**Hybrid T2 ConvNeXt Model Train**

**Release Notes**

**Run # 1 – > Using unbalanced dataset to train Hybrid T2 model for 300 epochs!!!**

**Train Report**

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Train code: ConvNeXt\_train\_**1.2**\_WIP.py (adopt class weights for imbalance issue of training dataset)

Model saved as: Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_xxE.pth / Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300'E.pth

Train data: D:/Hybrid\_model\_train/dataset\_v1.0/T1/train/ (NG: **3868**; OK: **5728**)

Val data: D:/TBR\_model\_train/dataset\_v1.0/T1/val/ (NG: **484**; OK: **716**)

Pre-trained model: None

**Epoch 98/300**

Training Loss: 0.0918, Training Accuracy: 0.9656| 150/150 [03:03<00:00, 1.23s/it]

Validation Loss: 0.0573, Validation Accuracy: 0.9825| 19/19 [00:18<00:00, 1.03it/s]

Best model saved with accuracy: 0.9825

**Epoch 125/300**

Training Loss: 0.0852, Training Accuracy: 0.9673| 150/150 [03:02<00:00, 1.22s/it]

Validation Loss: 0.0516, Validation Accuracy: 0.9842| 19/19 [00:18<00:00, 1.03it/s]

Best model saved with accuracy: 0.9842

**Epoch 153/300**

Training Loss: 0.0876, Training Accuracy: 0.9636| 150/150 [03:03<00:00, 1.22s/it]

Validation Loss: 0.0488, Validation Accuracy: 0.9867| 19/19 [00:18<00:00, 1.03it/s]

Best model saved with accuracy: 0.9867

**Epoch 253/300**

Training Loss: 0.0832, Training Accuracy: 0.9681| 150/150 [03:06<00:00, 1.24s/it]

Validation Loss: 0.0459, Validation Accuracy: 0.9883| 19/19 [00:18<00:00, 1.01it/s]

Best model saved with accuracy: 0.9883

**Epoch 300/300**

Training Loss: 0.0786, Training Accuracy: 0.9704| 150/150 [03:02<00:00, 1.22s/it]

Validation Loss: 0.0541, Validation Accuracy: 0.9792| 19/19 [00:18<00:00, 1.03it/s]

Training complete. Best/final model and optimizer saved successfully!

Training finished at: 2024-08-26 10:13:31

Total elapsed training time: **0d 16h 59m 26s**

一張含有 文字, 繪圖, 圖表, 螢幕擷取畫面 的圖片

自動產生的描述

**以Hybrid T2 model retest the previous T1 test dataset of both PCR and TBR to see any differences???**

**Test Report -- > PCR T2 (Tread)**

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Test code: ConvNeXt\_edge\_test\_1.0\_WIP.py

Threshold = **0.2** (Total test images: 559)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| T2\_ConvNeXt\_best\_model\_FZ\_13E.pth | 499 | | 60 | |
| 471 | **28** | 60 | **0** |
| T2\_ConvNeXt\_final\_model\_FZ\_20E.pth | 499 | | 60 | |
| 483 | **16** | 60 | **0** |

Accuracy (13E): **94.99%**

Accuracy (20E): **97.13%**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 499 | | 60 | |
| 481 | **18** | 59 | **1** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 499 | | 60 | |
| 471 | **28** | 59 | **1** |
| Accuracy (253E): **96.60%**  Accuracy (300E): **94.81%** | | | | |

Threshold = **0.3** (Total test images: 559)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| T2\_ConvNeXt\_best\_model\_FZ\_13E.pth | 499 | | 60 | |
| 481 | **18** | 60 | **0** |
| T2\_ConvNeXt\_final\_model\_FZ\_20E.pth | 499 | | 60 | |
| 489 | **10** | 60 | **0** |

Accuracy (13E): **96.77%**

Accuracy (20E): **98.21%**

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| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 499 | | 60 | |
| 489 | **10** | 59 | **1** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 499 | | 60 | |
| 478 | **21** | 59 | **1** |
| Accuracy (253E): **98.03%**  Accuracy (300E): **96.06%** | | | | |

Threshold = **0.4** (Total test images: 559)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| T2\_ConvNeXt\_best\_model\_FZ\_13E.pth | 499 | | 60 | |
| 488 | **11** | 60 | **0** |
| T2\_ConvNeXt\_final\_model\_FZ\_20E.pth | 499 | | 60 | |
| 492 | **7** | 60 | **0** |

Accuracy (13E): **98.03%**

Accuracy (20E): **98.74%**

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| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 499 | | 60 | |
| 493 | **6** | 59 | **1** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 499 | | 60 | |
| 482 | **17** | 59 | **1** |
| Accuracy (253E): **98.74%**  Accuracy (300E): **96.77%** | | | | |

Threshold = **0.5** (Total test images: 559)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| T2\_ConvNeXt\_best\_model\_FZ\_13E.pth | 499 | | 60 | |
| 492 | **7** | 59 | **1** |
| T2\_ConvNeXt\_final\_model\_FZ\_20E.pth | 499 | | 60 | |
| 495 | **4** | 60 | **0** |

Accuracy (13E): **98.56%**

Accuracy (20E): **99.28%**

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| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 499 | | 60 | |
| 494 | **5** | 59 | **1** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 499 | | 60 | |
| 485 | **14** | 59 | **1** |
| Accuracy (253E): **98.74%**  Accuracy (300E): **97.31%** | | | | |

**99.28% (PCR\_T2) vs.98.74% (Hybrid T2).**

**Test Report -- > TBR T2 (Sidewall)**

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Test code: ConvNeXt\_edge\_test\_1.0\_WIP.py

Threshold = **0.5** (Total test images: 524)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| TBR\_T2\_ConvNeXt\_best\_model\_UFZ\_161E.pth | 416 | | 108 | |
| 407 | **9** | 99 | **9** |
| TBR\_T2\_ConvNeXt\_final\_model\_UFZ\_200E.pth | 416 | | 108 | |
| 403 | **13** | 98 | **10** |

Accuracy (161E): **96.56%**

Accuracy (200E): **95.61%**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 416 | | 108 | |
| 410 | **6** | 107 | **1** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 416 | | 108 | |
| 406 | **10** | 108 | **0** |
| Accuracy (253E): **98.66%**  Accuracy (300E): **98.09%** | | | | |

Threshold = **0.4** (Total test images: 524)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| TBR\_T2\_ConvNeXt\_best\_model\_UFZ\_161E.pth | 416 | | 108 | |
| 403 | **13** | 101 | **7** |
| TBR\_T2\_ConvNeXt\_final\_model\_UFZ\_200E.pth | 416 | | 108 | |
| 401 | **15** | 100 | **8** |

Accuracy (161E): **96.18%**

Accuracy (200E): **95.61%**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 416 | | 108 | |
| 406 | **10** | 108 | **0** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 416 | | 108 | |
| 402 | **14** | 108 | **0** |
| Accuracy (253E): **98.09%**  Accuracy (300E): **97.32%** | | | | |

Threshold = **0.3** (Total test images: 524)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| TBR\_T2\_ConvNeXt\_best\_model\_UFZ\_161E.pth | 416 | | 108 | |
| 394 | **22** | 105 | **3** |
| TBR\_T2\_ConvNeXt\_final\_model\_UFZ\_200E.pth | 416 | | 108 | |
| 395 | **21** | 103 | **5** |

Accuracy (161E): **95.22%**

Accuracy (200E): **95.03%**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 416 | | 108 | |
| 402 | **14** | 108 | **0** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 416 | | 108 | |
| 395 | **21** | 108 | **0** |
| Accuracy (253E): **97.32%**  Accuracy (300E): **95.99%** | | | | |

**96.56% (TBR\_T2) vs.98.66% (Hybrid T2).**

**測試Hybrid T2 model的edge test dataset!!!**

Threshold = **0.5** (Total test images: 2400)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 1432 | | 968 | |
| 1410 | **22** | 961 | **7** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 1432 | | 968 | |
| 1390 | **42** | 965 | **3** |
| Accuracy (225E): **98.79%**  Accuracy (300E): **98.12%** | | | | |

Threshold = **0.4** (Total test images: 2400)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 1432 | | 968 | |
| 1402 | **30** | 963 | **5** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 1432 | | 968 | |
| 1377 | **55** | 965 | **3** |
| Accuracy (225E): **98.54%**  Accuracy (300E): **97.58%** | | | | |

Threshold = **0.3** (Total test images: 2400)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Model** | **OK Test Images** | | **NG Test Images** | |
| **OK** | **NG (Overkill)** | **NG** | **OK (Underkill)** |
| Hybrid\_T2\_ConvNeXt\_best\_model\_UFZ\_253E.pth | 1432 | | 968 | |
| 1384 | **48** | 966 | **2** |
| Hybrid\_T2\_ConvNeXt\_final\_model\_UFZ\_300E.pth | 1432 | | 968 | |
| 1361 | **71** | 965 | **3** |
| Accuracy (225E): **97.91%**  Accuracy (300E): **96.91%** | | | | |

**Best 98.79% (Hybrid T2)**