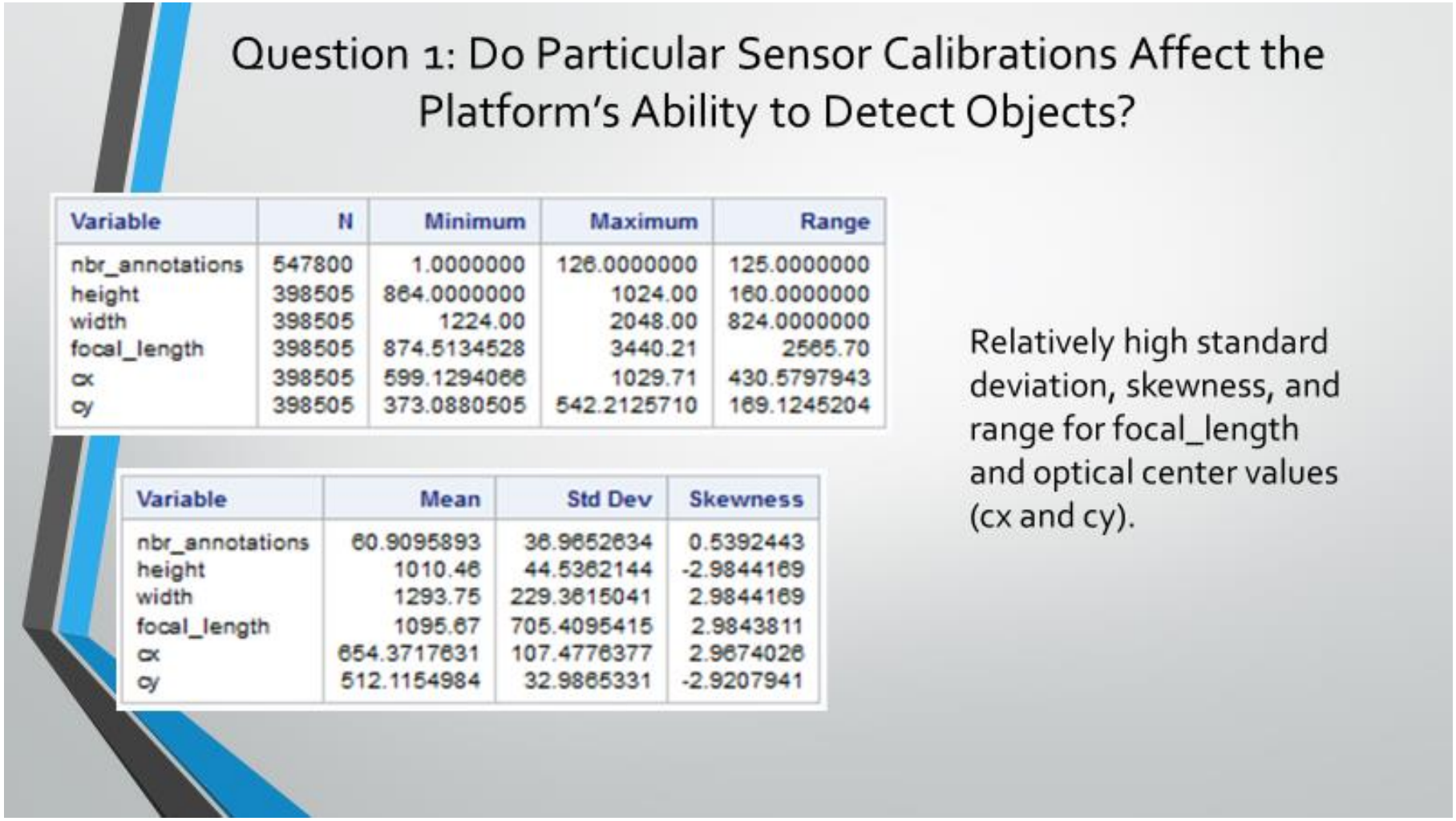
Figure 8: Initial Data Exploration and Regression



Variable	N	Minimum	Maximum	Range
nbr_annotations	547800	1.0000000	126.0000000	125.0000000
height	398505	864.0000000	1024.00	160.0000000
width	398505	1224.00	2048.00	824.0000000
focal_length	398505	874.5134528	3440.21	2565.70
cx	398505	599.1294066	1029.71	430.5797943
cy	398505	373.0880505	542.2125710	169.1245204

Variable	Mean	Std Dev	Skewness
nbr_annotations	60.9095893	36.9652634	0.5392443
height	1010.46	44.5362144	-2.9844169
width	1293.75	229.3615041	2.9844169
focal_length	1095.67	705.4095415	2.9843811
cx	654.3717631	107.4776377	2.9674026
cy	512.1154984	32.9865331	-2.9207941

Question 1: Do Particular Sensor Calibrations Affect the Platform's Ability to Detect Objects?

Adjusted R-Square	R-Square	C(p)	AIC	BIC	SBC	Variables in Model
0.0051	0.0051	5.0000	2882073.39	2882075.39	2882128	width focal_length cx cy
0.0051	0.0051	5.0002	2882073.39	2882075.39	2882128	height focal_length cx cy
0.0048	0.0048	143.2355	2882211.60	2882213.60	2882255	width focal_length cx

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	-1228.563752	58.64368968	-20.95	<.0001
width	1.373088	0.06505501	21.11	<.0001
focal_length	-0.415745	0.02152592	-19.31	<.0001
cx	-0.152207	0.00746742	-20.38	<.0001
cy	0.134207	0.01133296	11.84	<.0001

Low R-Square value, but high significance For each variable. Can we do more?

Yes. Possible disperate means. Check for clusters of data.

Question 1: Do Particular Sensor Calibrations Affect the Platform's Ability to Detect Objects?

HPBIN Results focal_length (Bin=10)

Variable	Binned Variable	Range	Frequency	Proportion
focal_length	BIN_focal_length	focal_length < 1131.0832767	364774	0.91535614
		1131.0832767 <= focal_length < 1387.6531006	0	0
		1387.6531006 <= focal_length < 1644.2229246	0	0
		1644.2229246 <= focal_length < 1900.7927485	0	0
		1900.7927485 <= focal_length < 2157.3625724	0	0
		2157.3625724 <= focal_length < 2413.9323964	0	0
		2413.9323964 <= focal_length < 2670.5022203	0	0
		2670.5022203 <= focal_length < 2927.0720442	0	0
		2927.0720442 <= focal_length < 3183.6418682	0	0
		3183.6418682 <= focal_length	33731	0.08464386

Examination of the data in PROC GLM shows two distinct ranges from **874-885** and **3385-3441**

Question 1: Do Particular Sensor Calibrations Affect the Platform's Ability to Detect Objects?

HPBIN Results Optical Center (cy) (Bin=10)

Variable	Binned Variable	Range	Frequency	Proportion
cy	BIN_cy	cy < 390.00050257	7547	0.01893828
		390.00050257 <= cy < 406.91295461	8368	0.02099848
		406.91295461 <= cy < 423.82540665	17816	0.04470709
		423.82540665 <= cy < 440.7378587	0	0
		440.7378587 <= cy < 457.65031074	0	0
		457.65031074 <= cy < 474.56276278	0	0
		474.56276278 <= cy < 491.47521483	0	0
		491.47521483 <= cy < 508.38766687	0	0
		508.38766687 <= cy < 525.30011891	268776	0.67446080
		525.30011891 <= cy	95998	0.24089535

Examination of the data in PROC GLM shows two distinct ranges from **373-421** and **512-542**

Question 1: Do Particular Sensor Calibrations Affect the Platform's Ability to Detect Objects?

HPBIN Results Optical Center (cx) (Bin=10)

Variable	Binned Variable	Range	Frequency	Proportion
cx	BIN_cx	cx < 642.18738602	384774	0.91535614
		642.18738602 <= cx < 685.24536545	0	0
		685.24536545 <= cx < 728.30334488	0	0
		728.30334488 <= cx < 771.36132431	0	0
		771.36132431 <= cx < 814.41930374	0	0
		814.41930374 <= cx < 857.47728317	0	0
		857.47728317 <= cx < 900.53526261	0	0
		900.53526261 <= cx < 943.59324204	0	0
		943.59324204 <= cx < 986.65122147	7234	0.01815285
		986.65122147 <= cx	26497	0.06649101

Examination of the data in PROC GLM shows two distinct ranges from **599-638** and **985-1030**

Question 1: Do Particular Sensor Calibrations Affect the Platform's Ability to Detect Objects?

Why the Dispersion?

Two different image sizes (i.e., two different basic sets of height / width parameters).

Table of channel by height

channel	height 864	height 1024	height Total
Not CAM_FRONT_ZOOMED	0 0.00 0.00 0.00	364774 91.54 100.00 100.00	364774 91.54
CAM_FRONT_ZOOMED	33731 8.46 100.00 100.00	0 0.00 0.00 0.00	33731 8.46
Total	33731 8.46	364774 91.54	398505 100.00

Frequency Missing = 149295

Table of channel by width

channel	width 1224	width 2048	width Total
Not CAM_FRONT_ZOOMED	364774 91.54 100.00 100.00	0 0.00 0.00 0.00	364774 91.54
CAM_FRONT_ZOOMED	0 0.00 0.00 0.00	33731 8.46 100.00 100.00	33731 8.46
Total	364774 91.54	33731 8.46	398505 100.00

Frequency Missing = 149295

CAM_FRONT_ZOOMED – Height 864, Width 2048

Channel **Not** CAM_FRONT_ZOOMED – Height 1024, Width 1224

Question 1: Do Particular Sensor Calibrations Affect the Platform's Ability to Detect Objects?

What's Next?

- Divide populations based on CAM_FRONT_ZOOMED / Not CAM_FRONT_ZOOMED.
- Rerun basic regression tools and attempt to find correlations.

Adjusted R-Square	R-Square	C(p)	AIC	BIC	SBC	Variables in Model
0.0075	0.0075	4.0000	2636336.96	2636338.96	2636380	focal_length cx cy
0.0074	0.0074	35.4587	2636368.42	2636370.42	2636401	focal_length cy
0.0063	0.0063	427.9888	2636760.70	2636762.70	2636793	focal_length cx

Nothing is appears to be linearly correlated, but….

Question 1: Do Particular Sensor Calibrations Affect the Platform's Ability to Detect Objects?

Not CAM_FRONT_ZOOMED HPBIN Results focal_length (Bin=10)

Variable	Binned Variable	Range	Frequency	Proportion
focal_length	BIN_focal_length	focal_length < 875.48841102	11060	0.03032014
		875.48841102 <= focal_length < 876.45936925	22589	0.06192601
		876.45936925 <= focal_length < 877.43232748	25054	0.06868362
		877.43232748 <= focal_length < 878.40528572	3906	0.01070800
		878.40528572 <= focal_length < 879.37824395	20188	0.05534386
		879.37824395 <= focal_length < 880.35120218	8384	0.02298409
		880.35120218 <= focal_length < 881.32416041	78530	0.21528398
		881.32416041 <= focal_length < 882.29711864	70109	0.19219846
		882.29711864 <= focal_length < 883.27007687	28802	0.07895848
		883.27007687 <= focal_length	96152	0.26359335

Notice the varying proportion numbers.