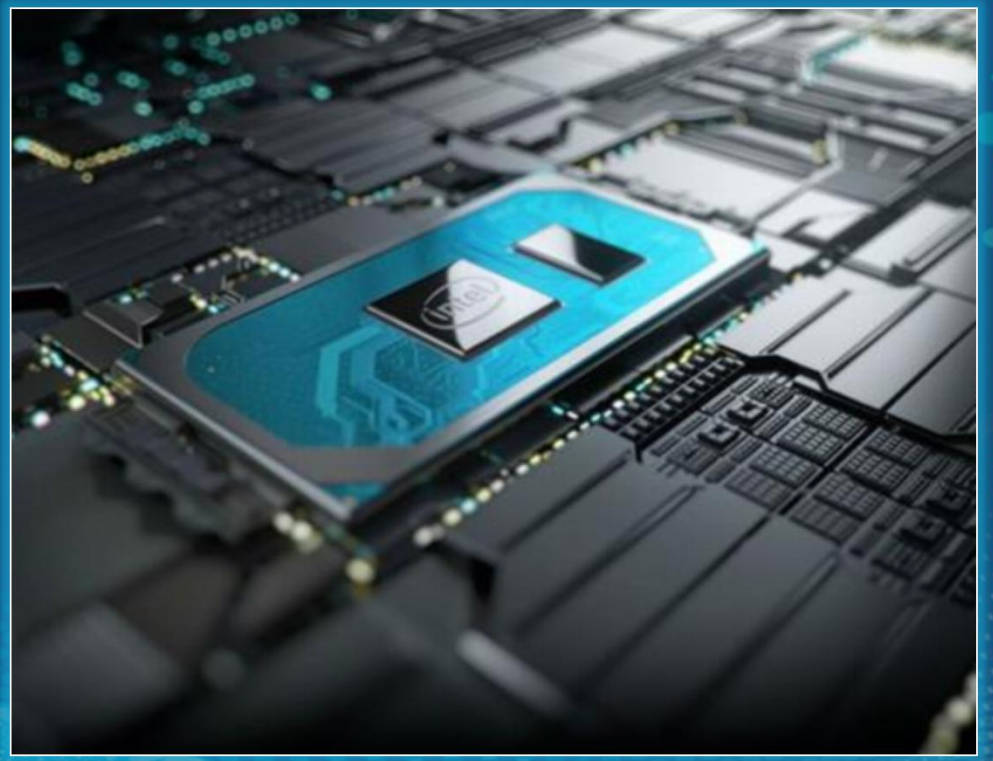
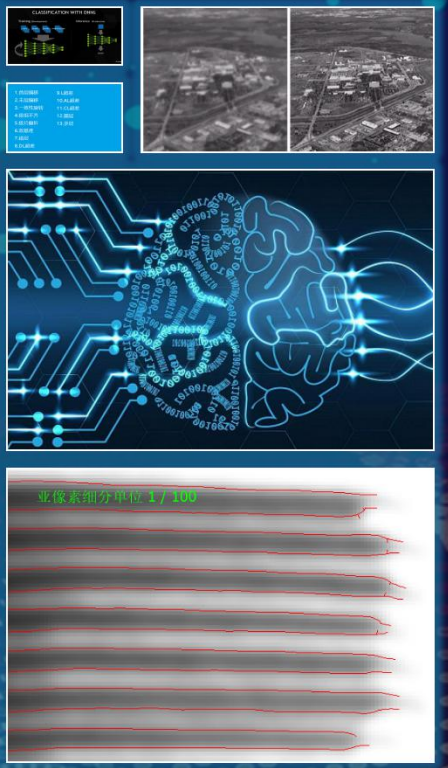
算法特点介绍

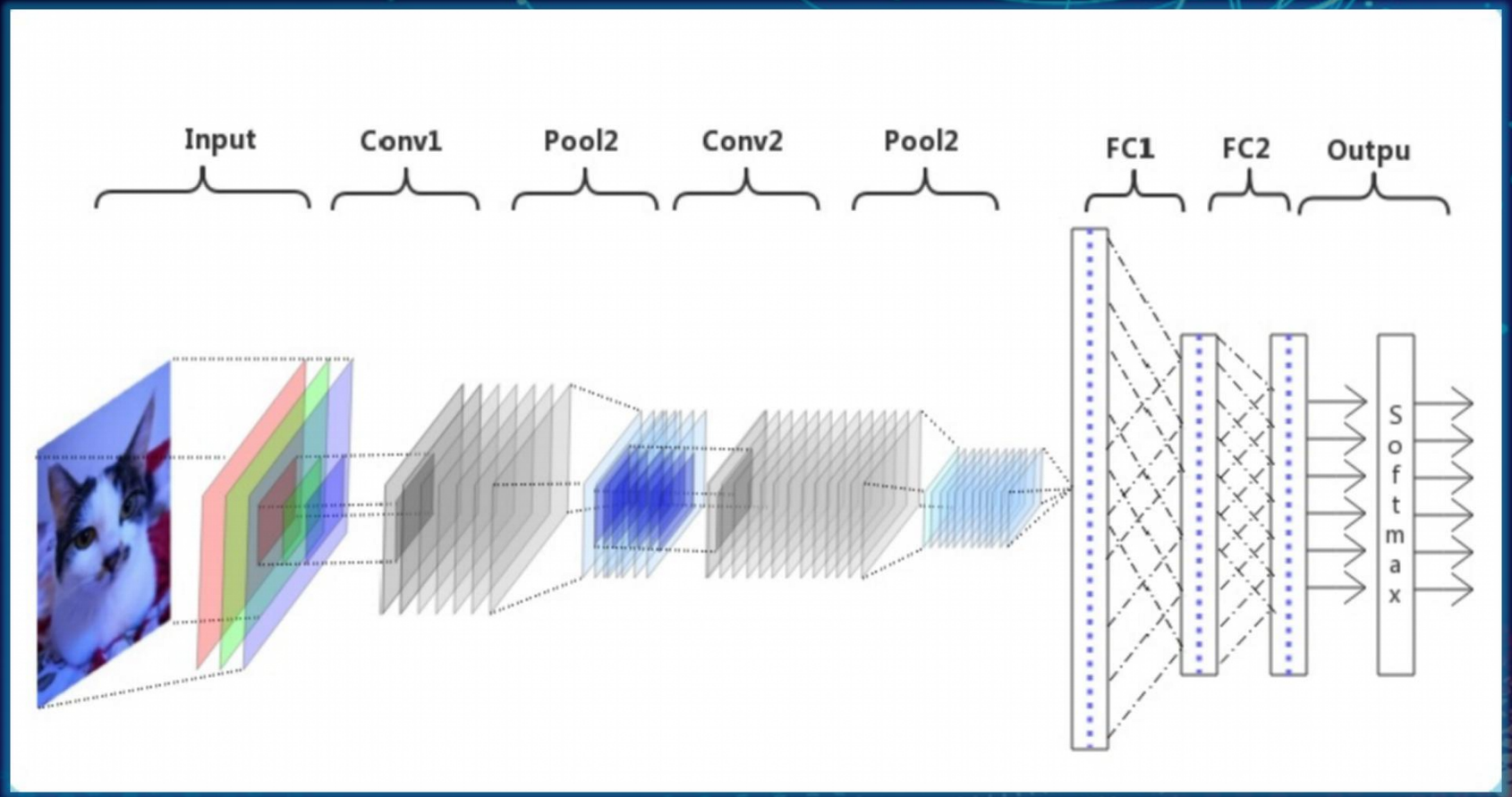
- 1.完全自主知识产权，纯C++核心算法，未使用任何第三方商业图形处理库；
- 2.应用了显卡GPU和CPU SSE运行加速，处理速度快，处理500W像素的电池图像，仅需200MS便可完成所有运算；
- 3.搭载了1/100超高亚像素处理阴阳极检测算法，以及人工智能多层卷积神经网络联合综合运算。处理精度高，阴阳极点位接近人眼水准；
- 4.应用了自主专利模糊图像边缘增强算法，对于电池本身原因导致的成像模糊，也能轻松识别出阴阳极点位；
- 5.强大NG类型识别与分类功能，可对极片翻折，极片不齐，阴阳极外凸等常见NG类型进行精准的识别与分类；
- 6.强大的自我学习功能，算法可根据测量结果进行自我学习以适应不同型号，不同种类的电池检测，不需要人工干预.



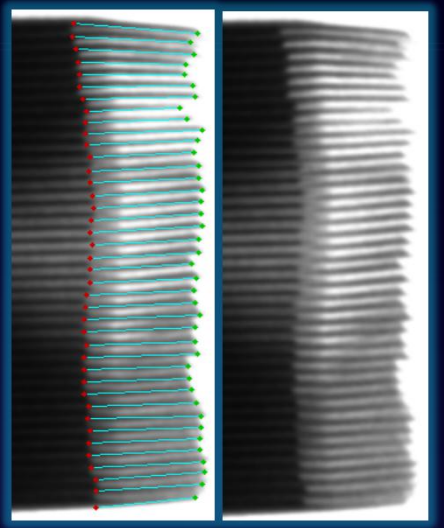


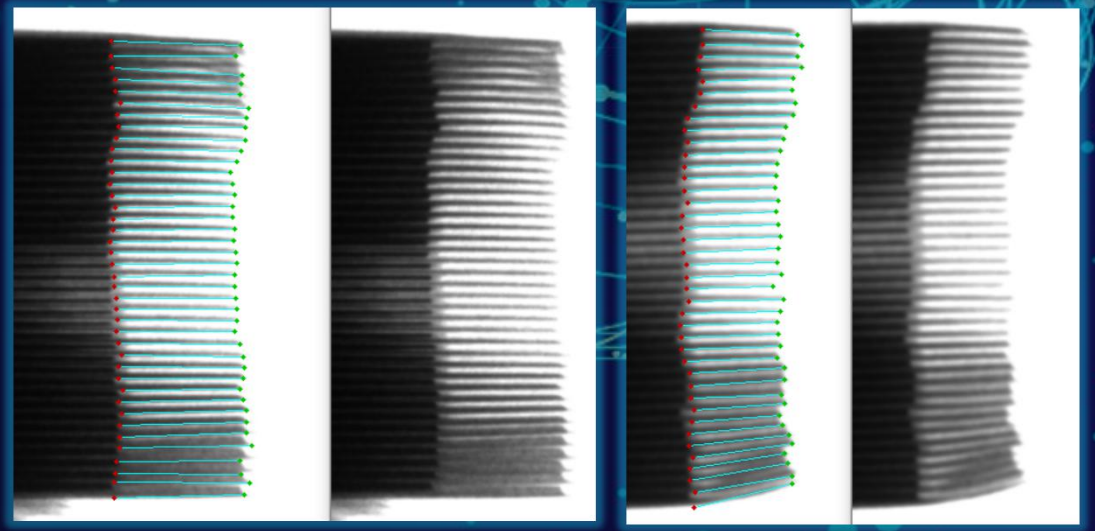
超高层机器学习人工智能深度卷积网络介绍

- 1.首先输入原始标记图像；
- 2.对图像进行滤波预处理；
- 3.对整个图像进行多核心卷积处理；
- 4.对卷积图像进行MAX池化处理；
- 5.再次对图像进行卷积；
- 6.再次对卷积图进行池化；
- 7.重复3-6，直至生成256层卷积和池化网络；
- 8.加入全连接层1并对前一层池化层进行全连接；
- 9.加入全连接层2并对前一层网络进行全连接；
- 10.接入SOFTMAX判别网络；
- 11.生成最终结果；



模糊图像处理效果图预览

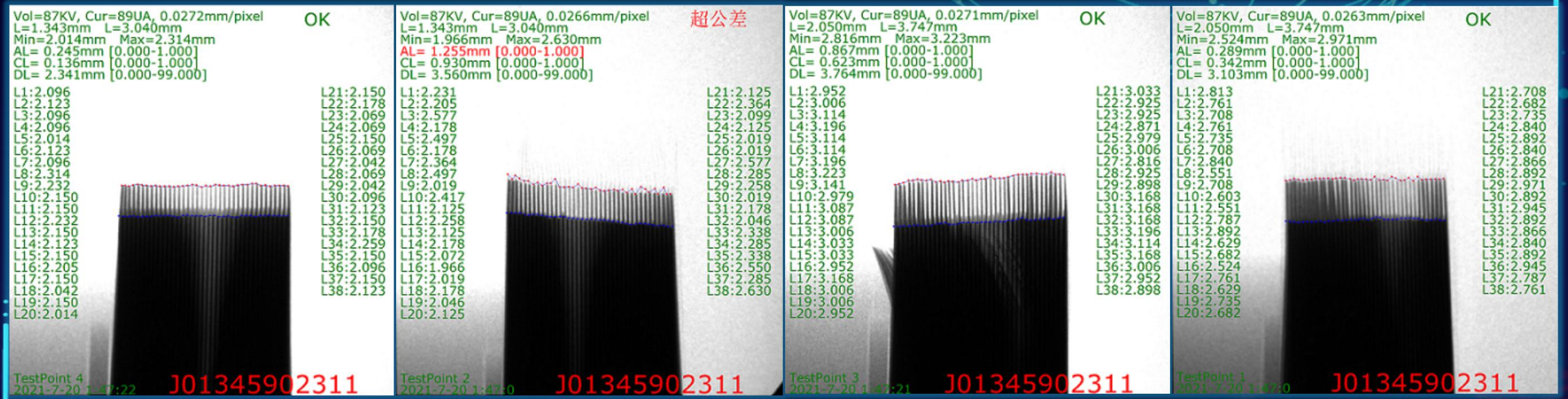




可以看到，在应用了模糊增强算法后，成像模糊不清的图片都能准确分辨出阴阳极点位

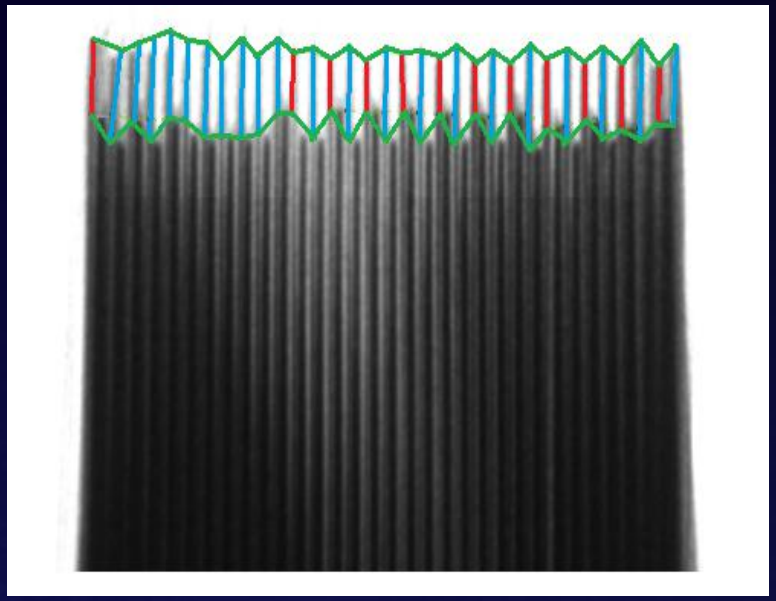
应用兆丰独有图像增强与滤波算法后，人眼很难分辨的阴极层点位也能得到准确识别

实际检测图片展示


Vol=87KV, Cur=89UA, 0.0272mm/pixel
OK
L=1.343mm L=3.040mm
Min=2.014mm Max=2.314mm
AL= 0.245mm [0.000-1.000]
CL= 0.136mm [0.000-1.000]
DL= 2.341mm [0.000-99.000]
L1:2.096 L2:2.123 L3:2.096 L4:2.096 L5:2.014 L6:2.123 L7:2.096 L8:2.314 L9:2.232 L10:2.150 L11:2.150 L12:2.232 L13:2.150 L14:2.123 L15:2.150 L16:2.205 L17:2.150 L18:2.042 L19:2.150 L20:2.014
L21:2.150 L22:2.178 L23:2.069 L24:2.069 L25:2.150 L26:2.069 L27:2.042 L28:2.069 L29:2.042 L30:2.096 L31:2.123 L32:2.150 L33:2.178 L34:2.259 L35:2.150 L36:2.096 L37:2.150 L38:2.123
TestPoint 4
J01345902311
Vol=87KV, Cur=89UA, 0.0266mm/pixel
超公差
L=1.343mm L=3.040mm
Min=1.966mm Max=2.630mm
AL= 1.255mm [0.000-1.000]
CL= 0.930mm [0.000-1.000]
DL= 3.560mm [0.000-99.000]
L1:2.231 L2:2.205 L3:2.577 L4:2.178 L5:2.497 L6:2.178 L7:2.364 L8:2.497 L9:2.019 L10:2.417 L11:2.125 L12:2.258 L13:2.125 L14:2.178 L15:2.072 L16:1.966 L17:2.019 L18:2.178 L19:2.046 L20:2.125
L21:2.125 L22:2.364 L23:2.099 L24:2.125 L25:2.019 L26:2.019 L27:2.577 L28:2.285 L29:2.258 L30:2.019 L31:2.178 L32:2.046 L33:2.338 L34:2.285 L35:2.338 L36:2.550 L37:2.285 L38:2.630
TestPoint 2
J01345902311
Vol=87KV, Cur=89UA, 0.0271mm/pixel
OK
L=2.050mm L=3.747mm
Min=2.816mm Max=3.223mm
AL= 0.867mm [0.000-1.000]
CL= 0.623mm [0.000-1.000]
DL= 3.764mm [0.000-99.000]
L1:2.952 L2:3.006 L3:3.114 L4:3.196 L5:3.114 L6:3.114 L7:3.196 L8:3.223 L9:3.141 L10:2.979 L11:3.087 L12:3.087 L13:3.006 L14:3.033 L15:3.033 L16:2.952 L17:3.168 L18:3.006 L19:3.006 L20:2.952
L21:3.033 L22:2.925 L23:2.925 L24:2.871 L25:2.979 L26:3.006 L27:2.816 L28:2.925 L29:2.898 L30:3.168 L31:3.168 L32:3.168 L33:3.196 L34:3.114 L35:3.168 L36:3.006 L37:2.952 L38:2.898
TestPoint 3
J01345902311
Vol=87KV, Cur=89UA, 0.0263mm/pixel
OK
L=2.050mm L=3.747mm
Min=2.524mm Max=2.971mm
AL= 0.289mm [0.000-1.000]
CL= 0.342mm [0.000-1.000]
DL= 3.103mm [0.000-99.000]
L1:2.813 L2:2.761 L3:2.708 L4:2.761 L5:2.735 L6:2.708 L7:2.840 L8:2.551 L9:2.708 L10:2.603 L11:2.551 L12:2.787 L13:2.892 L14:2.629 L15:2.682 L16:2.524 L17:2.761 L18:2.629 L19:2.735 L20:2.682
L21:2.708 L22:2.682 L23:2.735 L24:2.840 L25:2.892 L26:2.840 L27:2.866 L28:2.892 L29:2.971 L30:2.892 L31:2.945 L32:2.892 L33:2.866 L34:2.840 L35:2.892 L36:2.945 L37:2.787 L38:2.761
TestPoint 1
J01345902311

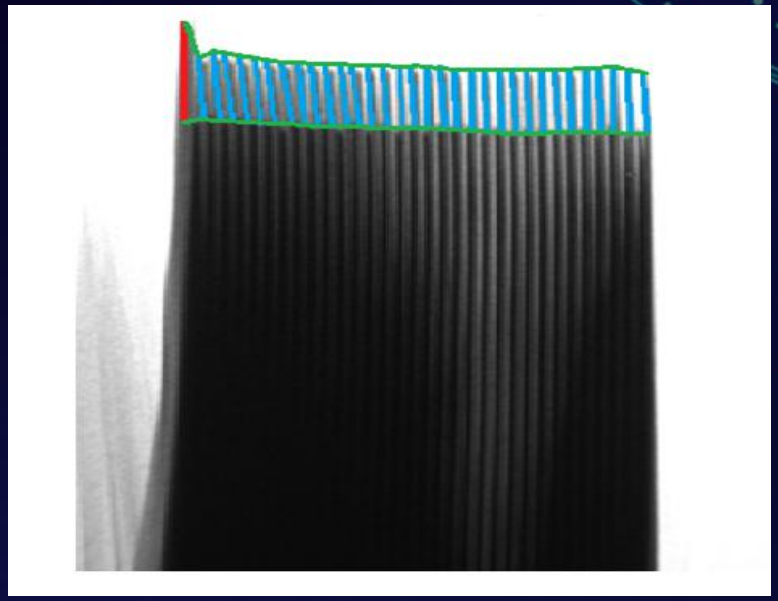
NG样本分类展示

Double Standars



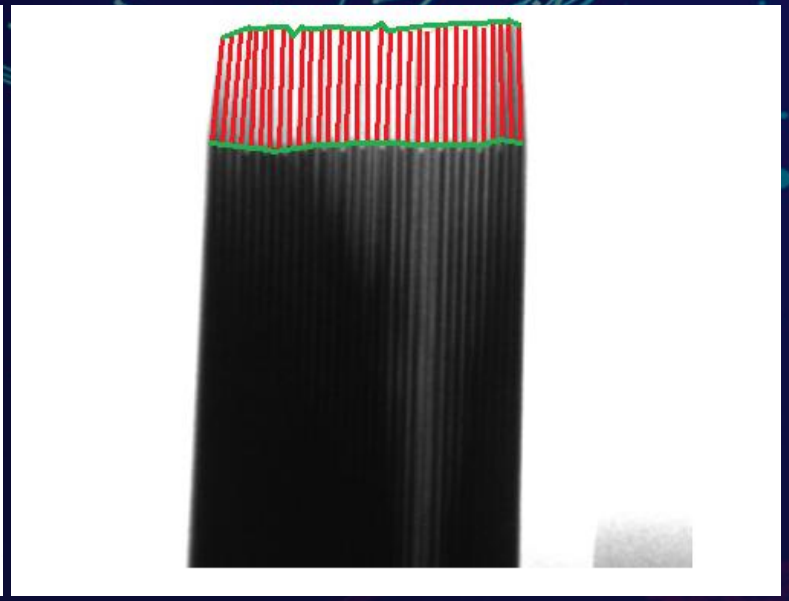
双基准

First Laver Shift



首层偏移

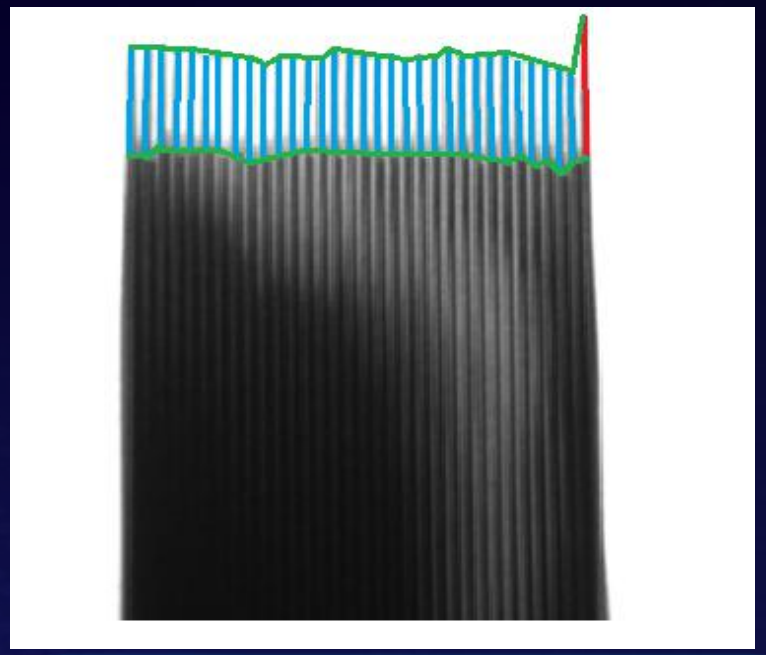
Total Shift



一致性旋转

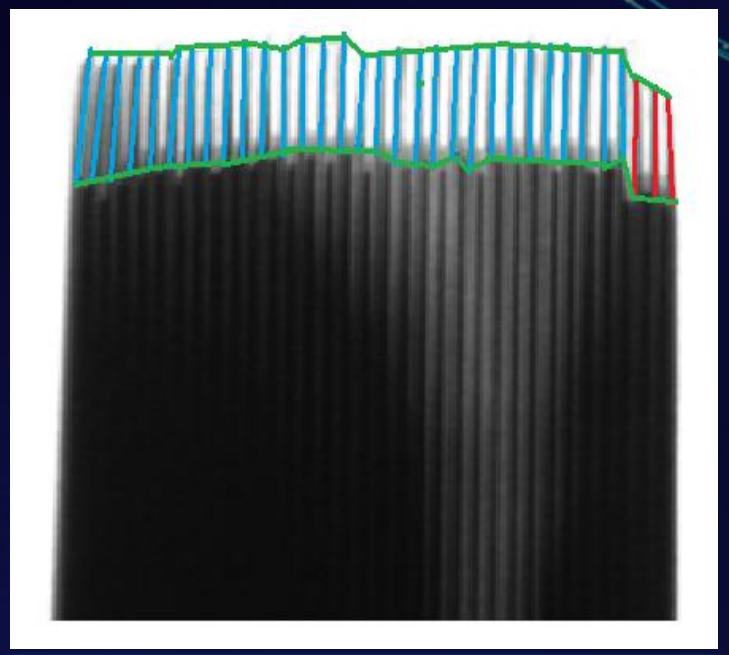
NG样本分类展示

Last Laver Shift



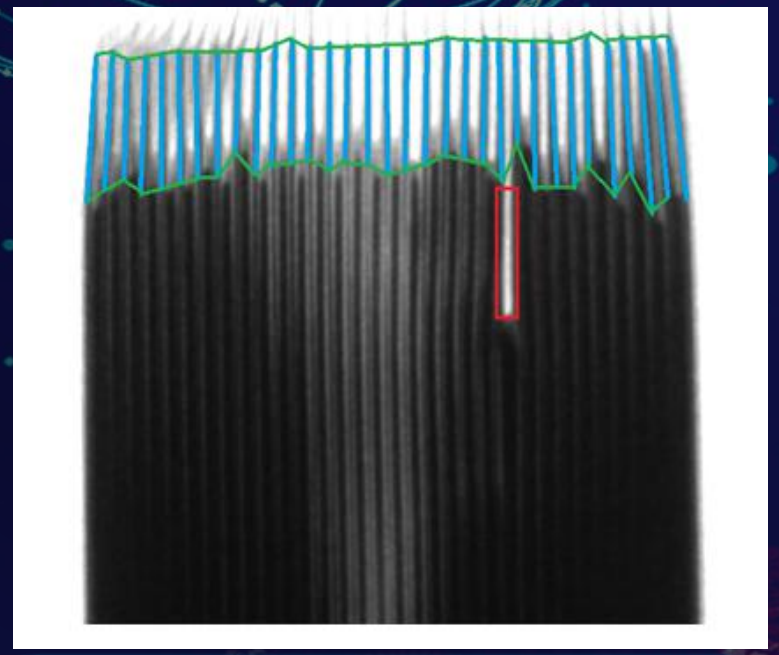
末层偏移

Staqed Lavers



错层

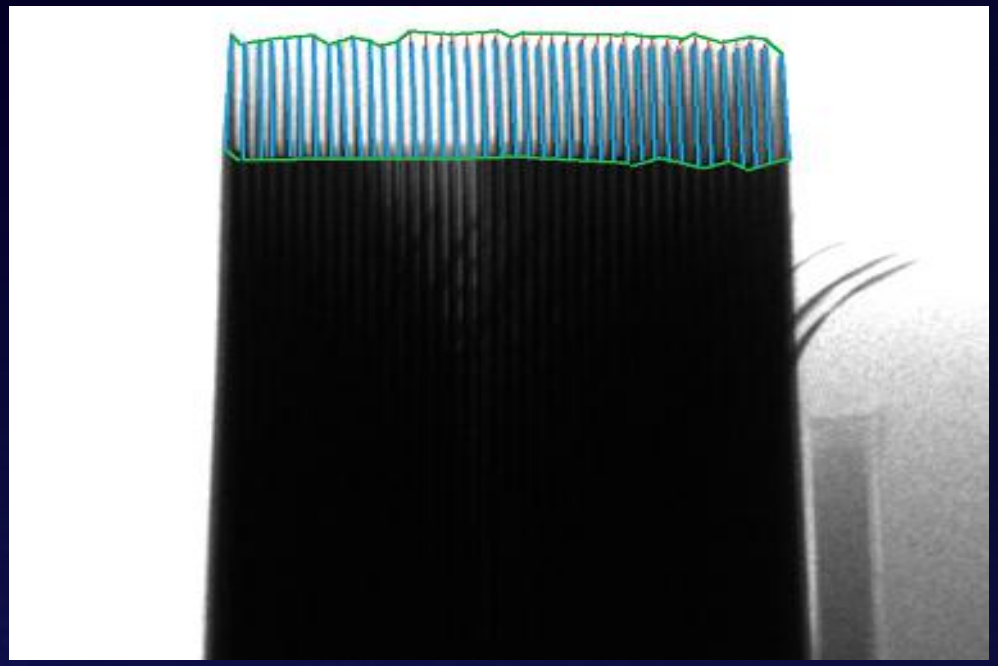
Piece Fold



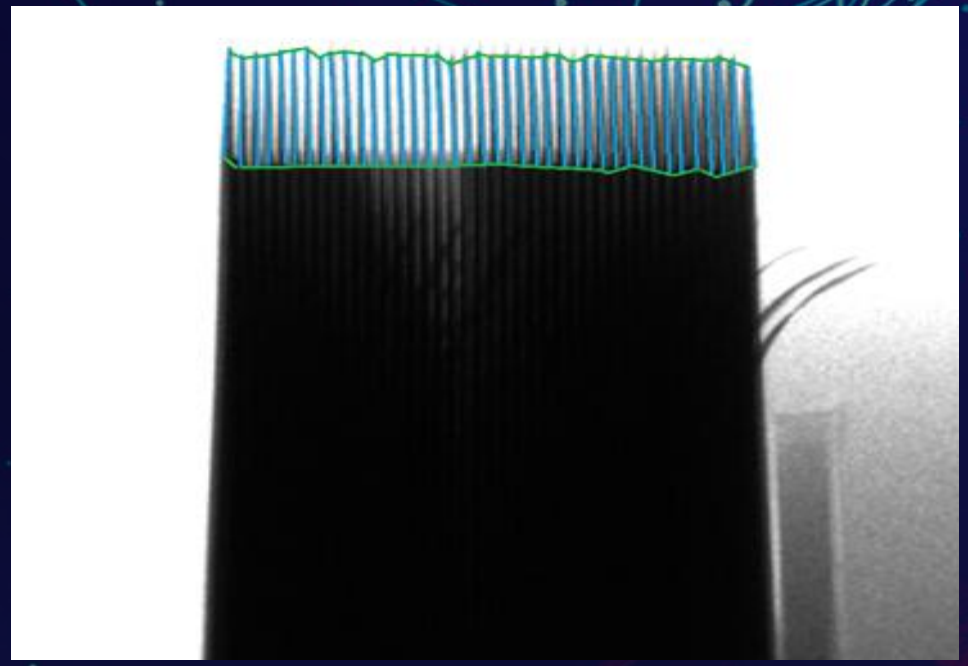
级片翻折

去虚影算法说明

无去虚影算法结果



有去虚影算法结果



结论：应用兆众独有的虚影去除算法，去除级片虚影，可显著降低实际生产过程中因虚影带来的误判NG，提升良品率。