

Instructions for using WebPlot Digitizer to obtain measures from an image file*

Project: Accuracy and precision, dart board



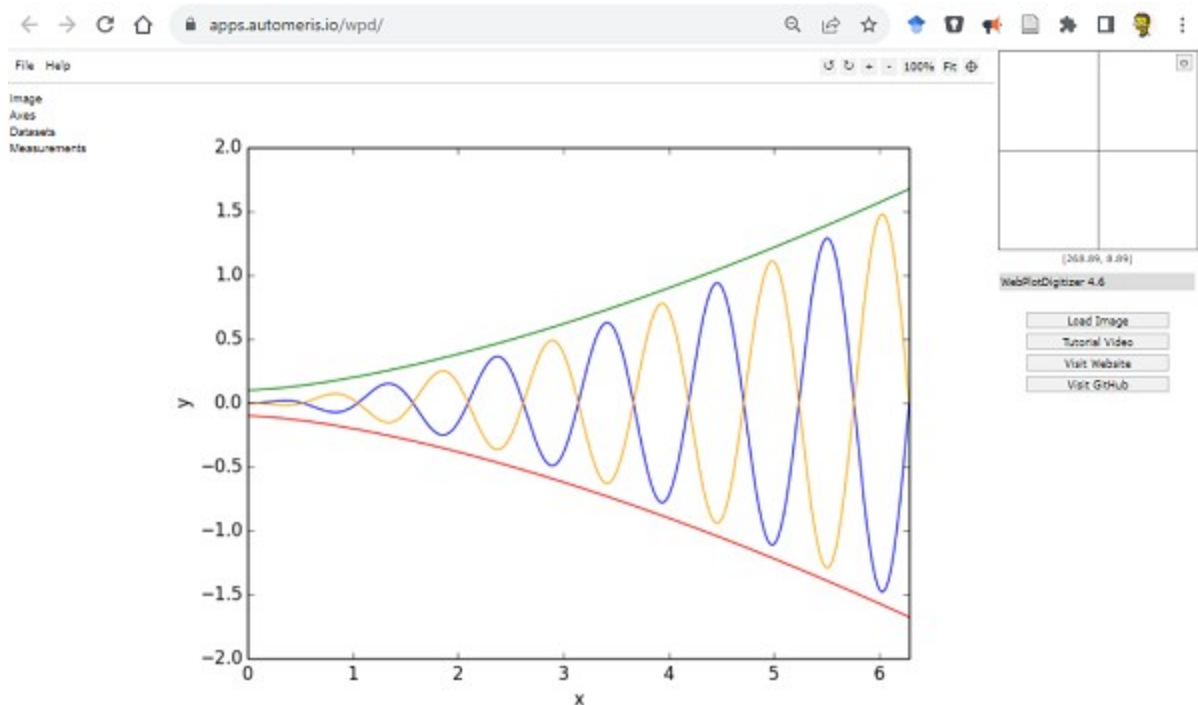
Figure 1. Image file of dartboard, Toysmith model 3121, with darts labeled by order.

* Includes instructions to copy/paste from the web app to Google Sheets spreadsheet.

SOP

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Overview

WebPlot Digitizer is at <https://apps.automeris.io/wpd/>

1. Load image file
2. Choose plot type
3. Measurements > Distance
4. First measure get calibration, number of pixels for known distance (diameter of board) > Add Pair (A)
5. Record darts, distance from origin (bulls eye)
 1. *Add Pair (A)*
 2. Repeat for each dart
6. View Data
7. Copy data to clipboard, import to spreadsheet
8. Convert pixels to distance

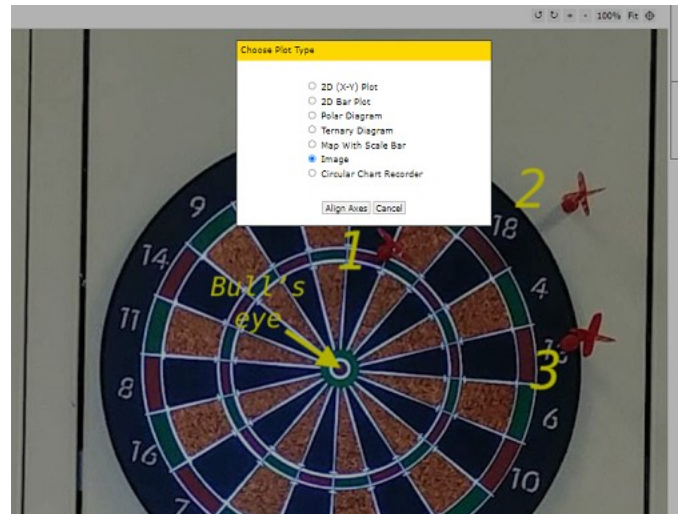
1. Load the image into Web Plot Digitizer

From the Menu bar: **File** → **Load Image(s)**

> Popup, Choose Files button, Browse to file

2. Choose Plot Type

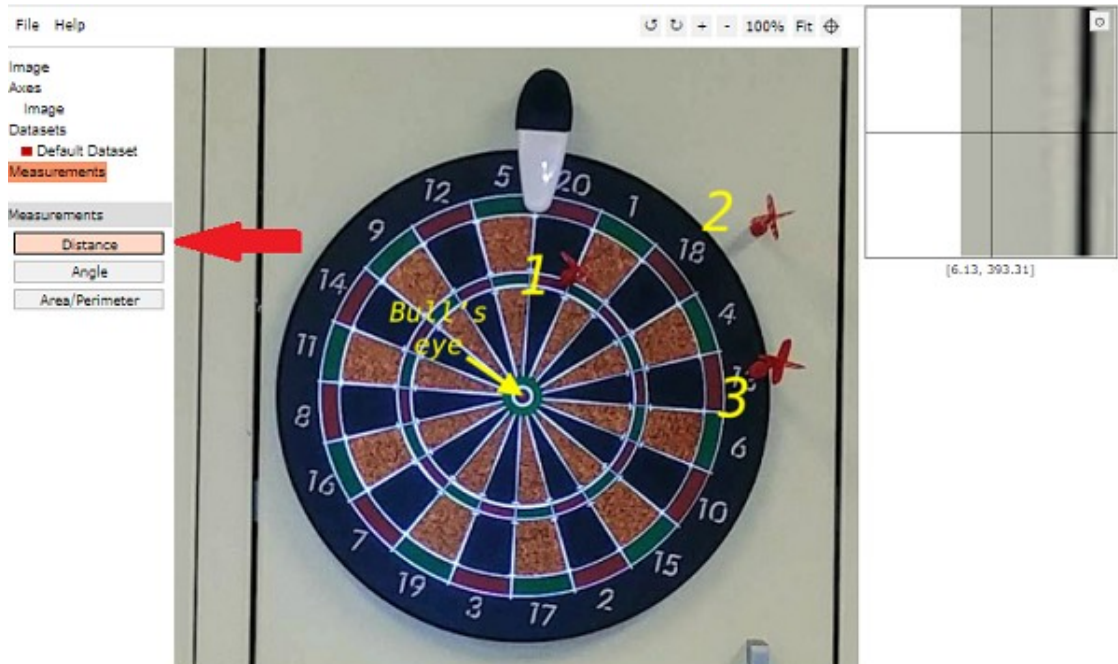
Image is the simplest choice for the dart board. Choose Image, then click **Align Axes** button



3. Set Measurements to Distance

Image shows screenshot of left-hand side of app window

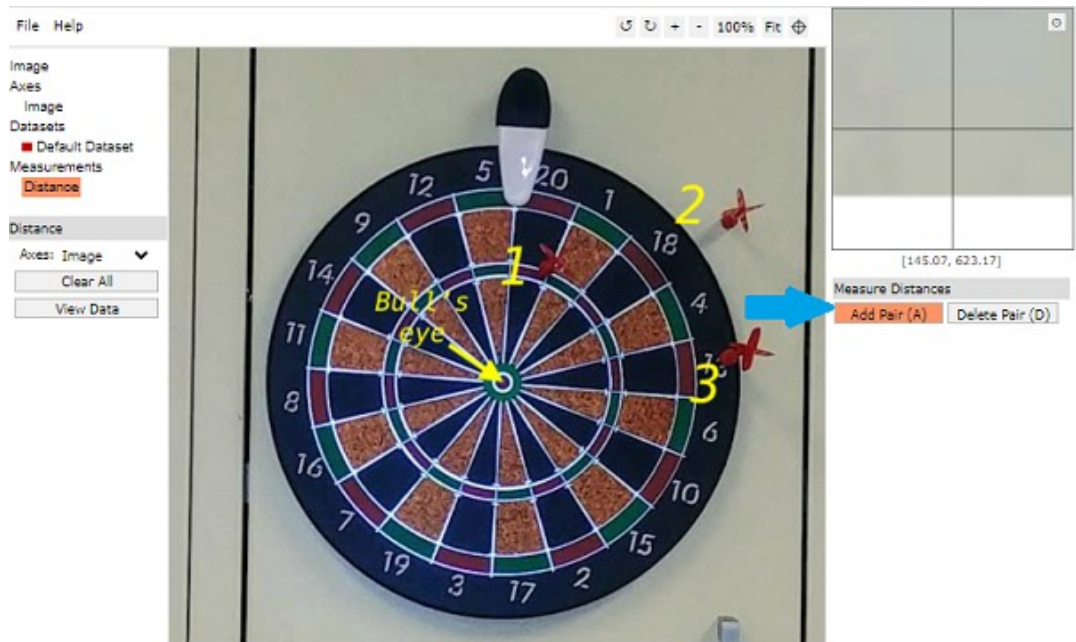
Click **Distance** button (red arrow points)



4. Set calibration scale, number of pixels for known distance

Image shows entire screenshot.

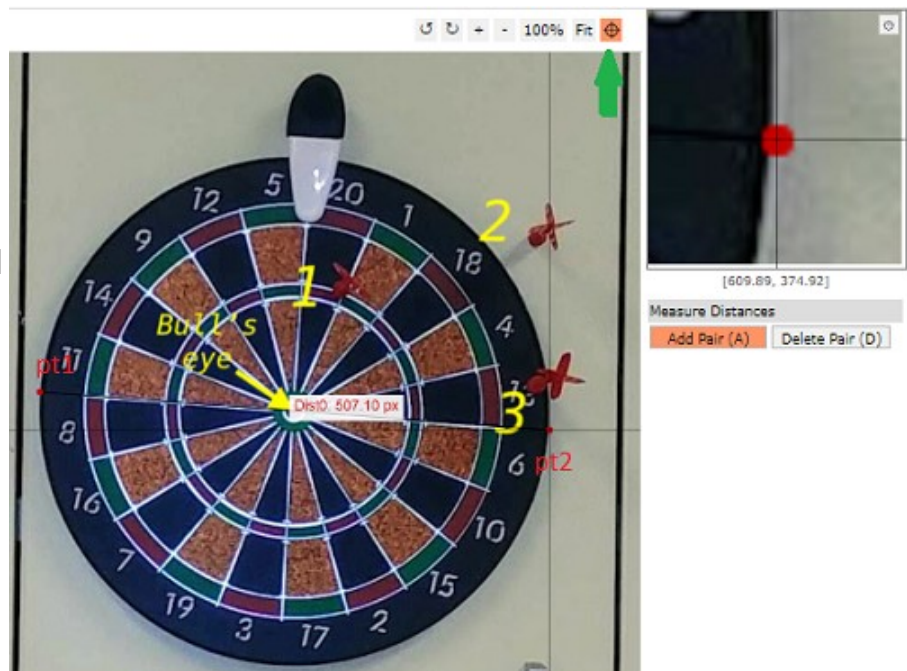
After clicking on Distance button, look to right-hand side; click **Add Pair (A)** (blue arrow points)



Set the calibration line by drawing a line across the diameter of the dart board.

Click first point on edge of dart board (shown as pt1), then move linearly to second point and click at opposite edge (shown as pt2)

Hint: Click on the “Toggle extended crosshair” (green arrow points), which lets user see location of cursor on the image (shown in upper right window)



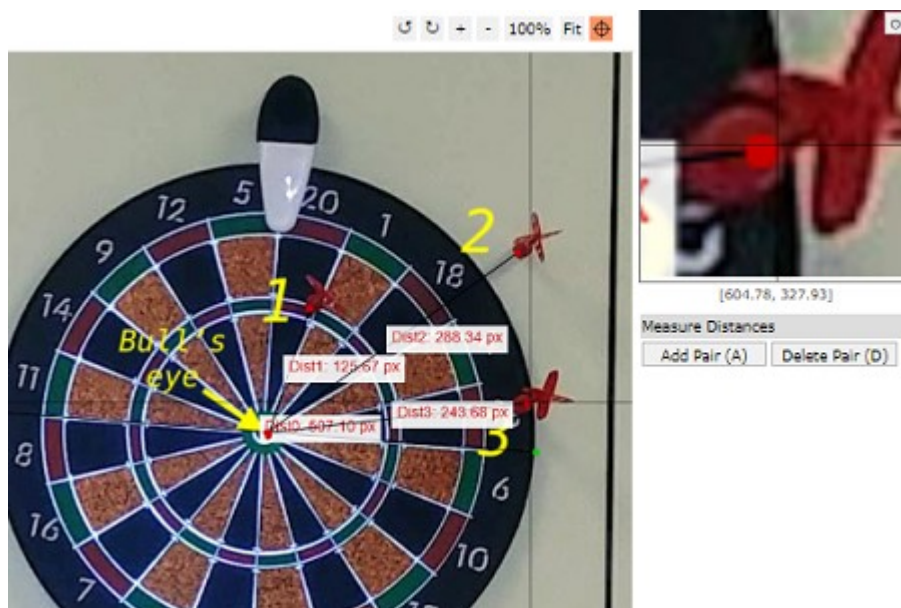
If successful, Distance in pixels pops up onto image (shown this example = 507.10 px)

5. Get distances for each dart tossed

Select **Add Pair()**, click on center then move cursor and click on first dart (this example, 125.67 px).

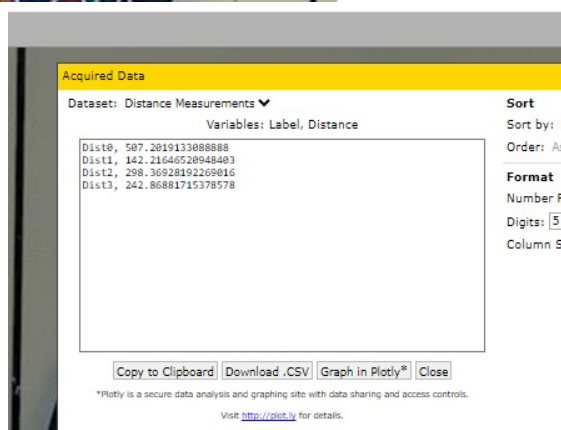
Repeat for each tossed dart (288.84 px and 243.68 px, respectfully).

“Toggle extended crosshair” selected



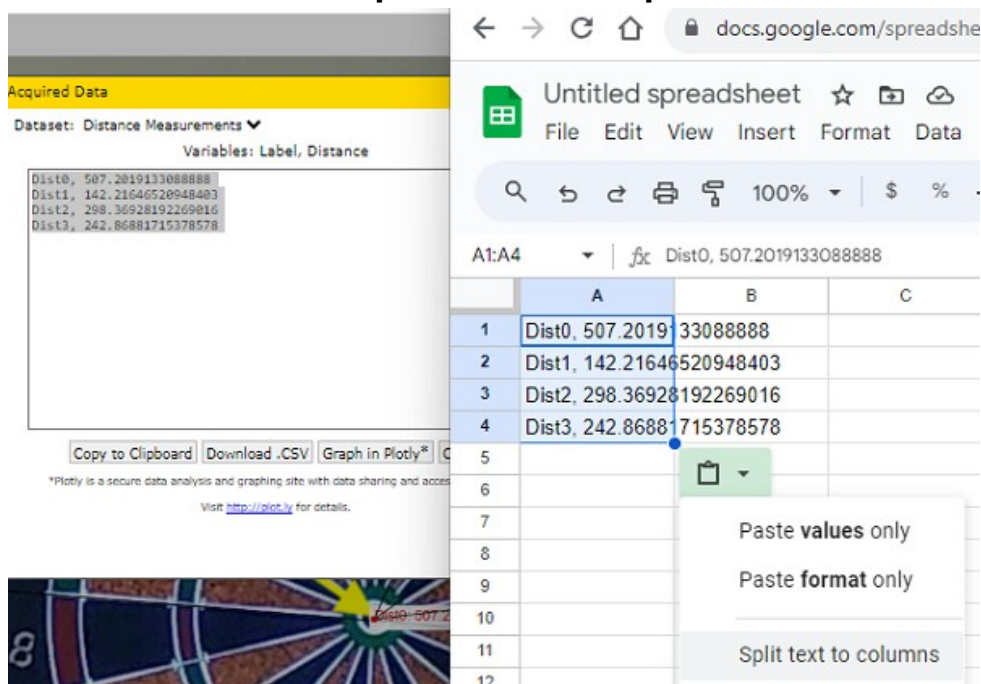
6. When finished, click on View Data

Click on Copy o Clipboard button, then navigate to your spreadsheet app, with an open spreadsheet ready.



7. Move cursor to empty cell in spreadsheet, then paste contents from clipboard to the spreadsheet.

The data were saved to the clipboard in comma separated variable format (CSV) – that is, columns of data are separated commas. All spreadsheet apps can be coerced to import CSV files.



The following instructions are for Google Sheets. LibreOffice Calc requires similar steps but a different interface.

At right screenshot after pasting from the clipboard to an empty cell in Google Sheets. A clipboard pops up at the lower right of the pasted cells; click the down arrow to reveal options. (WebPlot Digitizer screen is in the background, Google Sheets is in foreground.)

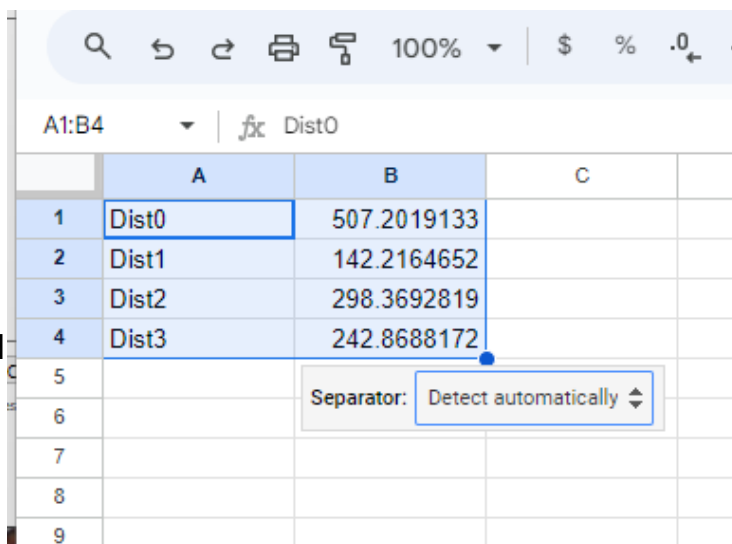
Select **Split text to columns**

Next, another popup menu appears.

Choose the **Separator: Detect automatically** should work, but if it fails, go back to this screen and click on arrows to select **Comma**.

After this step the data is imported into Google sheets. Rename the labels in column A. For example, Dist1 becomes Dart1, etc.

You should save or rename the file before proceeding.



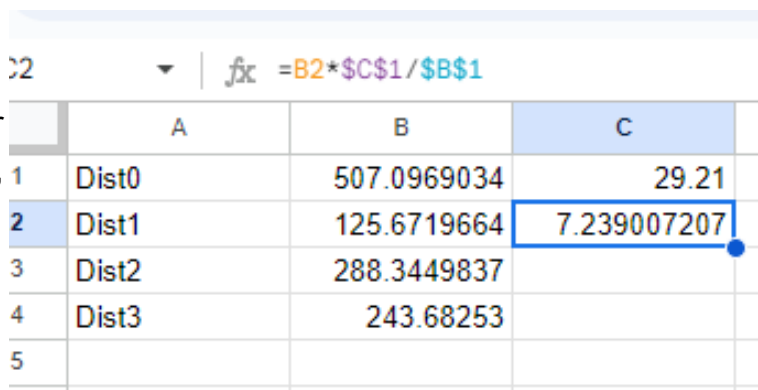
	A	B	C
1	Dist0	507.2019133	
2	Dist1	142.2164652	
3	Dist2	298.3692819	
4	Dist3	242.8688172	
5			
6			
7			
8			
9			

The data set is now ready to be updated, e.g., perform calculations to convert numbers of pixels to distance.

8. Convert pixels to distance

Recall that the first row contains the diameter of the dart board (distance) in pixels. In cell C1 enter the known distance – this example, the dart board diameter was 29.21 cm.

Next, enter the formula in cell C2 to convert numbers of pixels for Dart 1 to distance in cm.

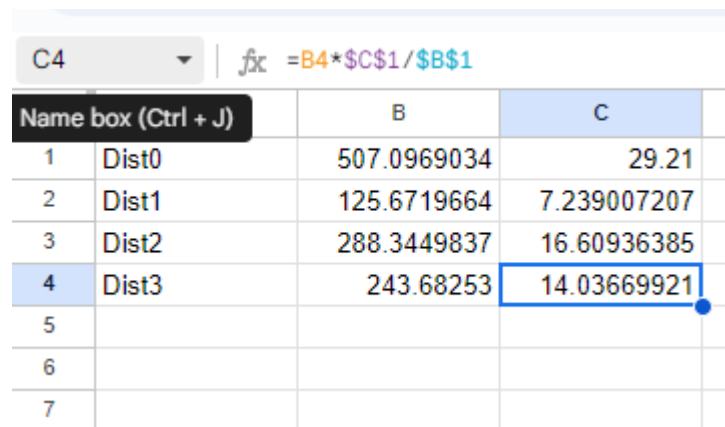


	A	B	C
1	Dist0	507.0969034	29.21
2	Dist1	125.6719664	7.239007207
3	Dist2	288.3449837	
4	Dist3	243.68253	
5			

Type $=B2*\$C\$1/\$B\1 , then press return key to carry out the calculation. Recall that B2 is a relative reference to the cell B2 whereas $\$B\1 is an absolute reference to cell B1. To complete the calculations for the rest of the darts, click and hold down on the blue dot at

the lower right of the collected cell (in this case, C2). Then, drag to end to update the cells.

Your work should look like the screenshot at right.



The screenshot shows an Excel interface. At the top, the formula bar displays the formula $=B4*\$C\$1/\$B\1 . Below the formula bar, a 'Name box (Ctrl + J)' is visible. The main area shows a table with columns B and C. Row 4 is selected, and a blue border with a handle is around cell C4, indicating a drag operation to fill the formula down to row 7.

		B	C
1	Dist0	507.0969034	29.21
2	Dist1	125.6719664	7.239007207
3	Dist2	288.3449837	16.60936385
4	Dist3	243.68253	14.03669921
5			
6			
7			