X-Ray Cutting 精度量測

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指導者:
2021/4/26

Outline

1. 專案介紹
    1. 專案背景目標
    2. 定義問題
    3. 製程流程說明
    4. 預期效益
2. 專案執行過程
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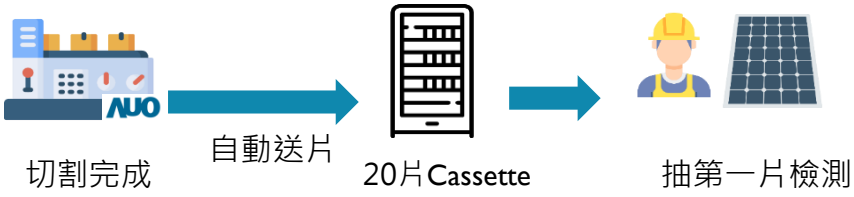
    2. 資料影像前處理
    3. 模型訓練
    4. 優化改善

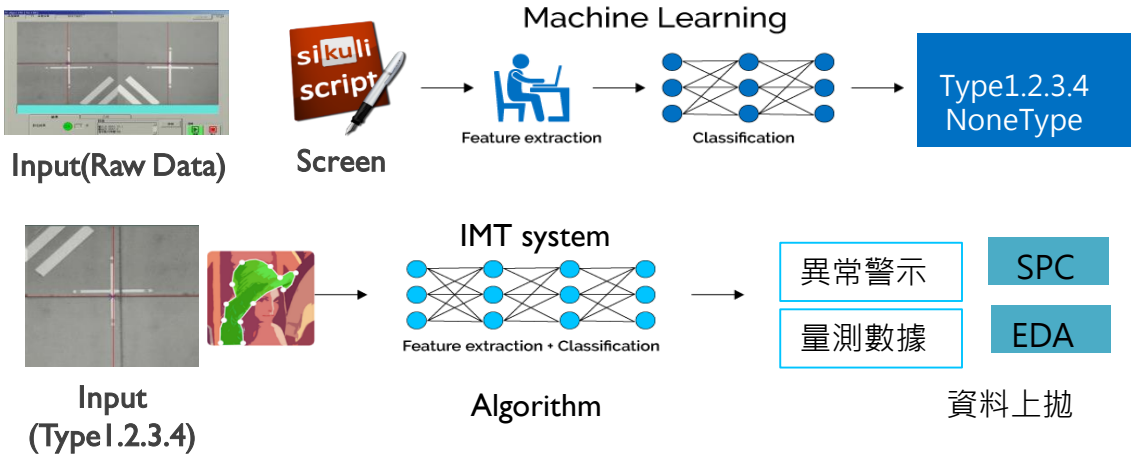
X-Ray Cutting 精度量測

痛點分析



原作業:

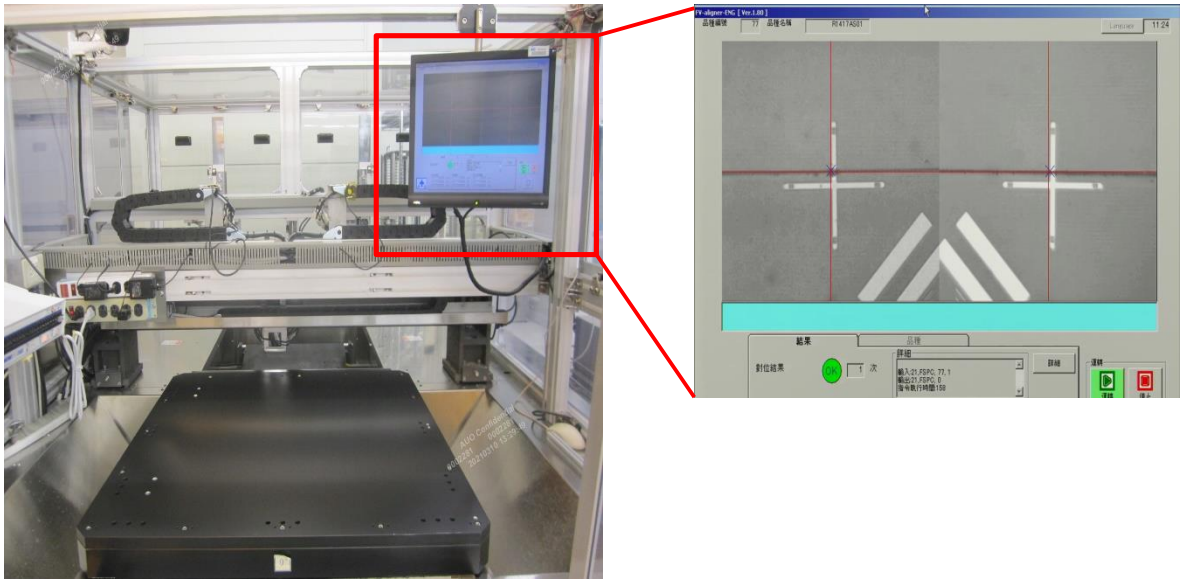
改善後:



X-Ray Cutting 精度量測

痛點分析

- **流程痛點**： 抽樣檢測，且人工量測且紙本填寫耗時，可能有量測、填寫錯誤
- **改善目標**：透過影像辨識的方式自動測量精度，可片片檢測異常
- **資料來源**：收集X-ray Cutting影像，擷取攝影機訊號取出切割Data



X-Ray Cutting 精度量測

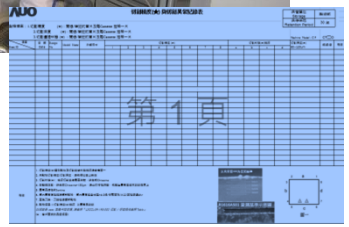
痛點分析

- **改善人工：**(移動站點+量測24個點+填表+Keyin資料上拋) x 抽檢次數 x 生產頻率

移動站點

抽檢量測24個點+填表

抽檢次數
(3/8共5次)
(3/9共7次)

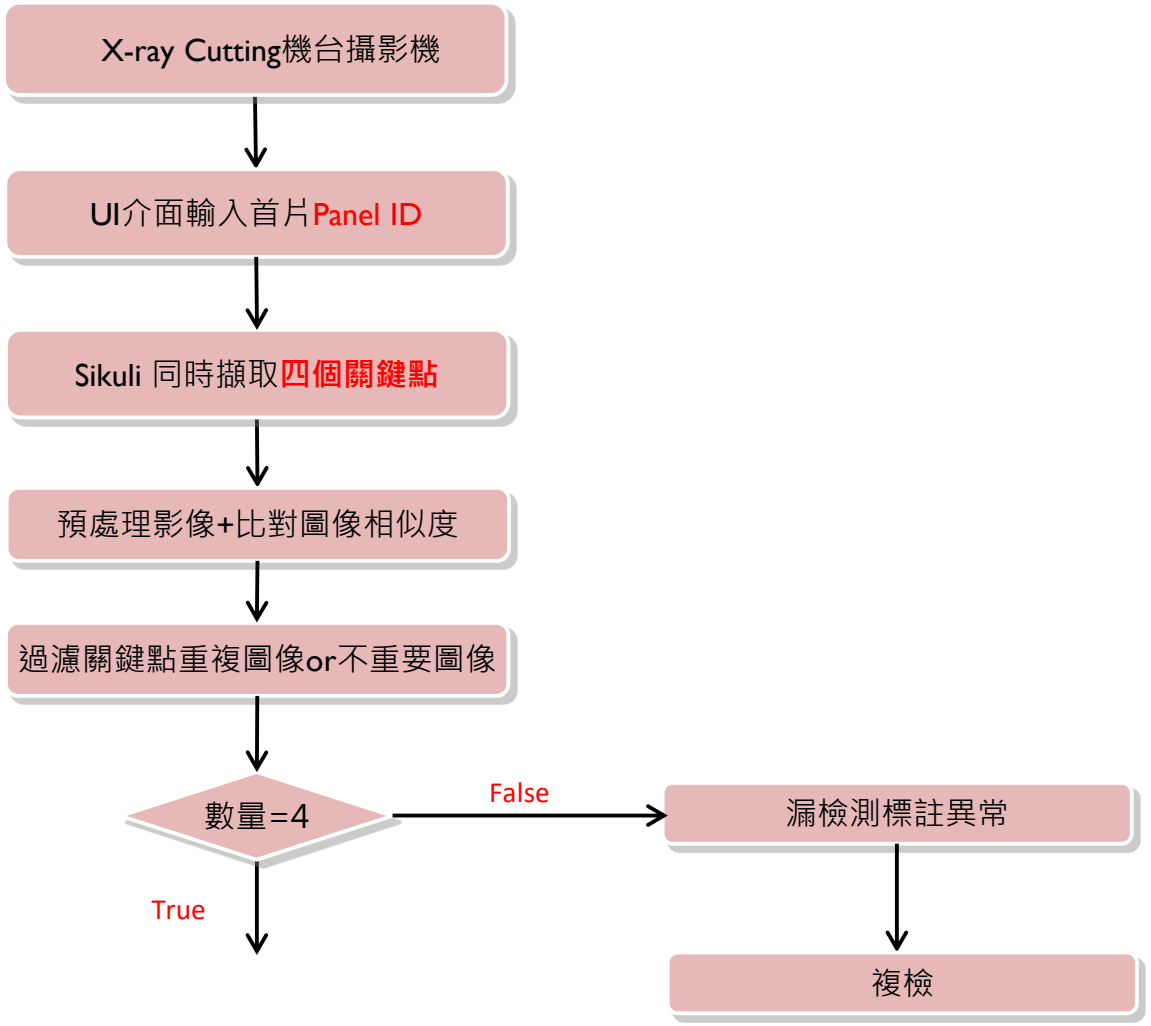


Keyin資料上拋

人工填表、人工keyin

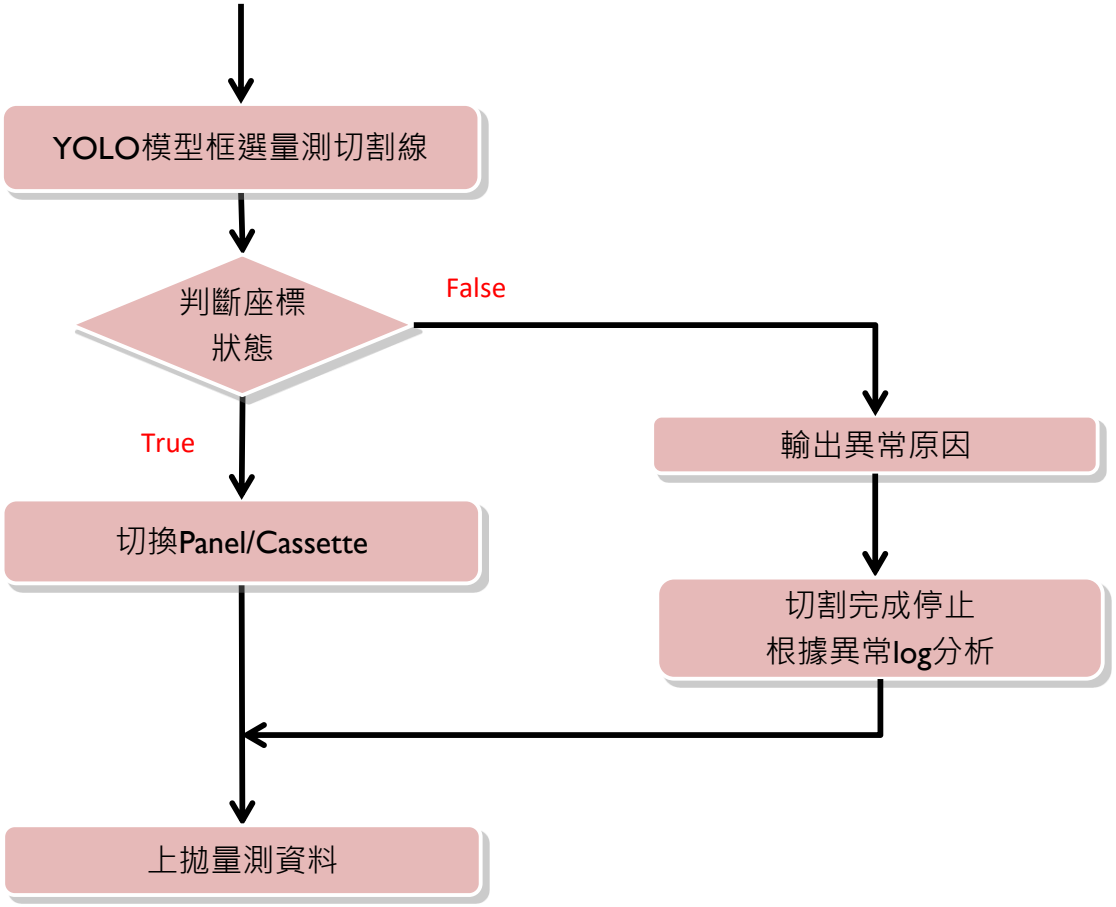
X-Ray Cutting 精度量測改善流程

定義問題



X-Ray Cutting 精度量測改善流程

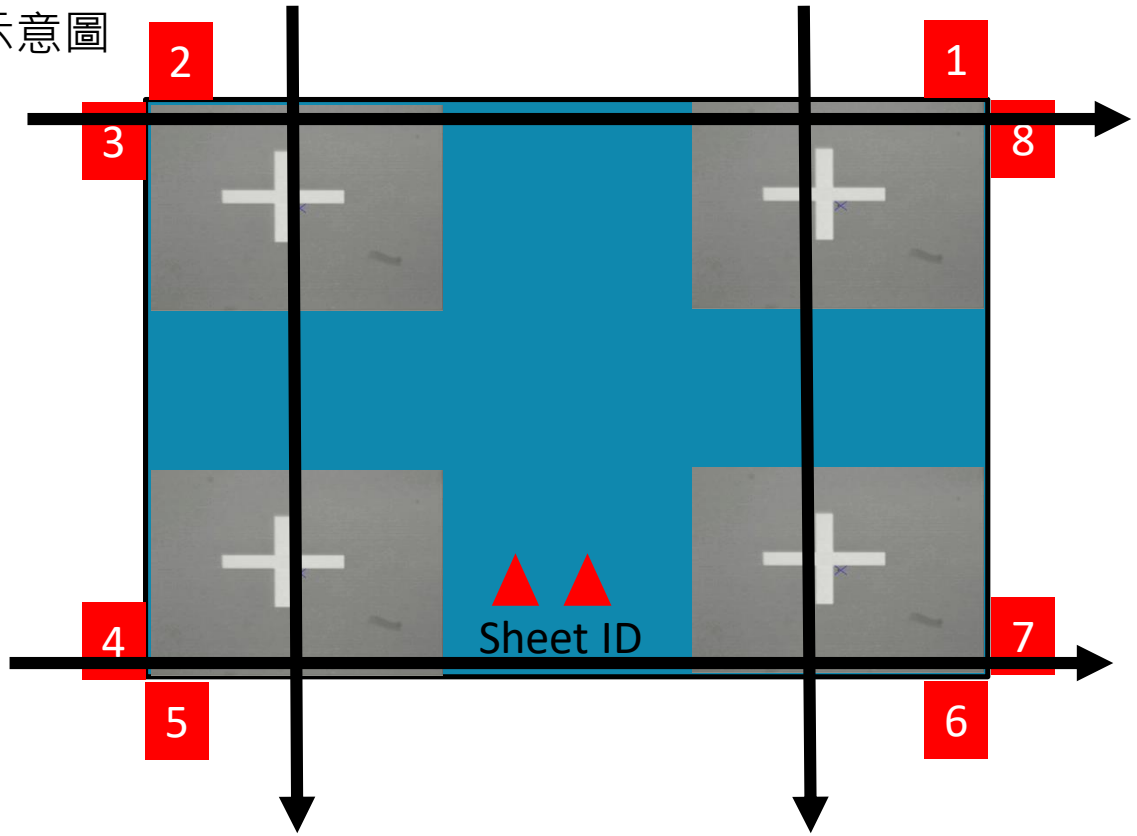
定義問題



資料前處理(R1717AS04)

定義問題

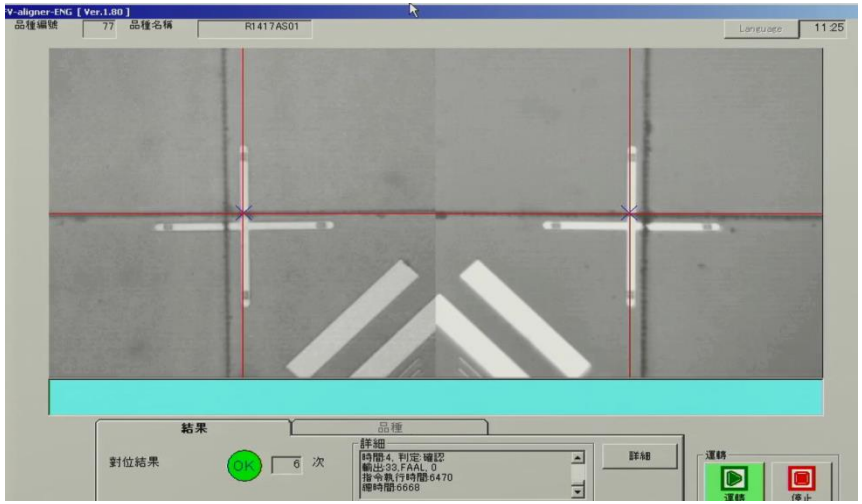
切割順序示意圖

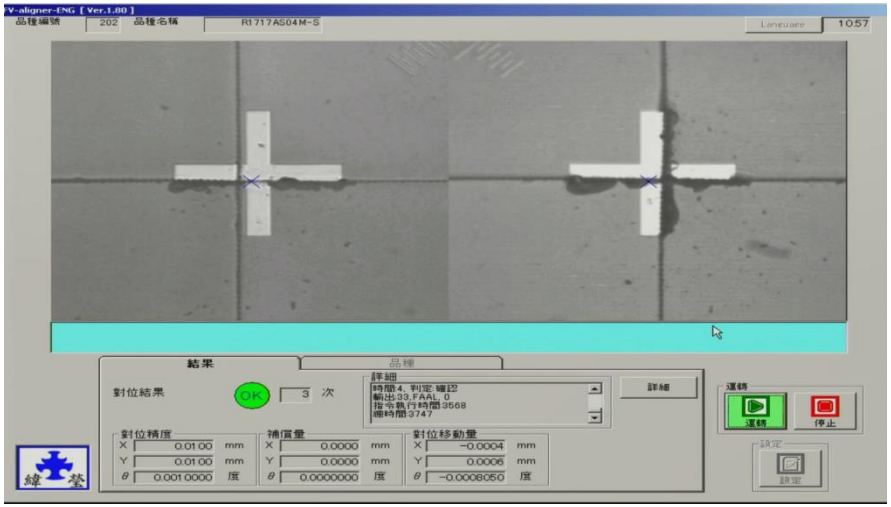


X-Ray Cutting 精度量測

定義問題

類別定義(Type)





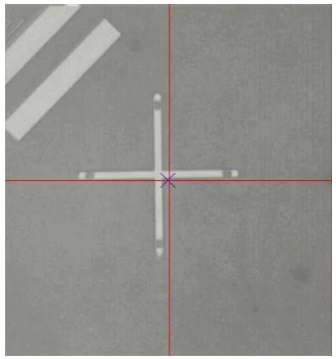
X-Ray Cutting 精度量測

定義問題

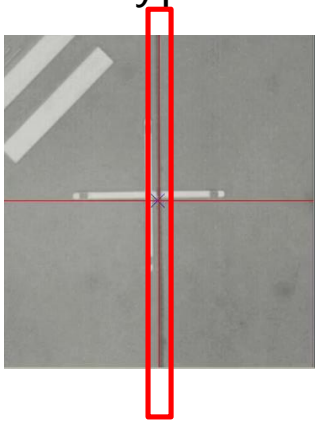
類別定義(SubType)

e.g.Type1

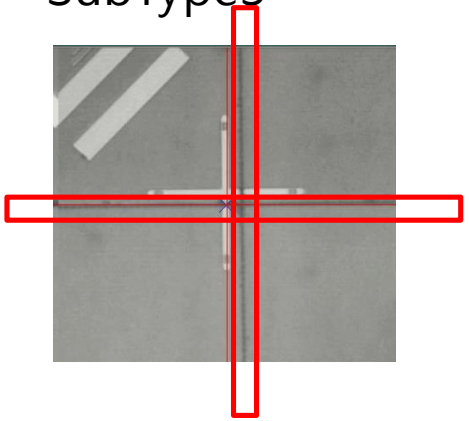
SubType1



SubType2



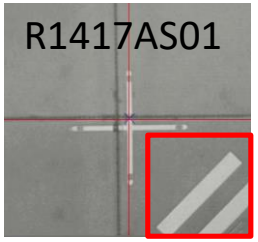
SubType3

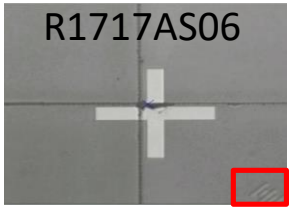


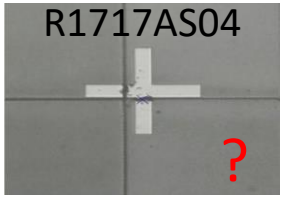
資料重新取樣

資料蒐集

多產品取樣







Model	尺規	切割次數	切割頻率
R1417AS01	368*442	1次切	4月2次
R1717AS04	500*500 447*447	2次切	每天
R1717AS06	500*500 441*441	2次切	4月5次
R1714AS02	438*363	1次切	4月4次

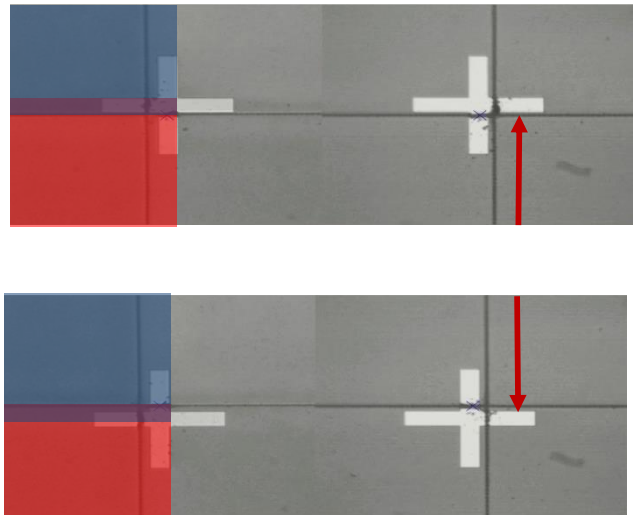
原取樣 R1417AS01 產出太少
故去對位紅線重新取樣，要更改取其他Model

資料前處理(影像擷取)

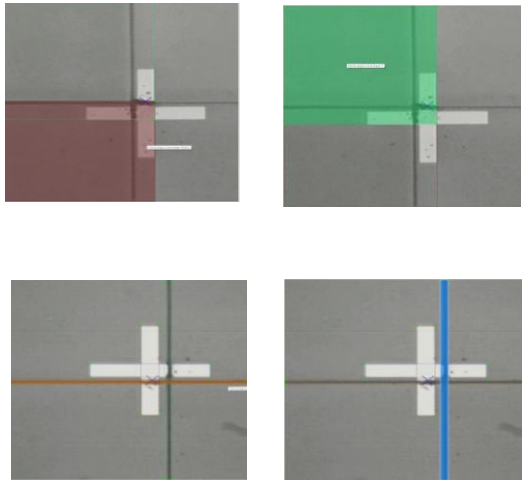
資料蒐集

重新取樣

SikuliX



R1717AS04原始圖像

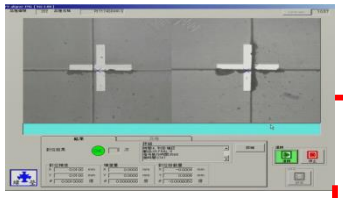


R1717AS04特徵圖像

資料前處理(R1717AS04)

資料蒐集

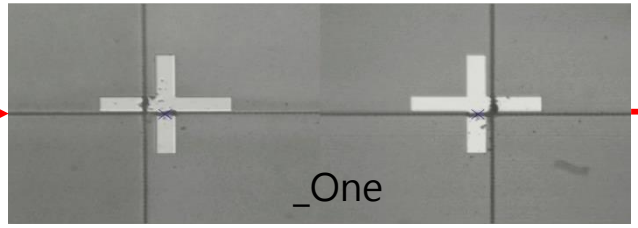
重新取樣



0:48

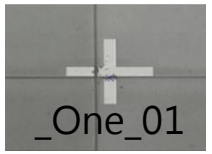
15-12-50_Y3VA

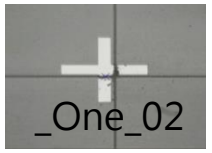
0:38



右下　　左下

Py切割





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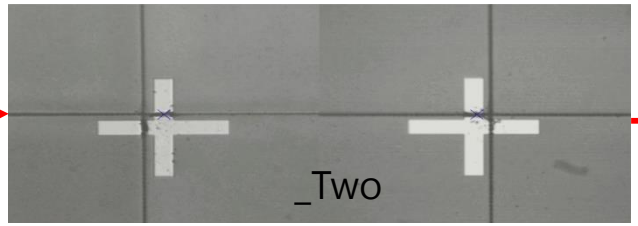

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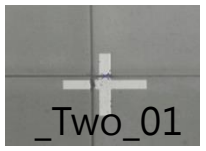
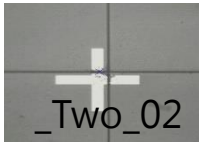
Py切割

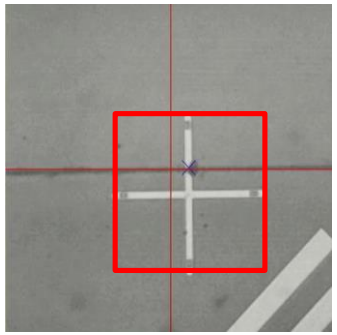


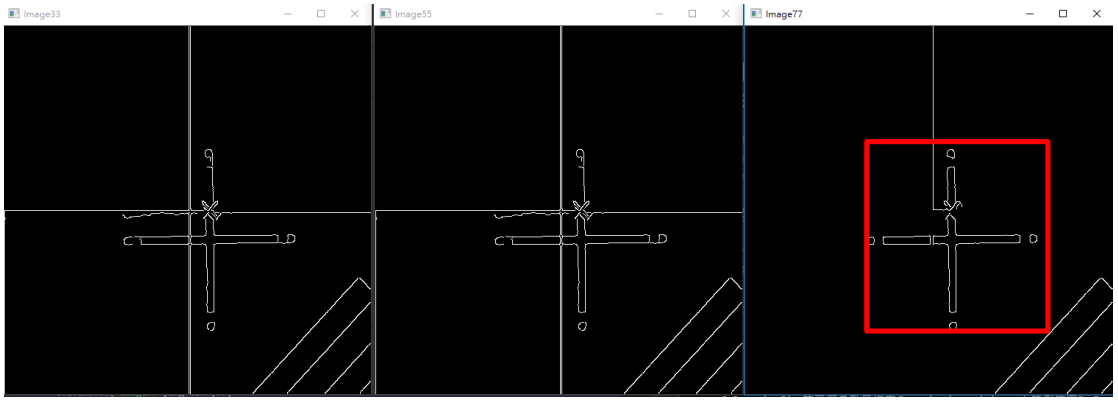


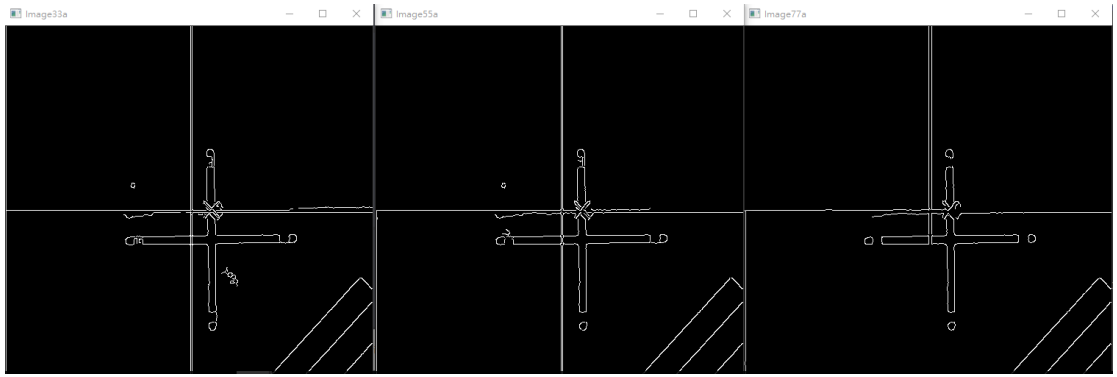
資料前處理(影像處理)

影像辨識

特徵顯現(去除紅線取特徵)



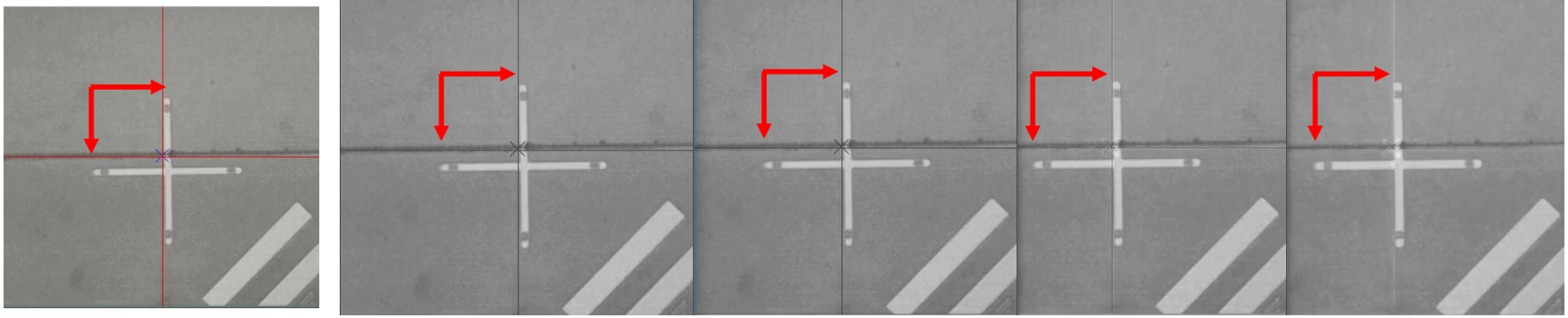


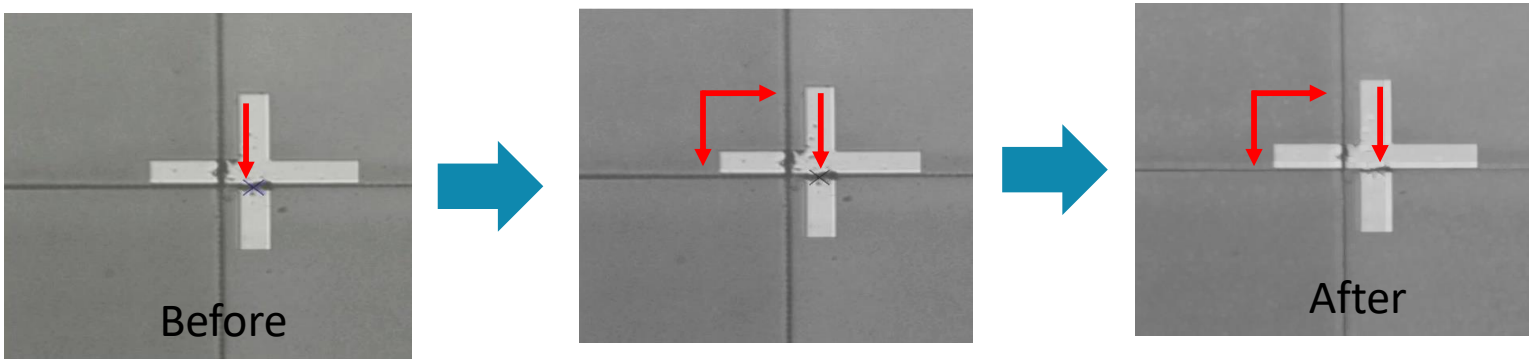


How to modify 紅線影響

影像辨識

特徵顯現(去除雜訊取特徵)

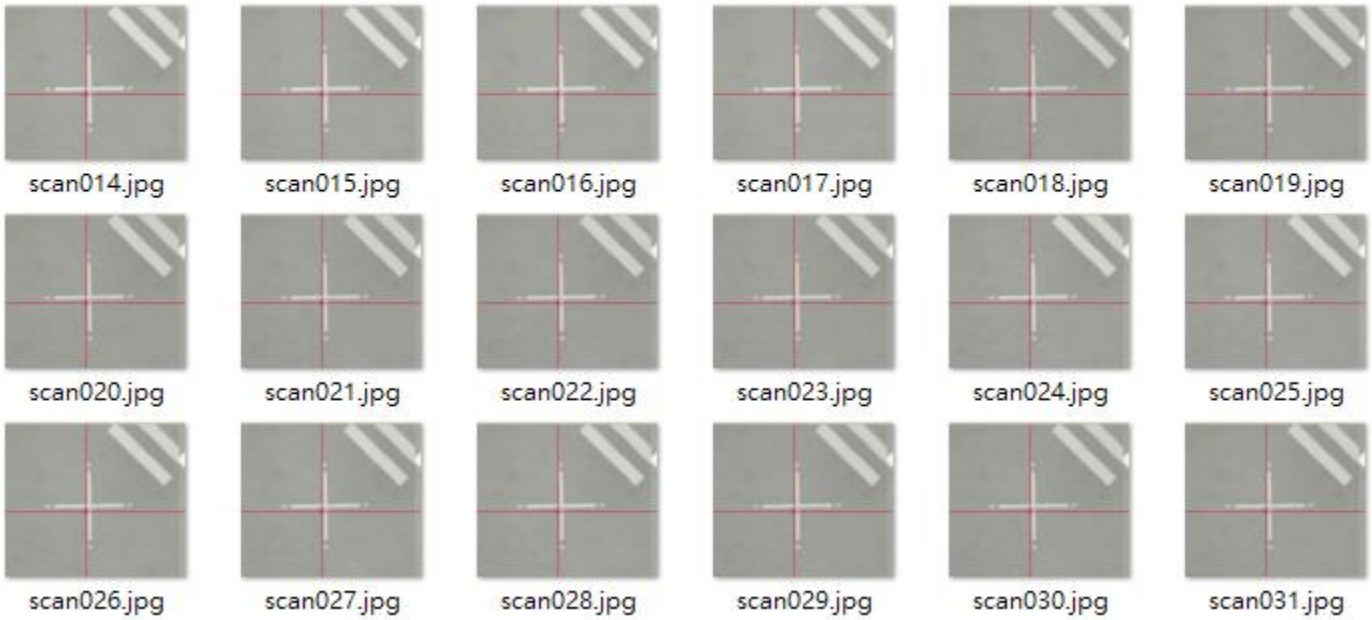




資料前處理(影像比對)

影像辨識

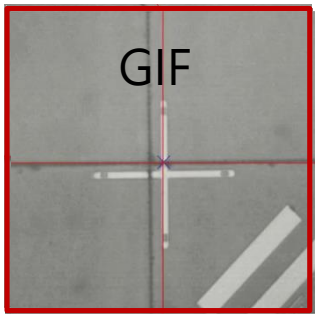
重複截圖問題

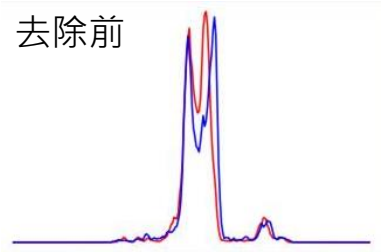


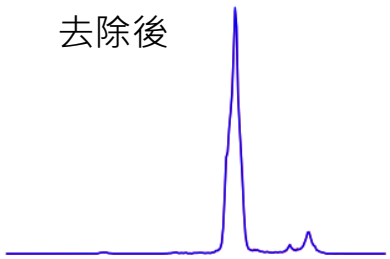
How to modify 影像重複

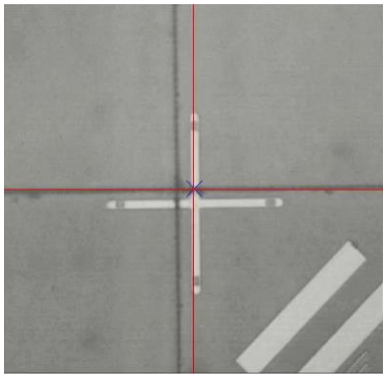
影像辨識

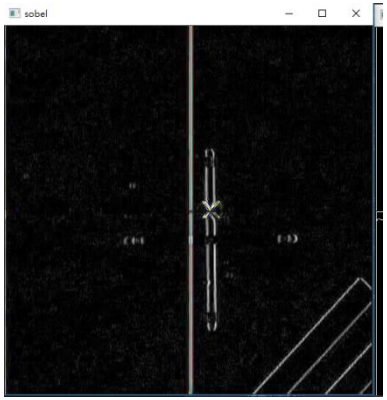
特徵顯現(去除機台光影問題)

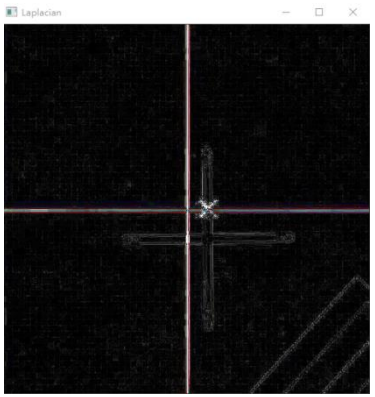




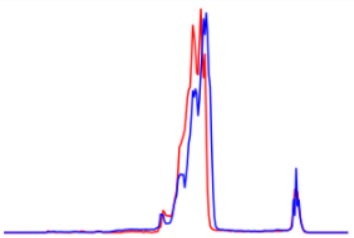




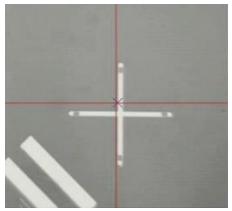


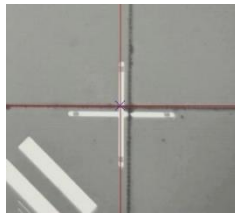


比較實驗參數

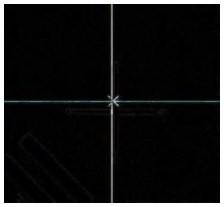


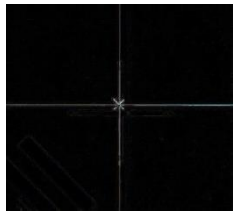
原始照片0.52018

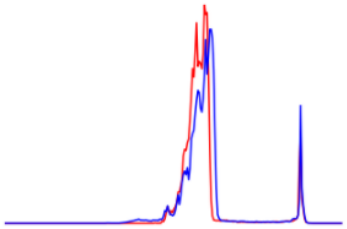




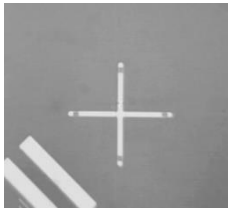
濾波A 0.5857

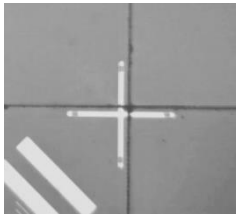




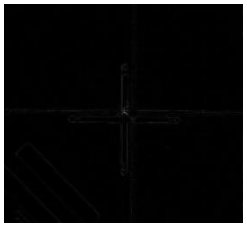


去紅線 0.69239





濾波B 0.5742

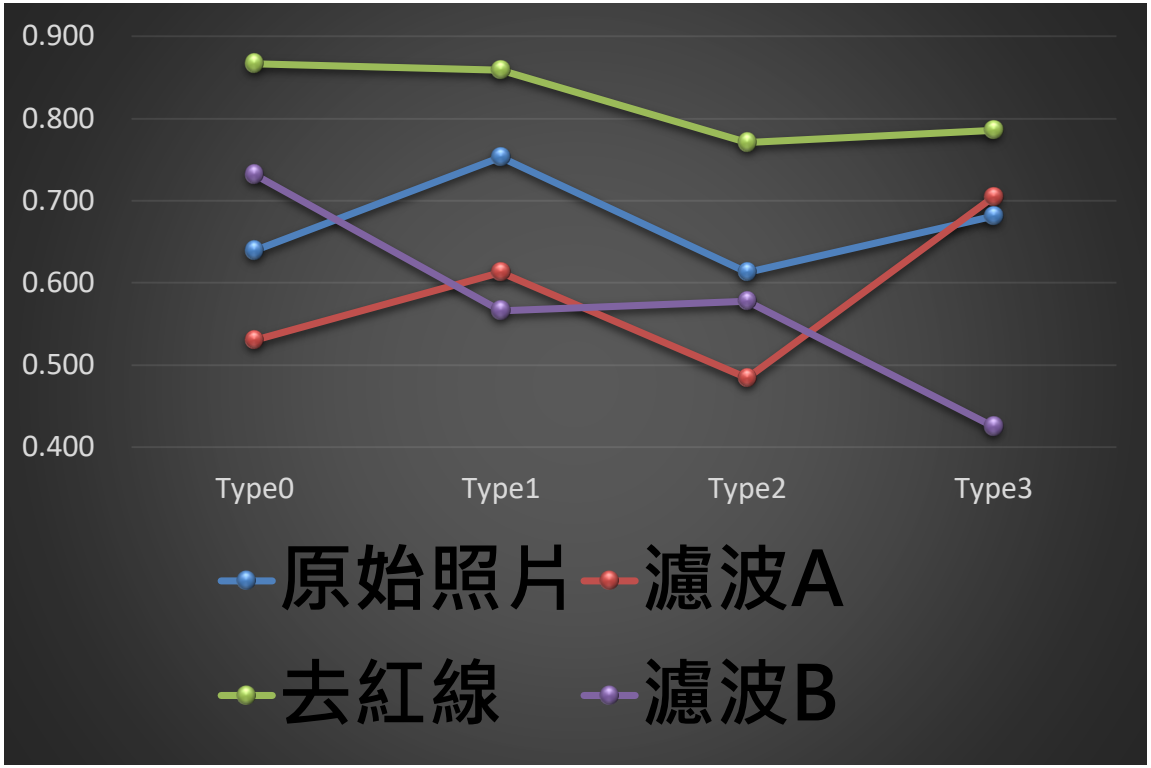


資料前處理(影像比對)

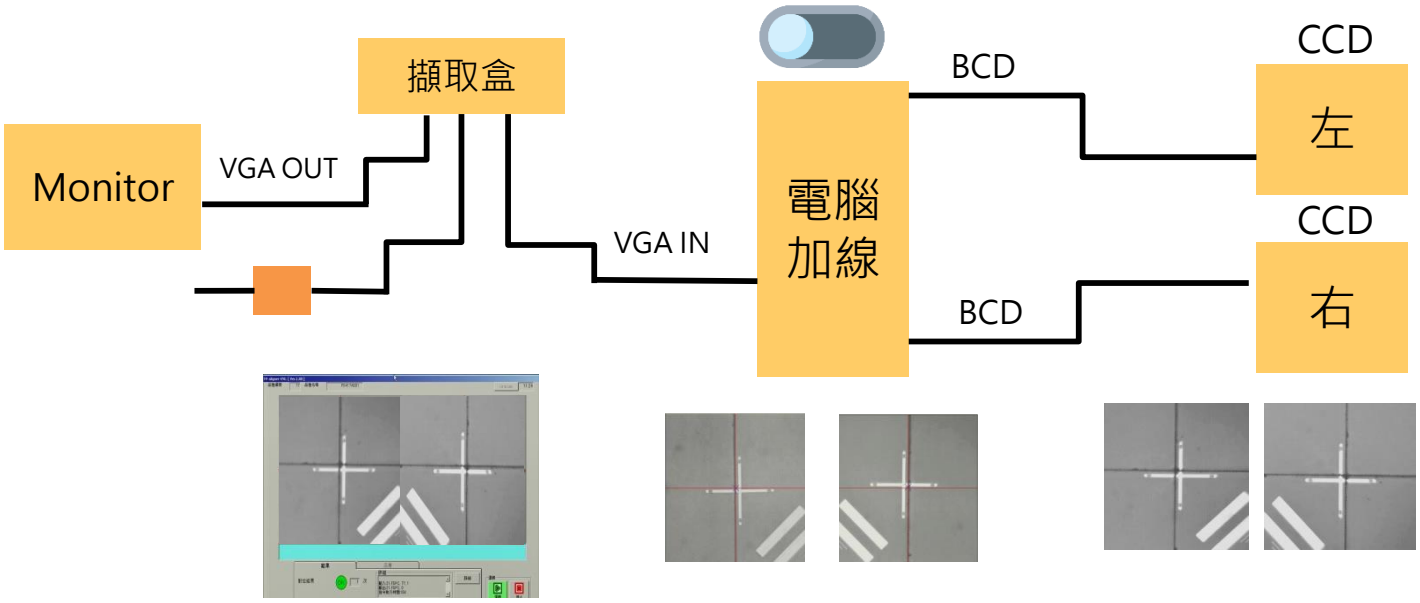
影像辨識

過濾比對

	原始照片	濾波A	去紅線	濾波B
Type0	0.639	0.53	0.867	0.732
Type1	0.753	0.613	0.859	0.566
Type2	0.613	0.484	0.771	0.578
Type3	0.681	0.705	0.786	0.425
AVG	0.6715	0.59425	0.82075	0.57525



X-ray Monitor 切割對位線去除



資料前處理(影像處理)

影像辨識

比對優化

ResultA　OK-相同Type比對數值越高越好

ERROR-同ResultA<同ResultB

ERROR-全ResultA下限<全ResultB上限

ResultB　OK-不同Type比對數值越低越好

ERROR-同ResultB>同ResultA

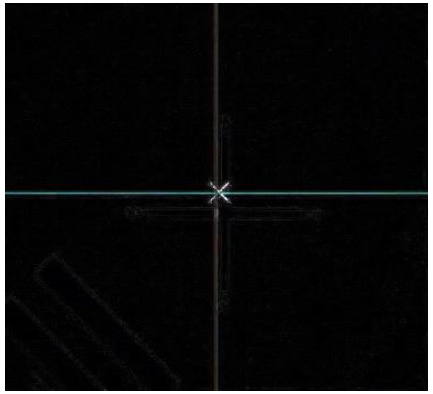
ERROR-全ResultB上限>全ResultA下限

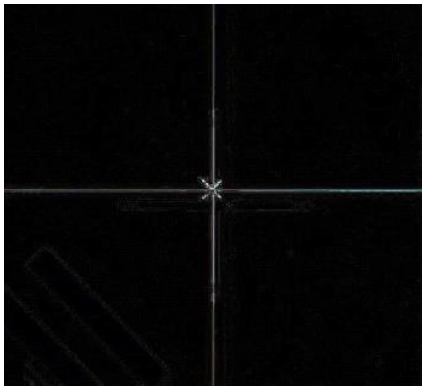
3/4Laplacian濾波

門檻0.613

25%

	Type0	Type1	Type2	Type3
Type0_O	0.530264	0.5413052	0.5569659	0.589428
Type1_O	0.556322	0.6131818	0.6138076	0.632124
Type2_O	0.586149	0.5752244	0.4846446	0.635698
Type3_O	0.585752	0.6910311	0.5953789	0.70054





資料前處理(影像處理)

影像辨識

比對優化

3/11去紅線				
門檻0.777835				
	Type0	Type1	Type2	Type3
Type0_O	0.88045	0.7487912	0.7605826	0.739387
Type1_O	0.780321	0.8607659	0.8080678	0.767536
Type2_O	0.772589	0.8494423	0.7783511	0.710014
Type3_O	0.702587	0.7851074	0.7106963	0.793309

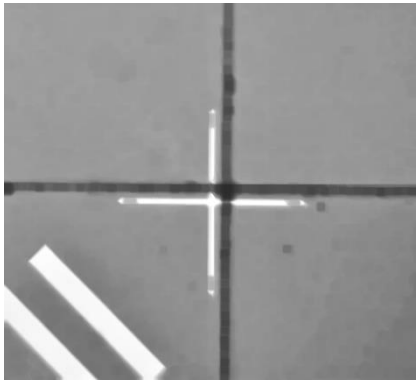
56%

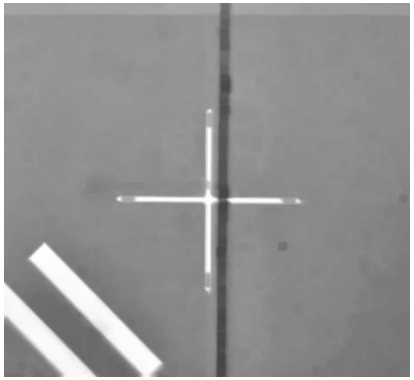
3/15加濾波器				
門檻0.79609				
	Type0	Type1	Type2	Type3
Type0_O	0.90648	0.7783787	0.7871182	0.746157
Type1_O	0.806052	0.8923589	0.8405786	0.778374
Type2_O	0.806931	0.8754532	0.7960945	0.729517
Type3_O	0.729952	0.8035682	0.7448337	0.824042

56%

3/18二次濾波+疊圖				
門檻0.73355				
	Type0	Type1	Type2	Type3
Type0_O	0.852121	0.6461788	0.6972363	0.628418
Type1_O	0.681473	0.8059641	0.7264466	0.695532
Type2_O	0.708488	0.7899912	0.7520309	0.654608
Type3_O	0.563003	0.7151212	0.6191027	0.733355

93%

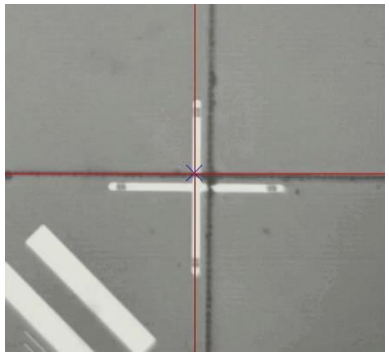
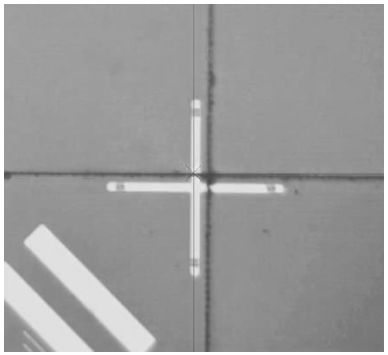
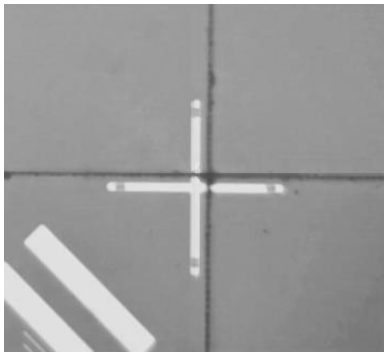
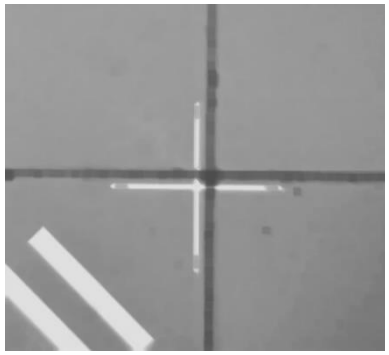
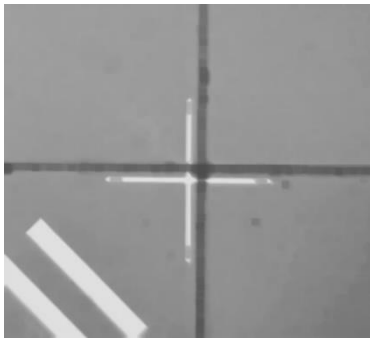
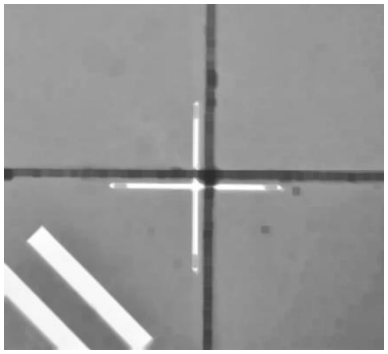




資料前處理(影像處理)

影像辨識

比對優化實驗過程

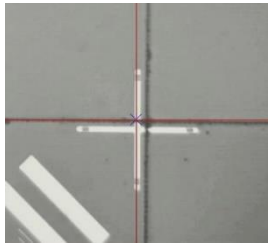







資料前處理(R1417AS01)

影像辨識

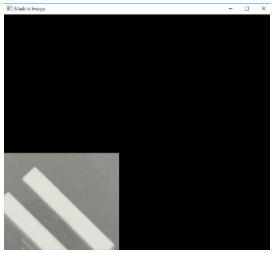
判別異常圖片

Original

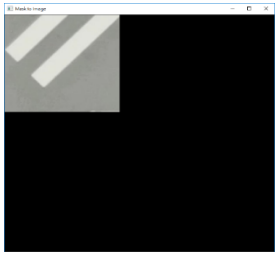


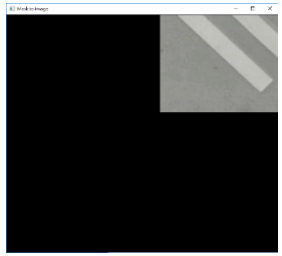
Region of Interest

Image Mask



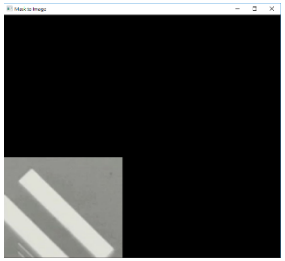
[[400,350],[0,350],
[0,0],[400,0]]

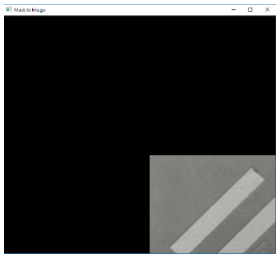




[[950,400],[500,400],
[500,0],[950,0]]

[[400,900],[0,900],
[0,500],[400,500]]



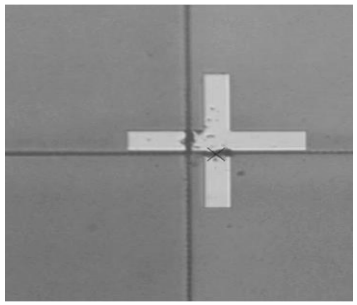
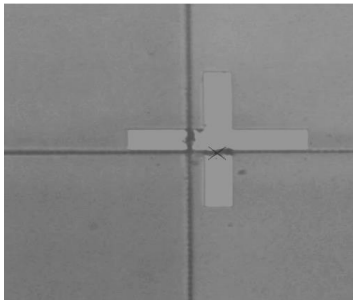
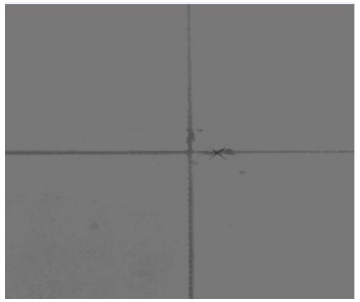
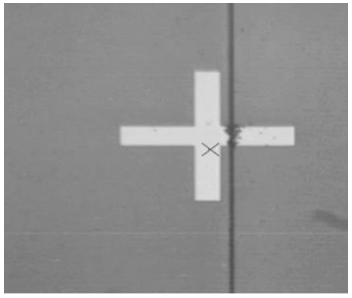
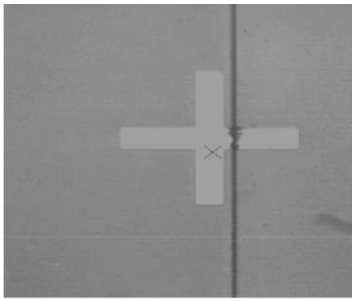


[[950,900],[500,900],
[500,500],[950,500]]

資料前處理(R1417AS01)

影像辨識

判別異常圖片

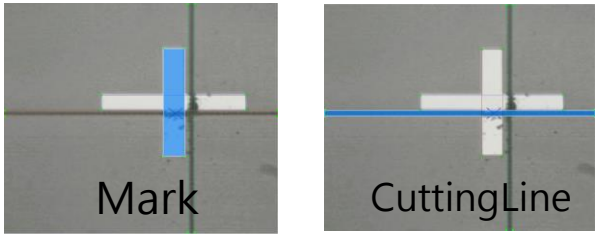
Original gray	TRUNC1 200,160	TRUNC2 160,120
		
		

影像辨識(YOLOv3)

影像辨識

辨識切割點位

Label

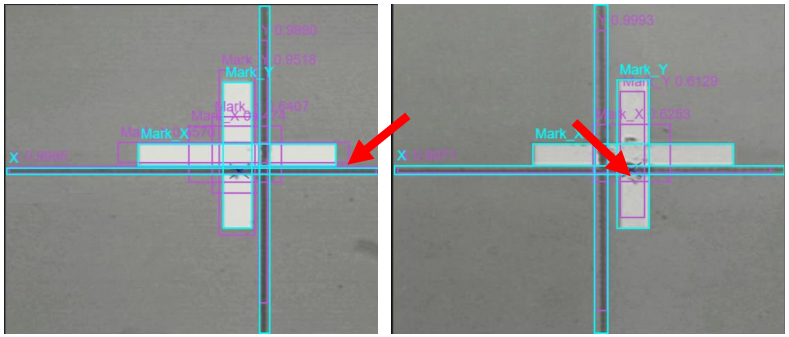


Before:原始取樣2種切割時間，4個切割點
共6個影片*4=24原始影像

After:擴增後增加至192張

誤判情況

	Mark_X	Mark_Y	X	Y
Mark_X	12	0	0	0
Mark_Y	0	19	0	0
X	0	0	19	0
Y	0	0	0	19
NoLabel	15	9	0	0
Total	27	28	19	19
ACC	44.44%	67.28%	100.00%	100.00%
TotalACC				74.19%



本次專案使用R1717AS04、R1717AS06、R1417AS01三模型
資料來源為Cell X-ray Cutting機台拍攝之圖片

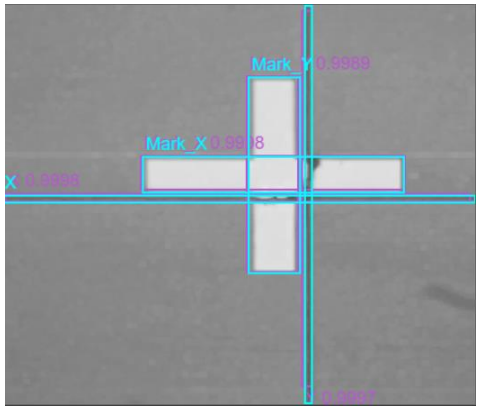
影像辨識(YOLOv4改進)

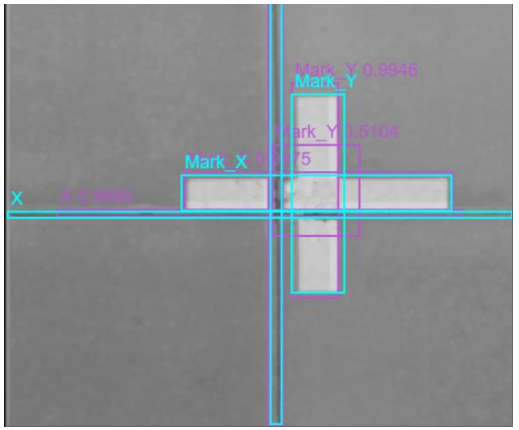
影像辨識

辨識情況

	Mark_X	Mark_Y	X	Y
Mark_X	19	0	0	0
Mark_Y	0	21	0	0
X	0	0	20	0
Y	0	0	0	19
NoLabel	0	1	0	0
Total	19	22	20	19
ACC	100.00%	95.45%	100.00%	100.00%
TotalACC				98.75%

測試情況





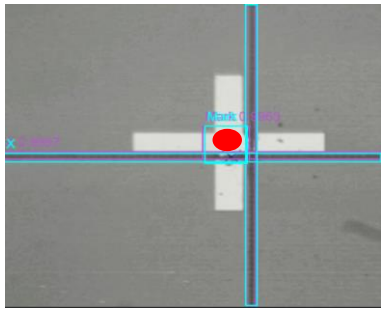
增加影像預處理，也增加標記特徵範圍，增加特徵差異

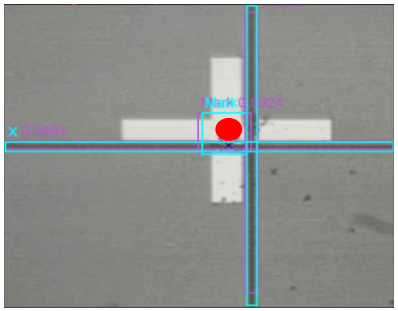
誤判的影像僅剩一張，有標記到但標記不完全

影像辨識(YOLOv4)

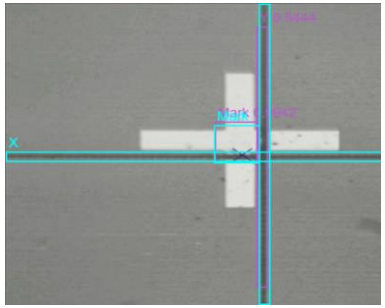
影像辨識

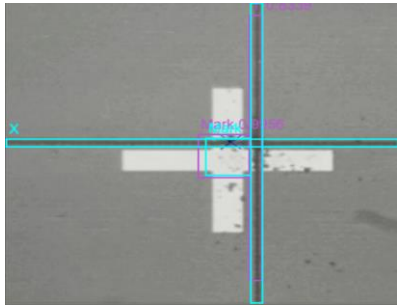
預計於中心點製造特徵
方便計算與量測座標



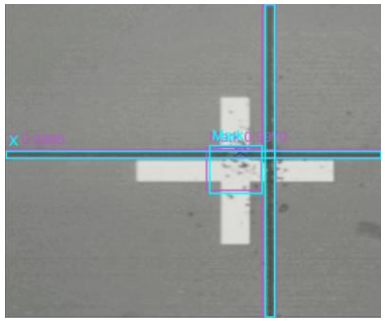


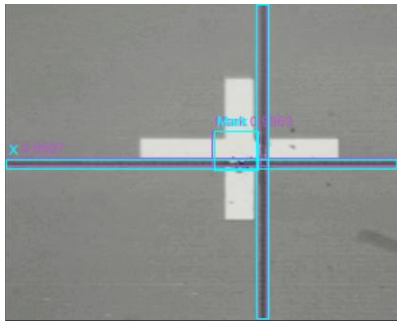
實際誤判情況





預期結果



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