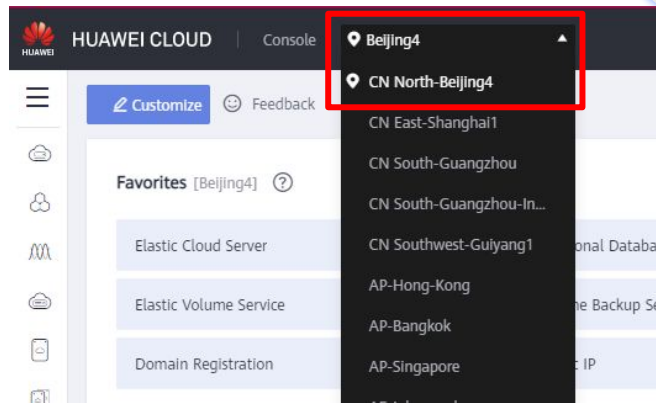


Login with Credentials!

Username: hwstaff_msc21_tutor

Iam: user_XX

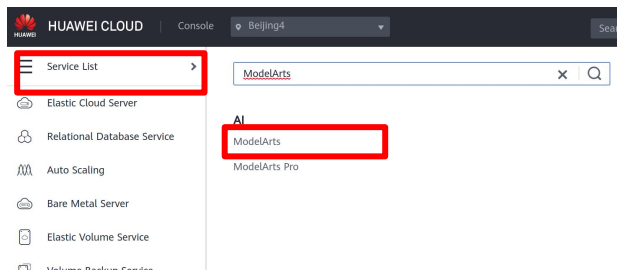
Password: **msc2021!**



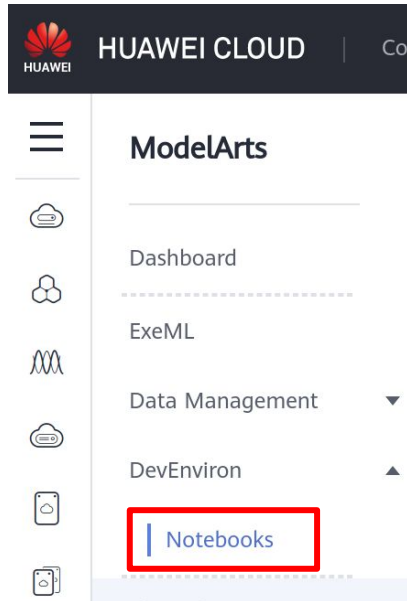
Change the Region to
CN-North-Beijing4

https://auth.huaweicloud.com/authui/login?id=hwstaff_msc21_tutor

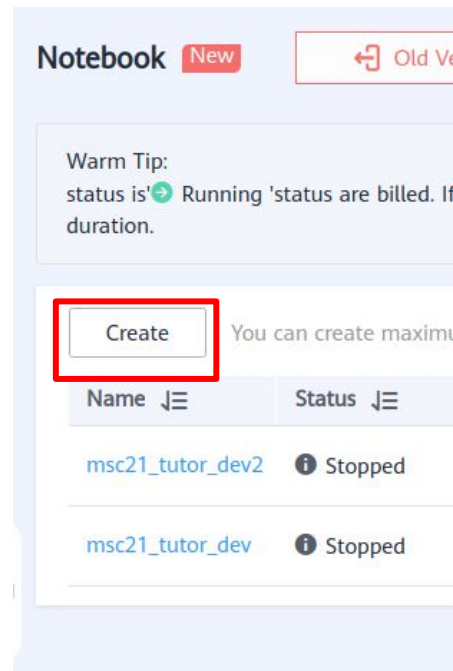
Hands on time!



**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"/> tensorflow2.1-cuda10.1-cudnn7-ubuntu18.04 | CPU and GPU general algorithm development and training, preconfigured with ... |
| <input type="radio"/> mindspore1.2.0-ascend910-cann5.0.2-euler2.8-aarch64 | CPU algorithm development and training, preconfigured with the AI engine Min... |

tensorflow1.15-mindspore1.3.0-cann5.0.2-euler2.8-aarch64

| | |
|---|--|
| <input type="radio"/> mindstudio3.0.2-ascend910-cann5.0.2.1-ubuntu18.04-aarch64 | Ascend operator development. The professional operator development tool Min... |
| <input checked="" type="radio"/> tensorflow1.15-mindspore1.3.0-cann5.0.2-euler2.8-aarch64 | Ascend+ARM algorithm development and training. TensorFlow and MindSpore ... |

Name:

notebook_user_XX

Work Environment:

Choose, Ascend + ARM

Flavour:

Ascend: 1*Ascend 910|CPU: 24vCPUs

★ 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!

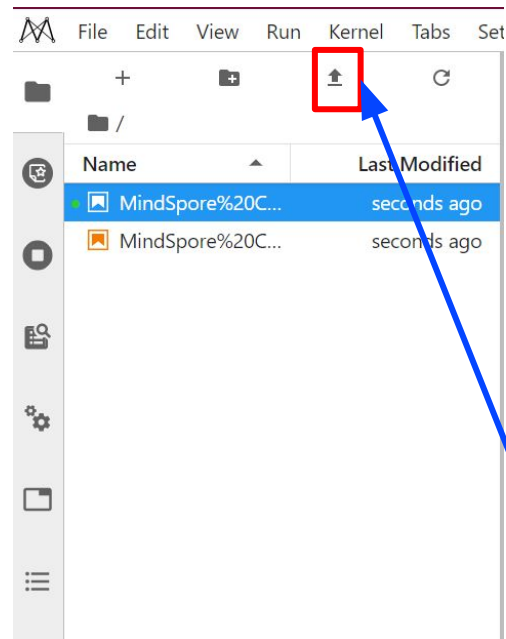
<https://github.com/MindSporeChallenge21/resources>

Download required notebooks
In “resources” repository.

Related Resources for Participants

Jupyter Notebook for MindSpore Fundamental Training

- Time: 2:30 pm- 4:30 pm
- Location: AI PLUG Training Room, 2/F, Building 19W, Hong Kong Science Park
- Content:
 - MindSpore basic training, building in-depth learning networks.
 - Learn how to utilize the AI computing resources on Huawei Cloud for model training and inferencing.
- Resources:
 - [Beginner Jupyter Notebook Tutorial](#) [60.2 KB]
 - [Intermediate Jupyter Notebook Tutorial](#) [401 KB]



Upload from
local storage

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



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



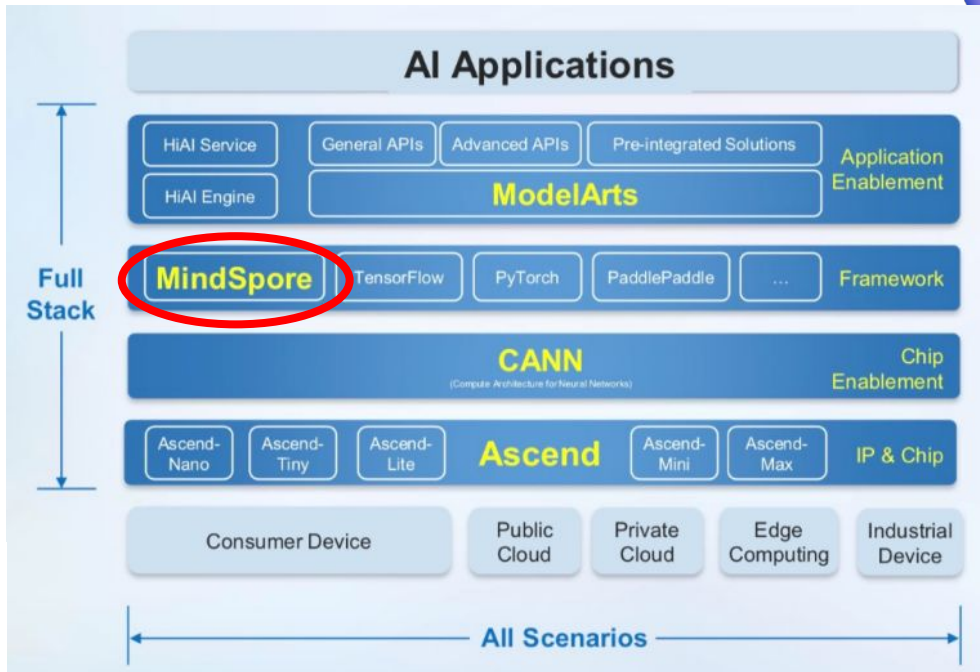
Flexible Debugging





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> | - |

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

Agenda

Part I - Beginner Tutorial

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

Download Jupyter Notebook
<https://downgit.github.io/#/home?url=https://github.com/MindSporeChallenge21/resources/blob/main/notebook/MindSpore%20Challenge%20Tutorial%20Beginner.ipynb>

Part II - Intermediate Tutorial

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

Download Jupyter Notebook
<https://downgit.github.io/#/home?url=https://github.com/MindSporeChallenge21/resources/blob/main/notebook/MindSpore%20Challenge%20Tutorial%20Intermediate.ipynb>