

The slide features a central white diamond shape with rounded corners, containing the year '2023' and the title 'Ephys Challenge'. This central element is surrounded by a dark blue circle with four dots at the top, bottom, left, and right. To the left and right of the central diamond are two overlapping blue diamonds. The background is a light gray with a complex, low-poly geometric pattern.

2023

Ephys Challenge

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Kai Xuan, Chen

Outline

01

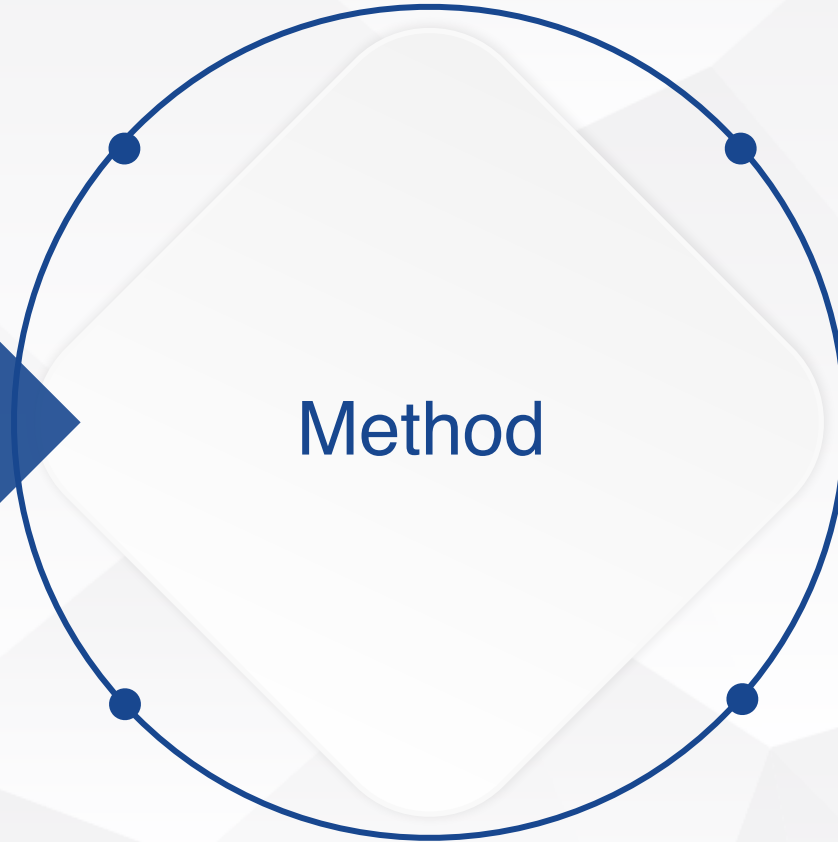
Method

02

Result

03

Demo



Method

01



Transfer Learning

**What is
it ?**

Why is it ?

How it work ?

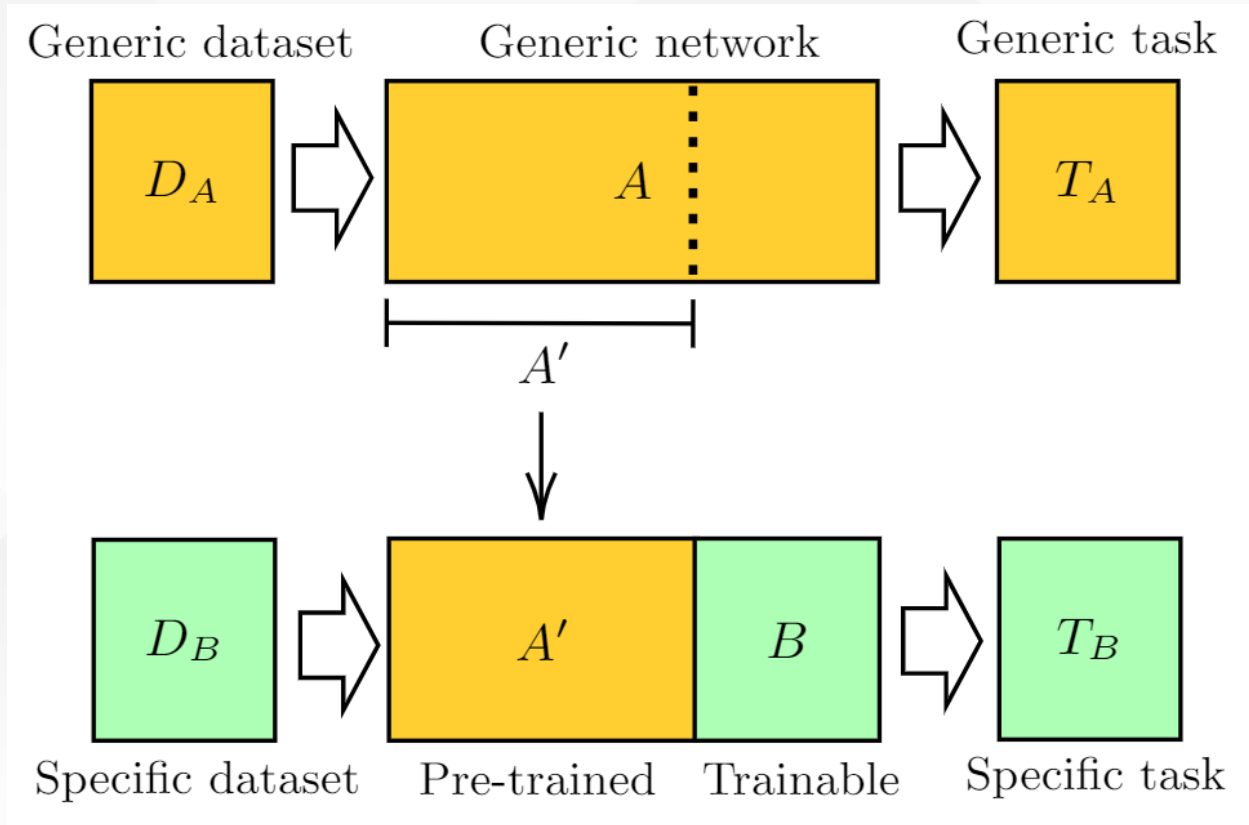
01



Transfer Learning

What is it ?

model trained on one task is adapted for a second, related task.



01



Transfer Learning

What is it ?

model trained on one task is adapted for a second, related task.

Why is it ?

1. Data too complex and Physical Constraint on QPU
2. Stand upon the shoulders of giants

01



Transfer Learning

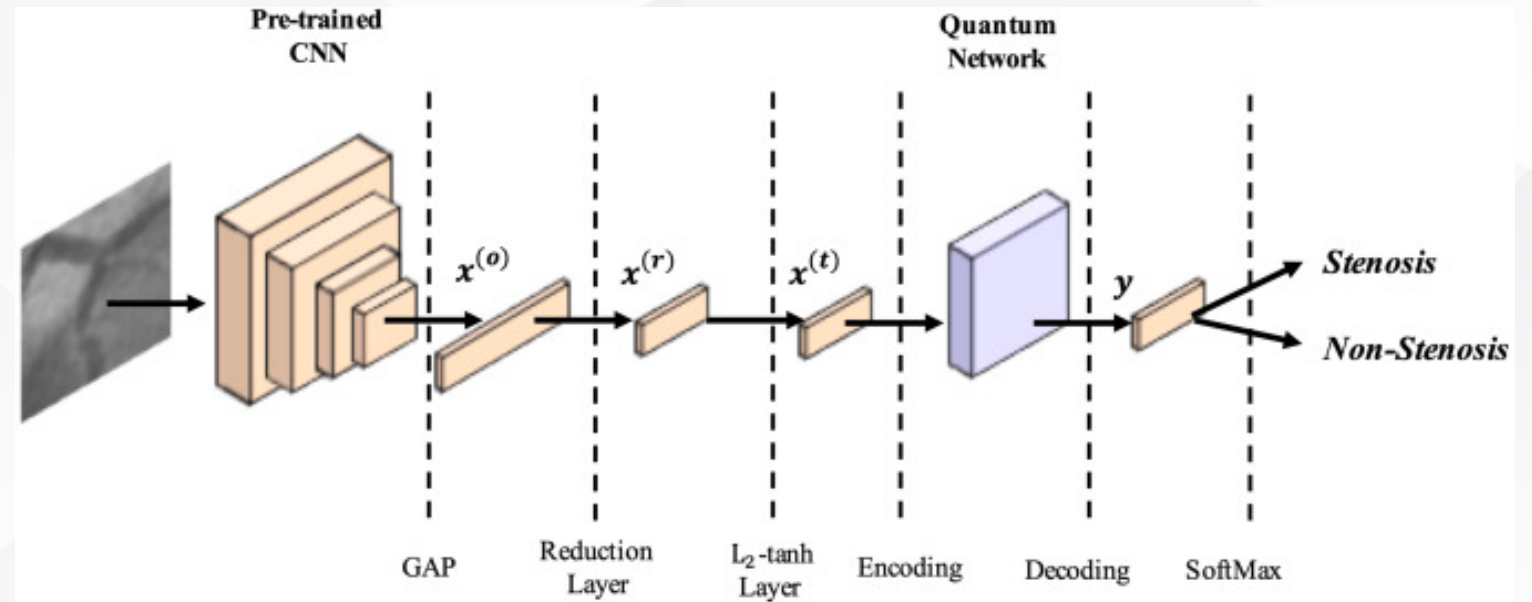
What is it ?

model trained on one task is adapted for a second, related task.

Why is it ?

How it work ?

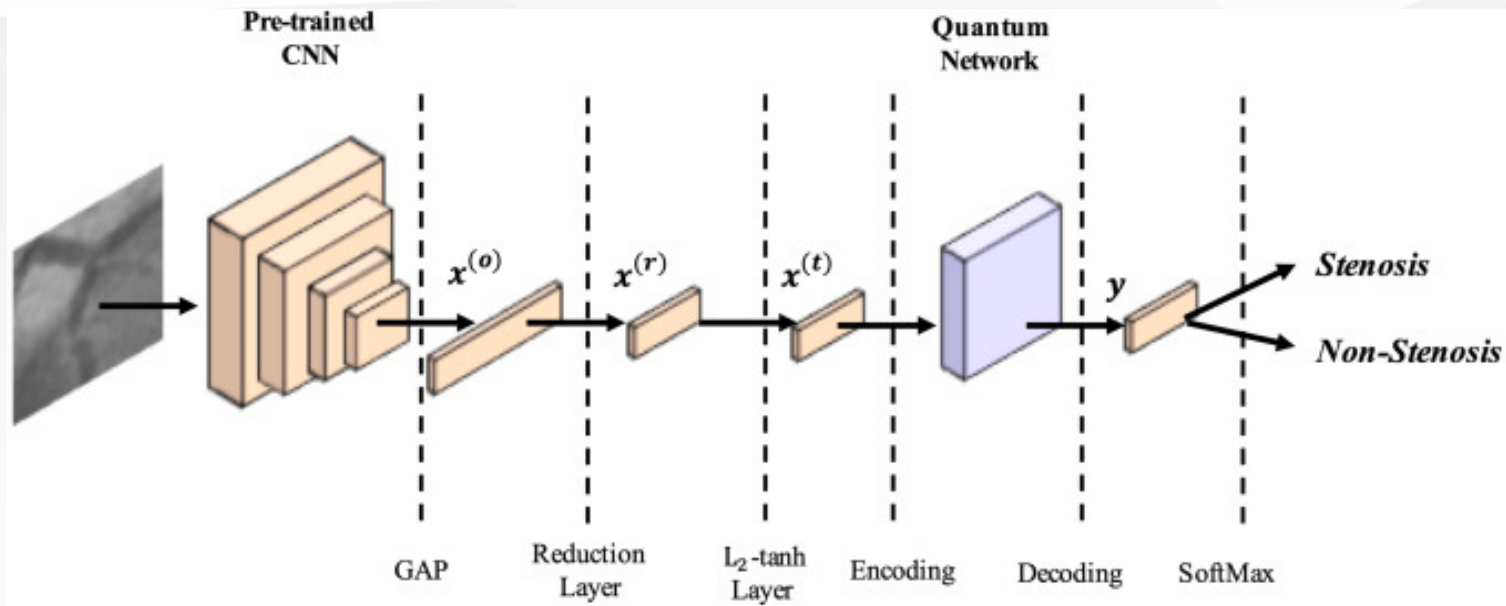
If you were a teardrop , in my eye, for fear of losing you , I would never cry



01



Transfer Learning



IN OUR MODEL :

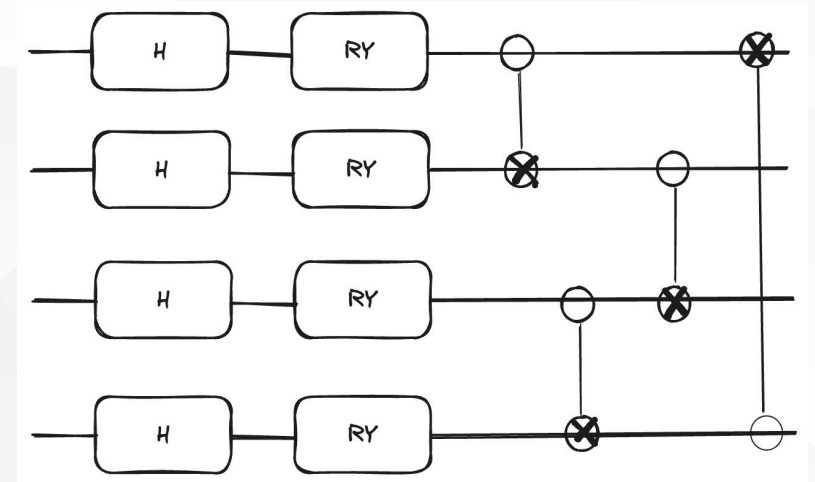
1. CNN : ResNet18
2. QNN : PennyLane

01



Transfer Learning

Our circuit



1. CNN : ResNet18
2. QNN : PennyLane



ResNet18

$L_{512 \rightarrow 4}$

QPU

$L_{4 \rightarrow 2}$

→ “bee”

What we do: Test different parameters to find the best model

02

Result



Our Best Model's Param

ResNet18

qubits = 4

step = 0.0006

batch_size = 4

num_epochs = 10

q_depth = 7

gamma_lr_scheduler = 0.1

q_delta = 0.01

Number of qubits

Learning rate

Number of samples for each training step

Number of training epochs

Depth of the quantum circuit (number of variational layers)

Learning rate reduction applied every 10 epochs.

Initial spread of random quantum weights

02

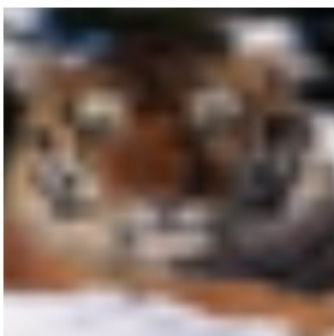


Result

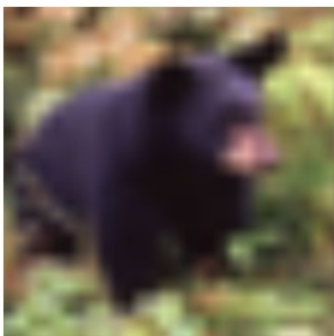
Result

Batch size: 4, Correct: 4

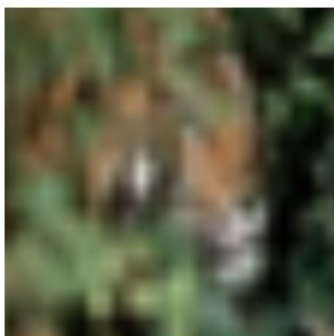
[tiger]



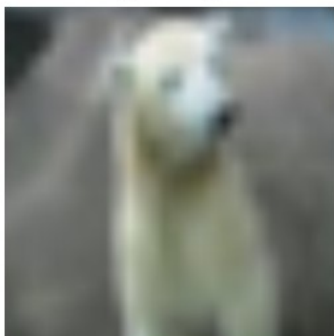
[bear]



[tiger]



[bear]



```
PS C:\政治大學\黑客松\2023EphysChallenge> python model.py
Files already downloaded and verified
Files already downloaded and verified
Training started:
Phase: train Epoch: 1/6 Loss: 0.4979 Acc: 0.7870
Phase: val   Epoch: 1/6 Loss: 0.2998 Acc: 0.9050
Phase: train Epoch: 2/6 Loss: 0.3795 Acc: 0.8440
Phase: val   Epoch: 2/6 Loss: 0.2530 Acc: 0.9100
Phase: train Epoch: 3/6 Loss: 0.3698 Acc: 0.8410
Phase: val   Epoch: 3/6 Loss: 0.2138 Acc: 0.9400
Phase: train Epoch: 4/6 Loss: 0.3820 Acc: 0.8410
Phase: val   Epoch: 4/6 Loss: 0.2556 Acc: 0.9450
Phase: train Epoch: 5/6 Loss: 0.3425 Acc: 0.8640
Phase: val   Epoch: 5/6 Loss: 0.2348 Acc: 0.9550
Phase: train Epoch: 6/6 Loss: 0.3305 Acc: 0.8630
Phase: val   Epoch: 6/6 Loss: 0.1880 Acc: 0.9250
Training completed in 10m 4s
Best test loss: 10000.0000 | Best test accuracy: 0.9550
```

03

DEMO



MANY THANKS!