Figure 8: Initial Data Exploration and Regression

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

Variable	N	Minimum	Maximum	Range
nbr_annotations	547800	1.0000000	126.0000000	125.0000000
height	479917	864.0000000	1024.00	160.0000000
width	479917	1224.00	2048.00	824.0000000
focal_length	479917	874.5134528	3440.21	2565.70
cx	479917	599.1294066	1029.71	430.5797943
cy	479917	373.0880505	542.2125710	169.1245204

Variable	Mean	Std Dev	Skewness
nbr_annotations	60.9095893	36.9652634	0.5392443
height	1001.26	55.8664662	-2.0499706
width	1341.10	287.7123009	2.0499706
focal_length	1241.45	885.6007349	2.0499909
cx	672.4681878	137.8699254	2.0390175
cy	506.6568271	42.9983999	-2.0510698

Relatively high standard deviation, skewness, and range for focal_length and optical center values (cx and cy).

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
0.0009	0.0010	5.0000	3464447.70	3464449.70	3464503	height focal_length cx cy
0.0009	0.0010	5.0014	3464447.70	3464449.70	3464503	width focal_length cx cy
0.0009	0.0009	19.4146	3464462.11	3464464.11	3464506	height focal_length cx

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	5796.07361	281.92412	20.56	<.0001
height	1	-5.31284	0.25979	-20.45	<.0001
focal_length	1	-0.34321	0.01659	-20.69	<.0001
cx	1	0.04129	0.00633	6.52	<.0001
cy	1	-0.03409	0.00841	-4.05	<.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	411715	0.85788793
		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	68202	0.14211207

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	25734	0.05362177
		390.00050257 <= cy < 406.91295461	3880	0.00808473
		406.91295461 <= cy < 423.82540665	38588	0.08040557
		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	220321	0.45908147
		525.30011891 <= cy	191394	0.39880646

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	411715	0.85788793
		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	1235	0.00257336
		986.65122147 <= cx	66967	0.13953871

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

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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	Total
Not CAM_FRONT_ZOOMED	0 0.00 0.00 0.00	411715 85.79 100.00 100.00	411715 85.79
CAM_FRONT_ZOOMED	68202 14.21 100.00 100.00	0 0.00 0.00 0.00	68202 14.21
Total	68202 14.21	411715 85.79	479917 100.00

Frequency Missing = 67883

Table of channel by width

channel	width 1224	width 2048	Total
Not CAM_FRONT_ZOOMED	411715 85.79 100.00 100.00	0 0.00 0.00 0.00	411715 85.79
CAM_FRONT_ZOOMED	0 0.00 0.00 0.00	68202 14.21 100.00 100.00	68202 14.21
Total	411715 85.79	68202 14.21	479917 100.00

Frequency Missing = 67883

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
0.0024	0.0024	4.0000	2971525.97	2971527.97	2971570	focal_length cx cy
0.0024	0.0024	3.4376	2971525.41	2971527.41	2971558	focal_length cx
0.0020	0.0020	149.7192	2971671.66	2971673.66	2971704	focal_length cy

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 < 875.48641102	3854	0.00936084
		875.48641102 <= focal_length < 876.45936925	10469	0.02542778
		876.45936925 <= focal_length < 877.43232748	24125	0.05859636
		877.43232748 <= focal_length < 878.40528572	12032	0.02922410
		878.40528572 <= focal_length < 879.37824395	59911	0.14551571
		879.37824395 <= focal_length < 880.35120218	18821	0.04571366
		880.35120218 <= focal_length < 881.32416041	65622	0.15938695
		881.32416041 <= focal_length < 882.29711864	68840	0.16720304
		882.29711864 <= focal_length < 883.27007687	101769	0.24718312
		883.27007687 <= focal_length	46272	0.11238842

Notice the varying proportion numbers.

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

Not CAM_FRONT_ZOOMED HPBIN Results Optical Center (cy) (Bin=10)

Variable	Binned Variable	Range	Frequency	Proportion
cy	BIN_cy	cy < 515.09770917	6371	0.01547430
		515.09770917 <= cy < 518.11047159	89908	0.21837436
		518.11047159 <= cy < 521.12323401	15767	0.03829591
		521.12323401 <= cy < 524.13599643	61130	0.14847649
		524.13599643 <= cy < 527.14875885	128655	0.31248558
		527.14875885 <= cy < 530.16152127	75944	0.18445770
		530.16152127 <= cy < 533.17428369	18525	0.04499472
		533.17428369 <= cy < 536.18704611	12326	0.02993819
		536.18704611 <= cy < 539.19980853	1278	0.00310409
		539.19980853 <= cy	1811	0.00439867

Notice the varying proportion numbers.

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

Not CAM_FRONT_ZOOMED HPBIN Results Optical Center (cx) (Bin=10)

Variable	Binned Variable	Range	Frequency	Proportion
cx	BIN_cx	cx < 602.97898122	36114	0.08771602
		602.97898122 <= cx < 606.82855585	13723	0.03333131
		606.82855585 <= cx < 610.67813049	59628	0.14482834
		610.67813049 <= cx < 614.52770512	61673	0.14979537
		614.52770512 <= cx < 618.37727976	60732	0.14750981
		618.37727976 <= cx < 622.22685439	71558	0.17380469
		622.22685439 <= cx < 626.07642902	68780	0.16705731
		626.07642902 <= cx < 629.92600366	9353	0.02271717
		629.92600366 <= cx < 633.77557829	28233	0.06857414
		633.77557829 <= cx	1921	0.00466585

Notice the varying proportion numbers.