

Halcon 标定完成后的二维测量

1. `gen_measure_rectangle2(: : Row, Column, Phi, Length1, Length2, Width, Height, Interpolation : MeasureHandle)`

产生测量矩形句柄，控制输入为测量矩形范围的坐标中心，矩形长轴和水平方向夹角范围的弧度，矩形边长的一半，测量图片的宽和高度，输出为测量句柄。

2. `measure_pairs(Image : : MeasureHandle, Sigma, Threshold, Transition, Select : RowEdgeFirst, ColumnEdgeFirst, AmplitudeFirst, RowEdgeSecond, ColumnEdgeSecond, AmplitudeSecond, IntraDistance, InterDistance)`

抽取和矩形主轴垂直的直线，返回第一类和第二类边缘点的行列坐标值，边缘分类由 Transition 的灰度差分决定。控制输出还有，一个边缘对之间的距离；以及一类边缘对相继边缘之间的距离。

3. `image_points_to_world_plane(: : CameraParam, WorldPose, Rows, Cols, Scale : X, Y)`

把像素坐标转化到世界坐标系中的 Z=0 平面中的 X,Y 坐标。控制输入为，相机内参数，标定的世界坐标位姿，测量单位，像素坐标，输出为 Z=0 平面的 X,Y 坐标。

4. `distance_pp(: : Row1, Column1, Row2, Column2 : Distance)`

利用两点距离公式计算两点之间的距离。

注意用法： `distance_pp (X1[0:4], Y1[0:4], X1[1:5], Y1[1:5], Distance)`

5. `tuple_mean(: : Tuple : Mean)` 返回数组的平均值。

6. `tuple_deviation(: : Tuple : Deviation)` 返回数组中所有元素的标准差。

对应的 HALCON 单相机标定后的测量程序段如下：

```
1: calibrate_cameras (CalibDataID, Errors)
2: get_calib_data (CalibDataID, 'camera', 0, 'params', CamParam)
3: NumImage := 11
4: get_calib_data (CalibDataID, 'calib_obj_pose', [0, NumImage],
'pose', Pose)
5: * To take the thickness of the calibration plate into account, the
z-value
6: * of the origin given by the camera pose has to be translated by the
7: * thickness of the calibration plate.
```

```

8: * Deactivate the following line if you do not want to add the
correction.
9: set_origin_pose (Pose, 0, 0, 0.00075, Pose)
10: * measure the distance between the pitch lines
11: gen_measure_rectangle2 (195, 226, -0.526627271434, 174, 3, 652, 494,
'bilinear', MeasureHandle)
12: measure_pairs (Image, MeasureHandle, 0.5, 5, 'all', 'all',
RowEdgeFirst, ColumnEdgeFirst, AmplitudeFirst, RowEdgeSecond,
ColumnEdgeSecond, AmplitudeSecond, IntraDistance, InterDistance)
13: Row := (RowEdgeFirst+RowEdgeSecond)/2.0
14: Col := (ColumnEdgeFirst+ColumnEdgeSecond)/2.0
15: disp_cross (WindowHandle, Row, Col, 6, 0)
16: image_points_to_world_plane (CamParam, Pose, Row, Col, 'mm', X1,
Y1)
17: distance_pp (X1[0:4], Y1[0:4], X1[1:5], Y1[1:5], Distance)
18: tuple_mean (Distance, MeanDistance)
19: tuple_deviation (Distance, DeviationDistance)
20: disp_message (WindowHandle, 'Mean distance:
'+MeanDistance$.3f+'mm +/- '+DeviationDistance$.3f+'mm', 'window',
30, 150, 'yellow', 'false')
21: close_measure (MeasureHandle)
22: clear_calib_data (CalibDataID)

```