2023

Ephys Challenge

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Outline

01 Method

02 Result

03 Demo

01 Method

01 Transfer Learning

What is it ?

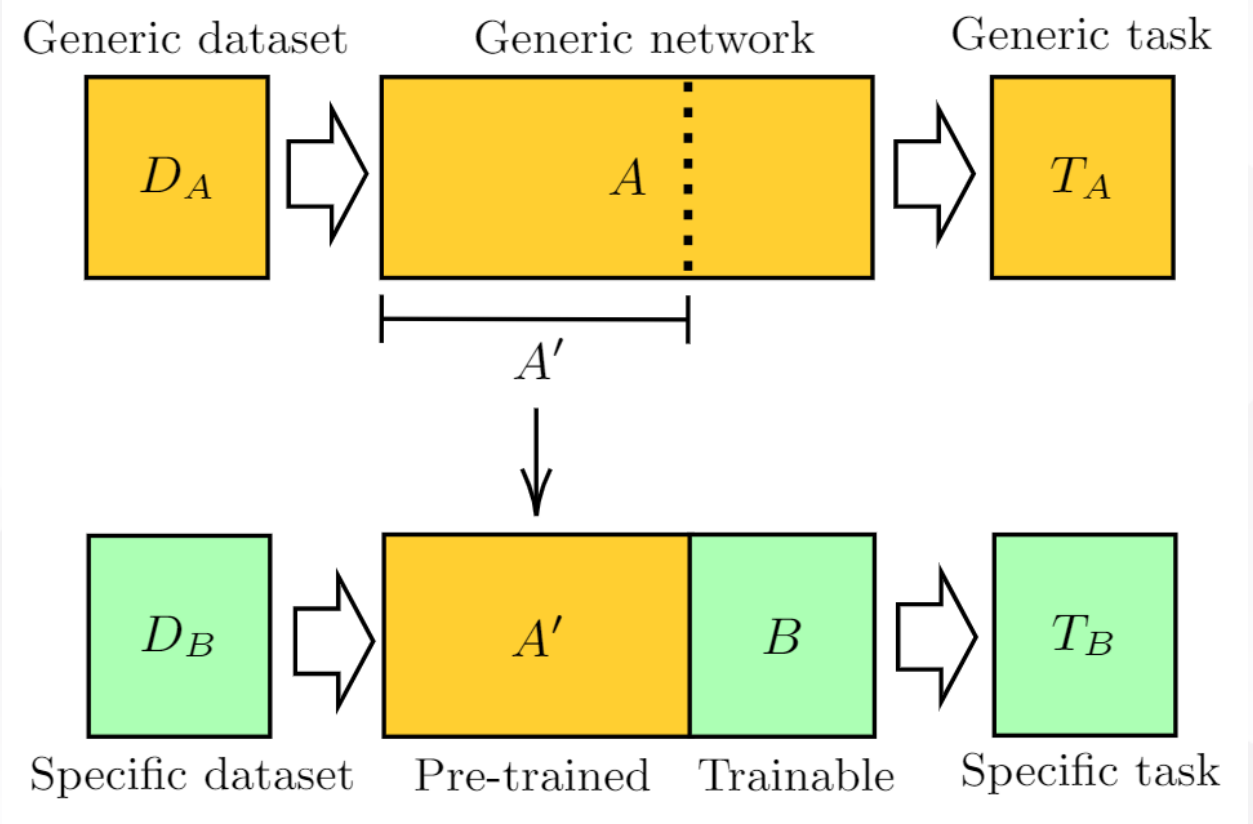
Why is it ?

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 ?

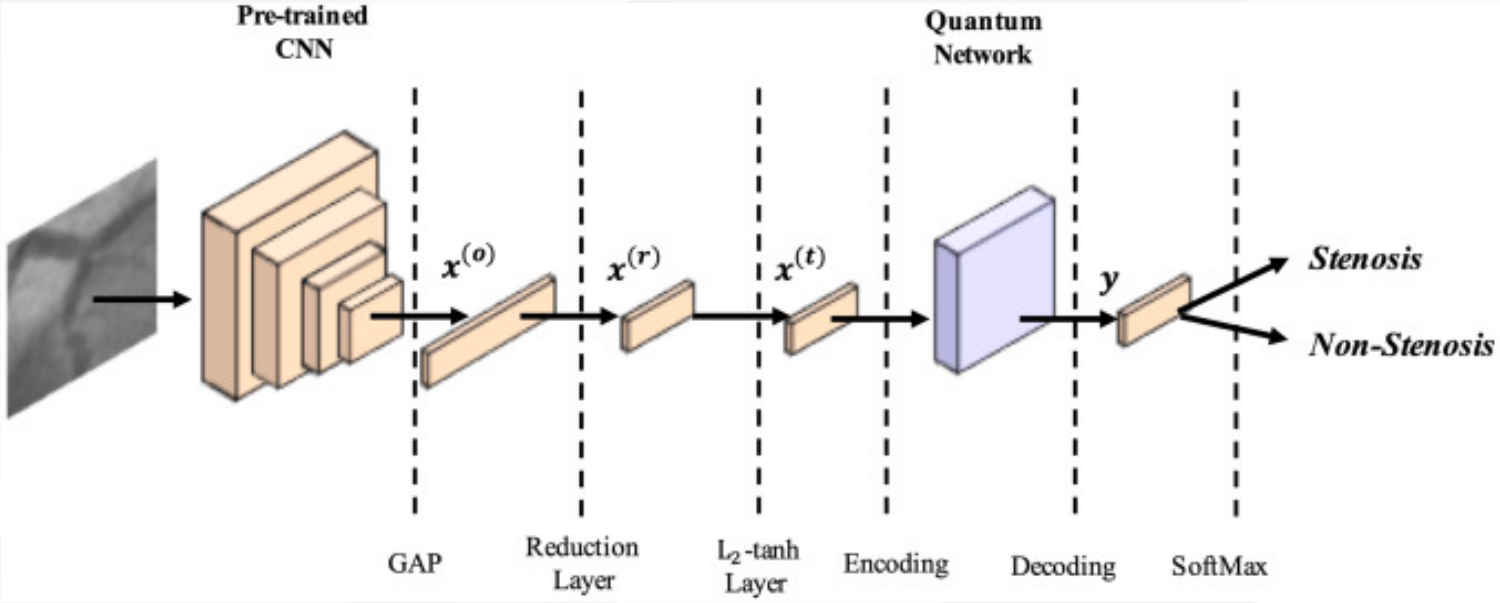
1. **Data too complex and Physical Constraint on QPU**
2. **Stand upon the shoulders of giants**

01 Transfer Learning

What is it ?

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

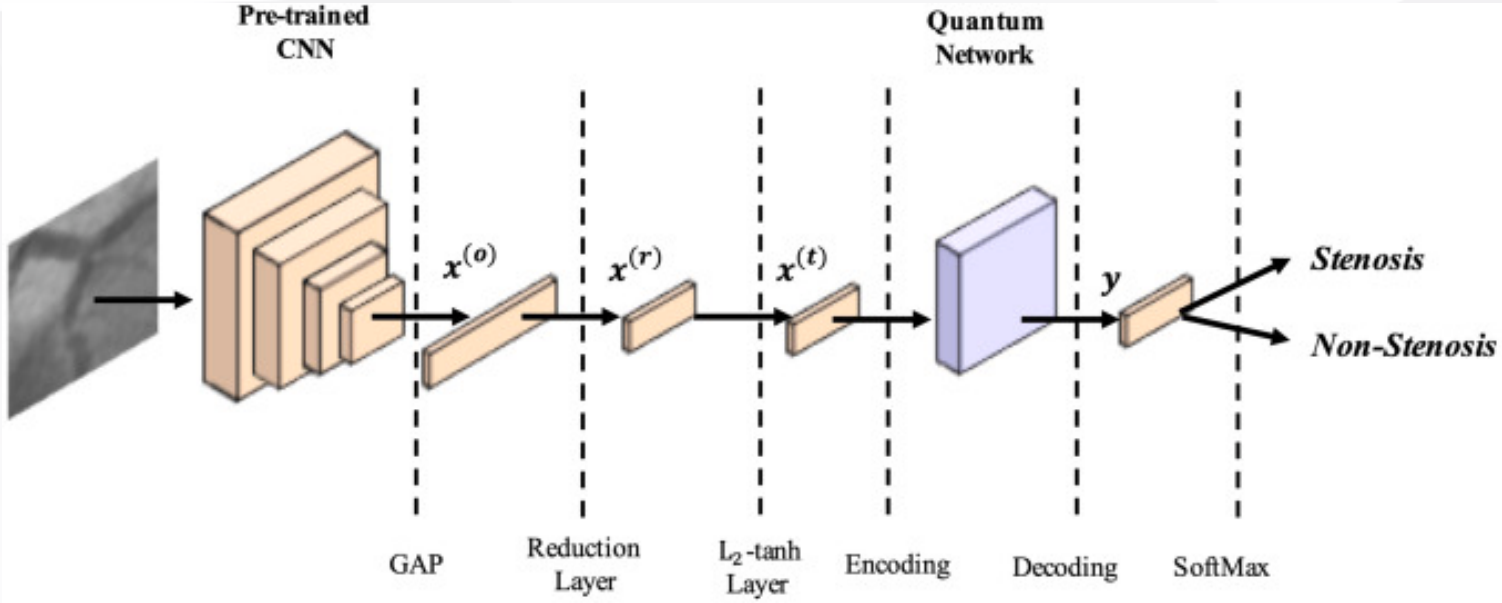
Why is it ?



How it work ?

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

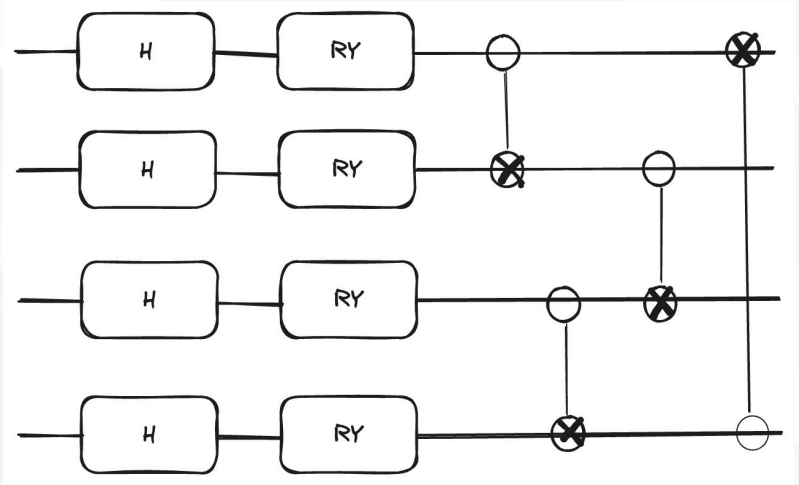
01 Transfer Learning



IN OUR MODEL :

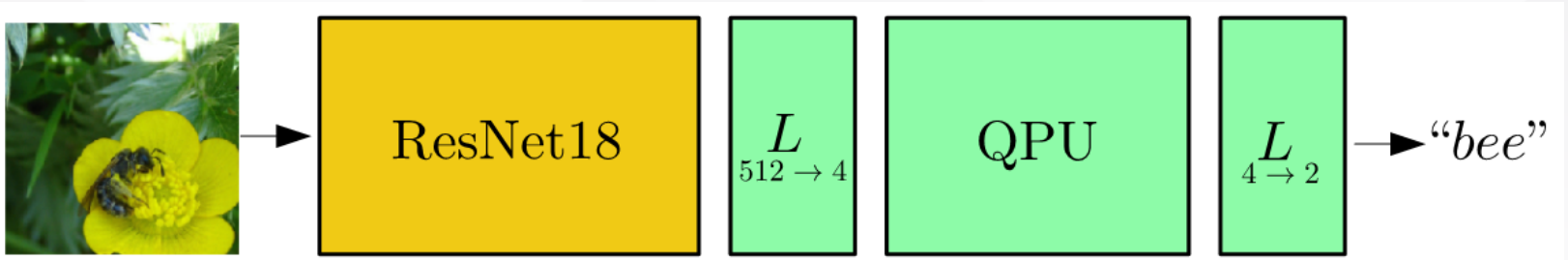
1. CNN : ResNet18
2. QNN：PennyLane

01 Transfer Learning



Our circuit

1. CNN : ResNet18
2. QNN：PennyLane



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

02

Result

02 Result

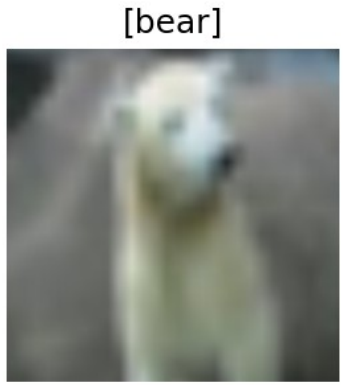
Our Best Model‘s Param

ResNet18

```
qubits = 4                      # Number of qubits
step = 0.0006                   # Learning rate
batch_size = 4                  # Number of samples for each training step
num_epochs = 10                 # Number of training epochs
q_depth = 7                     # Depth of the quantum circuit (number of variational layers)
gamma_lr_scheduler = 0.1        # Learning rate reduction applied every 10 epochs.
q_delta = 0.01                  # Initial spread of random quantum weights
```

Result

Batch size: 4, Correct: 4




```
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!