# Special Project in Big Data and Art Forgery

To recap from the lecture presentation, there is an enormous amount of money at stake and the expense of verify authentic artworks is expensive. There is a new way to use Artificial Intelligence and Big Data to authenticate artwork (or at least identify fraud) but that too is beyond the reach of the average Introduction to Art student. In this project, you will get a chance to practice some of this work at an inexpensive and approachable level.

How we will do it

Let's take a very simple example of upper left to lower right or upper right to lower left line drawing.
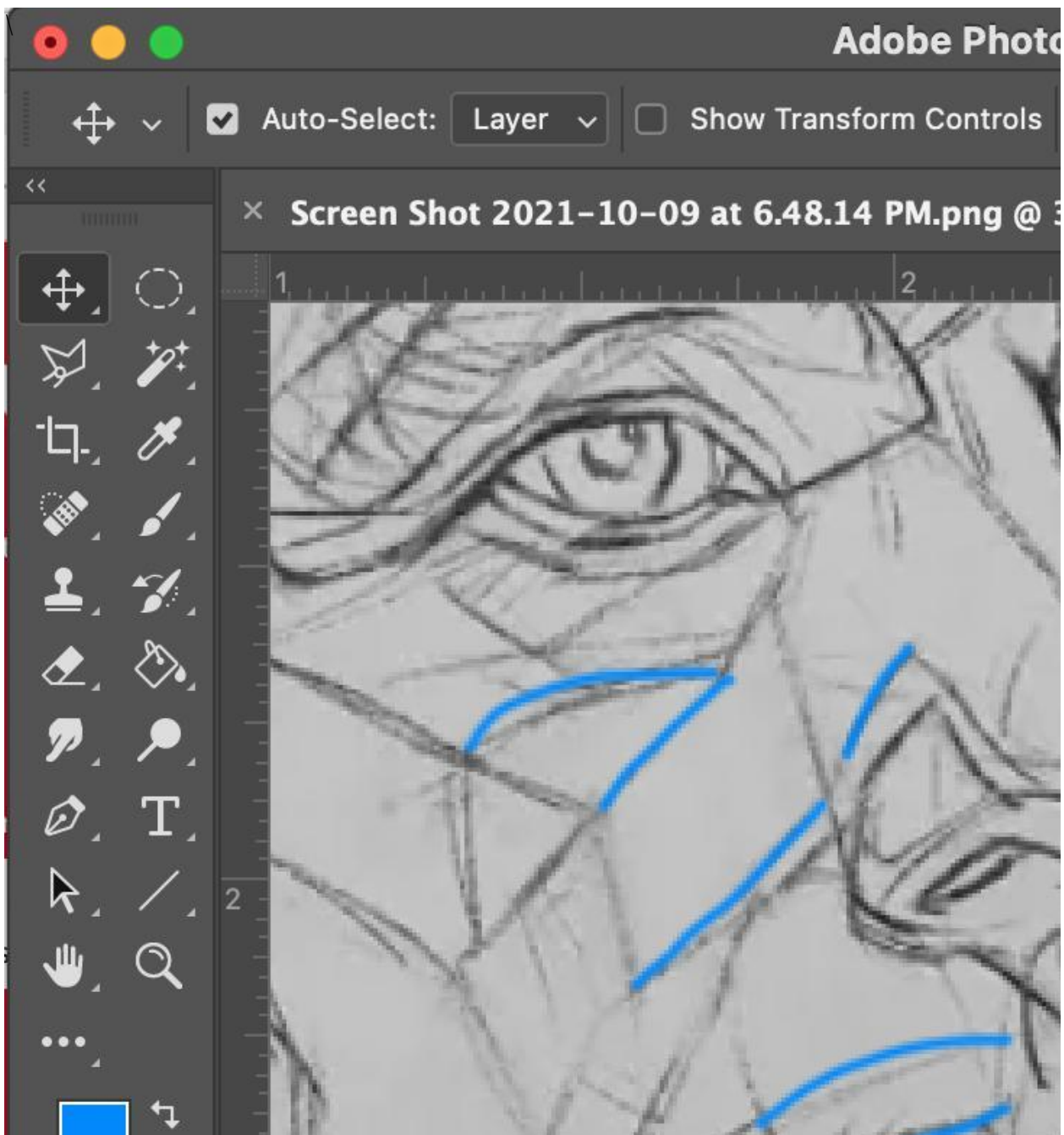
If we open the "info" window in Photoshop, we can place the cursor (I have exaggerated these as large dots to see them easier) over drawing lines- such as the blue line beside the nose and see x and y values in the info window in the upper right of the screen. First find the beginning of the line and then find the end of the line.
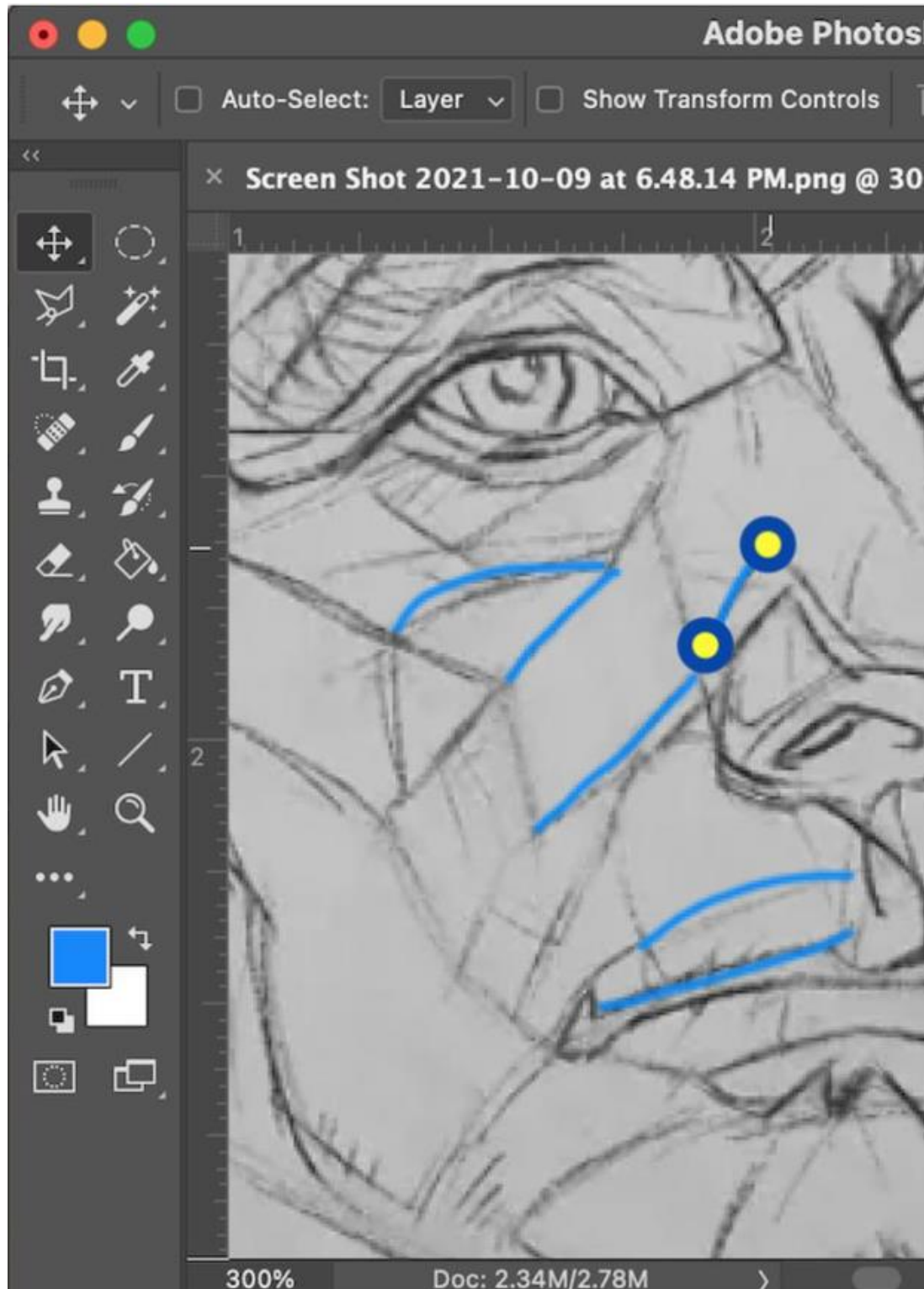
We can look at other lines as well. Below we can map the X and Y of the red line.
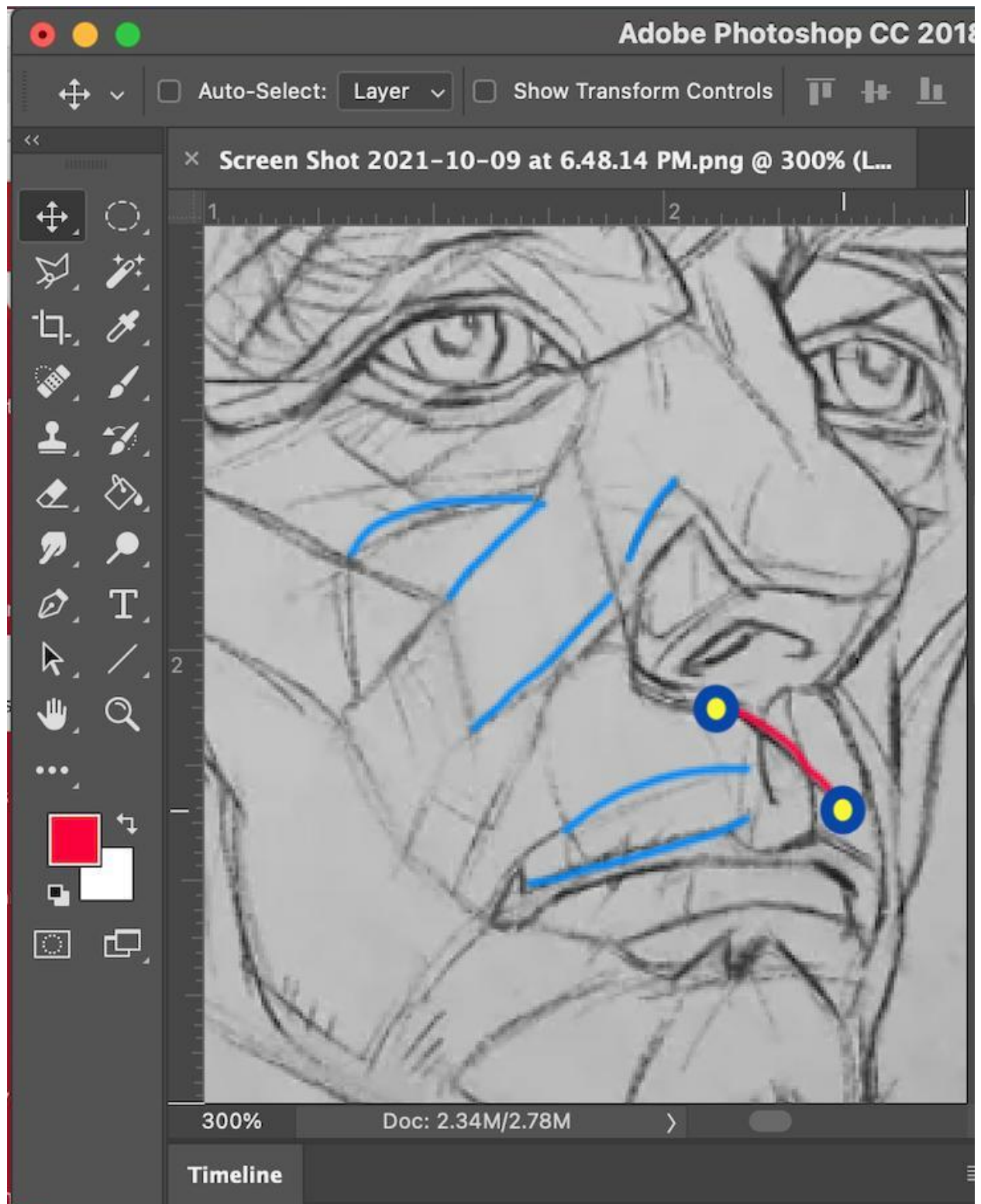
The Blue line showed us these coordinates:

beginning point

	X:	2.032
	Y:	1.639

end point

	X:	1.924
	Y:	1.809

The Red line showed us these coordinates:

beginning point

	X:	2.390
	Y:	2.349

end point

	X:	2.109
	Y:	2.125

If we take this to Excel, we can record it like this:

	A	B	C	D	E	F	
1	LINE ID	X1	Y1	X2	Y2	Slope	Degre
2	IMAGE 1 1	2	1.6	1.9	1.8	2	63.4
3	2	2.3	2.3	2.1	2.1	-1	
4	3	0.5	0	0.6	0.2	-2	-63.4
5	4					#DIV/0!	#DI
6	5					#DIV/0!	#DI
7	6					#DIV/0!	#DI
8	7					#DIV/0!	#DI
9	8					#DIV/0!	#DI

You can see where the x and y coordinates go and then I have formulated the sheet to automatically compute SLOPE, DEGREE, and HANDEDNESS (1=Right hand and 0= Left hand)

Here is the artwork to test:

x and y coordinates of the above image go into BLUE cells on the spreadsheet.

x and y coordinates of the above image go into RED cells on the spreadsheet.

One of these is a fraud. While it is almost impossible to prove the authentic drawing, you can be very persuasive in using your data to argue that one is the imposter. Students in this project have been listed in numbered alphabetical order. Quadrants have been created over each drawing. The number next to your name relates to your numbered quadrant. We will make the gathering of data easier by dividing the workload from all the students. You will be responsible for 30 lines in your quadrant from each drawing. The instructor will provide a formatted excel sheet that will automatically generate Slope, Degree, and "Handedness" with 0 suggesting left-handedness and 1 suggesting right-handedness. The artist, Kerry James Marshall, is left-handed. The imposter is right-handed.

When you have completed your collective 60 lines, you will send to me to combine into a "group-sized" excel file. Your final responsibility is to analyze the group file and report to me which is the fraud, and which is authentic.

The instructor will prepare the excel sheet but you have to do the sleuthing to find lines to analyze. The line data will go into a spread sheet such as the illustration below:

	A	B	C	D	E	F	
1	LINE ID	X1	Y1	X2	Y2	Slope	Degre
2	IMAGE 1 1	2	1.6	1.9	1.8	2	63.4
3	2	2.3	2.3	2.1	2.1	-1	
4	3	0.5	0	0.6	0.2	-2	-63.4
5	4					#DIV/0!	#DI
6	5					#DIV/0!	#DI

The formula for the SLOPE column is simply =-(E2-C2)/(D2-B2), the formula for Degree is =-DEGREES(ATAN((E2-C2)/(D2-B2))). Assuming that taking whether the slope is negative or positive is sufficient, that formula is =IF(G2<0, 0, 1).