Appendix A: Autozen Data Schema and Features

Team Members:

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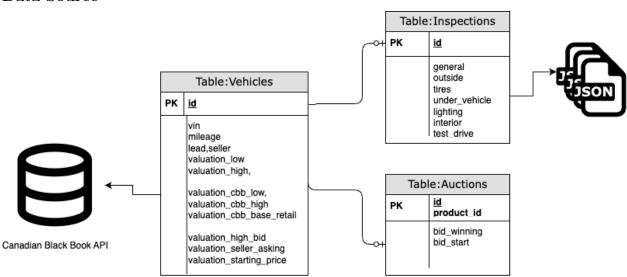
Course:

DSCI 591 Capstone Project

Summer 2023

The University of British Columbia

Data Source



Autozen granted us access to their production data spanning the period from 2021 to 2023. The data comprises three relational tables: vehicle inventory, inspections, and auction results. These tables contain a combination of structured columns with categorical, ordinal, numerical, and binary data types, as well as photos of the cars, CARFAX documents, text, and JSON objects. We excluded the photo, document, and text columns since they were already represented by the structured columns.

The data collection script was designed to extract the desired information, flatten the JSON objects, and consolidate them into a master dataset consisting of 216 features (Appendix A). These features were categorized as follows:

- General information: make, model, year, mileage, color, location, etc.
- Outside: rust status, scratches, etc.
- Tires: tread depth, condition of rims, etc.
- Under-vehicle: exhaust state, differential, etc.
- Under the hood: drive belt condition, battery health, engine oil status, etc.
- Lighting: headlights and taillights' working conditions, etc.
- Interior: seat condition, dashboard status, odors, etc.
- Test drive evaluations: handling, braking system, external noise, etc.
- Auction results: date, starting bid, valuation ranges by CBB and Autozen, winning bid, offer status, etc.

Notably, the winning bid serves as the target variable for the predictive models in this project.

Features

Numerical

Index	Column	Number of Null Values	Levels
1	bid_start	0	[98762.0, 46107.0, 118700.0, 116690.0, 116000
2	general_mileage	0	[7697.0, 3500.0, 64000.0, 12481.0, 26000.0, 19
3	interior_numberOfKeysFobs	1134	[nan, 2.0, 3.0, 1.0]
4	interior_numberOfKeysFobsDeck	ar 26 0	[2.0, 1.0, nan, 3.0, 4.0, 5.0]
5	interior_numberOfWorkingKeysI	Fo 8 s	[1.0, 2.0, 3.0, 0.0, 4.0, nan, 5.0]
6	$tires_driverFrontBreakPadMeasu$	ır dő ént	[7.0, 8.0, 5.0, 6.0, nan, 10.0, 9.0, 0.0, 4.0,
7	$tires_driverFrontPressure$	0	[32.0, 34.0, 50.0, 36.0, 31.0, 35.0, 37.0, 39
8	$tires_driverFrontTreadDepth$	325	[8.0, 6.0, 4.0, 9.0, 5.0, 10.0, nan, 14.0, 7.0
9	$tires_driver Rear Break Pad Measure and the sum of th$	re 364 nt	[6.0, 8.0, 5.0, 9.0, nan, 10.0, 7.0, 4.0, 2.0,
10	$tires_driver Rear Pressure$	0	[32.0, 34.0, 50.0, 35.0, 30.0, 37.0, 38.0, 36
11	$tires_driver Rear Tread Depth$	328	[7.0, 4.0, 9.0, 5.0, nan, 14.0, 13.0, 11.0, 0
12	$tires_passengerFrontBreakPadMe$	ea 362 ement	[7.0, 5.0, 6.0, nan, 8.0, 10.0, 4.0, 9.0, 3.0,
13	$tires_passengerFrontPressure$	0	[32.0, 34.0, 50.0, 36.0, 29.0, 30.0, 35.0, 37]
14	$tires_passengerFrontTreadDepth$	328	[9.0, 7.0, 4.0, 8.0, 5.0, 10.0, nan, 14.0, 0.0
15	$tires_passengerRearBreakPadMe$	a 362 ment	[6.0, 7.0, 9.0, nan, 5.0, 10.0, 4.0, 8.0, 3.0,

16	$tires_passengerRearPressure$	0	[32.0, 34.0, 50.0, 35.0, 30.0, 37.0, 36.0,
17	$tires_passengerRearTreadDepth$	328	38 [7.0, 4.0, 9.0, 5.0, nan, 14.0, 13.0, 11.0,
18	under_the_hood_batteryActual	M è258 rement	0 [nan, 742.0, 462.0, 690.0, 248.0, 435.0,
19	under_the_hood_batteryRating	1258	320.0 [nan, 810.0, 600.0, 725.0, 840.0, 525.0,
20	under_the_hood_coolantStrengt	-halldasuramant	500.0 [nan, -42.0, -40.0, -50.0, -30.0, -51.0,
	under_the_nood_coolantstrengt		-49.0
21	valuation_autozen_high	0	[107531.0, 48738.0, 125588.0, 127061.0, 142950
22	$valuation_autozen_low$	0	[98762.0, 44764.0, 115247.0, 116690.0, 131256
23	valuation_cbb_trade_in_high	24	[99566.0,47318.0,121930.0,117649.0,
24	valuation_cbb_trade_in_low	17	138786 [91446.0, 43460.0, 111890.0, 108046.0,
25	valuation_highest_bid_amount	86	127433 [128500.0, 123333.0, 118700.0,
26	valuation_seller_asking_price	549	116690.0, 11600 [nan, 0.0, 1.0, 78000.0, 73000.0,
27	valuation starting price	0	72000.0, 980 [98762.0, 46107.0, 118700.0, 116690.0,
		~	116000

Ordinal

Index	Column	Number of Null Values	Levels
1	general_additionalWarranty	221	[yes, no, unknown, nan]
2	general_transferableWarranty	221	[unknown, yes, no, nan]
3	$interior_acOperationBlowsCold$	1232	[nan, ok, serviceRequired]
4	$interior_additional Issues Interior$	968	[nan, ok, serviceSuggested, serviceRequired]
5	$interior_audioSteeringWheelCont$	cro 128	[ok, nan, notAvailable, serviceSuggested, serv
6	$interior_audioSystem$	28	[ok, nan, serviceSuggested, serviceRequired]
7	$interior_carpetFloorMats$	34	[ok, nan, serviceSuggested, serviceRequired]
8	$interior_center Console$	99	[ok, serviceRequired, nan, serviceSuggested]
9	$interior_cigaretteLighterPowerOu$	ıtl 9 @2	[nan, ok, serviceSuggested, notAvailable]
10	$interior_condition Of Seats$	205	[ok, serviceSuggested, serviceRequired, nan]
11	interior_dashboard	40	[ok, nan, serviceSuggested, serviceRequired]
12	$interior_door Handles$	34	[ok, serviceSuggested, nan, serviceRequired]
13	$interior_driverFrontDoorTrim$	41	[ok, serviceSuggested, serviceRequired, nan]

14	$interior_driverFrontSeatHeater$	40	[ok, notAvailable, nan]
15	$interior_driver Rear Door Trim$	49	[ok, serviceSuggested, nan,
			notAvailable, serv
16	$interior_driverRearSeatHeater$	40	[notAvailable, ok, nan,
			serviceRequired]
17	interior_evChargingKit	1323	[nan, notAvailable]
18	interior fuelDoorRelease	34	ok, serviceRequired, nan,
	_		serviceSuggested]
19	interior_gloveBox	895	[nan, ok, serviceSuggested]
20	interior gloveBoxCenterConsole	1259	[nan, ok, serviceSuggested]
21	interior headliner	39	[ok, nan, serviceSuggested]
22	interior headrests	40	[ok, nan, serviceSuggested,
			serviceRequired]
23	interior_hoodRelease	34	[ok, nan, serviceRequired,
		01	serviceSuggested]
24	interior horn	42	[ok, nan, serviceRequired]
25	interior_keyFobCondition	34	[ok, serviceRequired, nan,
20	interior_keyr obcondition	04	serviceSuggested
26	interior_navigationOperation	28	[ok, notAvailable, serviceSuggested,
20	interior_navigationOperation	26	nan, serv
27	interior passengerFrontDoorTrim	41	ok, serviceSuggested, nan,
41	interior_passengerFrontDoor frim	41	. , , , ,
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28	interior_passengerFrontSeatHeater	40	[ok, notAvailable, nan,
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29	interior_passengerRearDoorTrim	63	[ok, serviceSuggested, nan,
90		40	notAvailable, serv
30	$interior_passengerRearSeatHeater$	40	[notAvailable, ok, nan,
		4.0	serviceSuggested]
31	$interior_powerSeatOperation$	40	[ok, notAvailable, nan,
			serviceSuggested, serv
32	interior_rearCamera	36	[ok, nan, notAvailable,
			serviceRequired, servi
33	$interior_rearViewMirror$	40	[ok, nan, serviceRequired,
			serviceSuggested]
34	$interior_rearWindowDefrostOperar$	t i36 n	[ok, nan, notAvailable,
			serviceSuggested, serv
35	$interior_seatBelts$	40	[ok, nan, serviceRequired,
			serviceSuggested]
36	interior_seats	1159	[nan, ok, serviceSuggested]
37	interior_spareTire	34	[yes, no, notAvailable, ok, nan]
38	$interior_spareTireTools$	34	[yes, no, notAvailable, ok, nan,
			serviceSugges
39	interior_steeringWheel	115	[ok, nan, serviceRequired,
			serviceSuggested]
40	$interior_steeringWheelSteeringCol$	u 1n2n5 3	[nan, ok, serviceSuggested]
41	interior_sunroofOperation	40	[ok, notAvailable, nan,
	-		serviceSuggested, serv
42	interior_sunVisors	40	[ok, nan, serviceSuggested]
43	interior_trunkRelease	35	ok, notAvailable, serviceRequired,
	_		nan, servi
44	interior_waterLeaks	39	[ok, nan, serviceSuggested,
	_		serviceRequired]
			ī 1

45	lighting_additionalIssuesLighting	939	[nan, ok, serviceSuggested,
			serviceRequired]
46	$lighting_brakeLights$	5	[ok, nan, serviceSuggested,
			serviceRequired
47	$lighting_emergency 4 Way Flashers$	4	[ok, serviceSuggested, nan]
48	lighting_fogLights	4	[ok, notAvailable, serviceSuggested,
			nan, serv
49	$lighting_frontDRL$	4	[ok, notAvailable, serviceSuggested, nan]
50	lighting_frontSignalLights	5	[ok, serviceSuggested, nan,
50		9	serviceRequired]
51	lighting_headlightsHighBeam	4	[ok, serviceSuggested, nan]
52	lighting_headlightsLowBeam	4	ok, serviceSuggested, nan,
32	ngnting_neadiigntsLowDeam	4	•
F 9	1: -1.4: :	4	serviceRequired]
53	lighting_interiorLights	4	[ok, nan, serviceSuggested]
54	$lighting_licensePlateLight$	5	[ok, nan, serviceRequired,
	20.1.1		serviceSuggested]
55	lighting_rearSignalLights	4	[ok, nan, serviceSuggested]
56	$lighting_reverseLights$	4	[ok, nan, serviceSuggested]
57	$lighting_sideMarkerLights$	4	[ok, notAvailable, serviceRequired,
			nan, servi
58	$lighting_tailLights$	5	[ok, serviceSuggested,
			serviceRequired, nan]
59	$outside_additional Issues Exterior$	925	[nan, ok, serviceSuggested,
			serviceRequired]
60	outside_bodyDentsDingsHailDama	agle2	[serviceSuggested, ok,
	Ů,		serviceRequired, nan]
61	outside_collisionDamage	14	[ok, serviceSuggested,
			serviceRequired, nan]
62	$outside_driverFrontWindowGlass$	909	[nan, ok]
63	outside_driverFrontWindowGlassOp@ration		[ok, nan, serviceSuggested]
64	outside_driverPowerSlidingDoors	17	[not Available, ok, nan,
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65	$outside_driver Rear Window Glass$	909	[nan, ok, serviceRequired]
66	outside_driverRearWindowGlassO		[ok, notAvailable, nan,
00	outside_driverriear window drasso	peration	serviceRequired]
67	outside driverSideMirror	17	- ,
67	$outside_driverSideMirror$	17	[serviceSuggested, ok, nan, serviceRequired]
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68	outside_driverSideMirrorHeater	909	[nan, ok, notAvailable]
69	$out side_lift gate Operation$	13	[ok, notAvailable, nan,
			serviceRequired, servi
70	$outside_paintFinish$	13	[ok, serviceSuggested,
			serviceRequired, nan]
71	$outside_paintScratches$	12	[serviceSuggested, ok,
			serviceRequired, nan]
72	$outside_passengerFrontWindowGla \textbf{90}9$		[nan, ok, serviceSuggested]
	outside_passengerFrontWindowGlassOperation		[ok, nan, serviceSuggested,
73			
73	_1 0		serviceRequired]
73 74	outside_passengerPowerSlidingDoo	or i s7	
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105	tires driverFrontShockStrut	318	[ok, nan, serviceSuggested]
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107	tires driverFrontTireCondition	478	
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108	$tires_driver Front Valve Stem Condit$	51 0339 9	[nan, ok, serviceRequired,
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109	$tires_driverRearBrakePad$	318	[ok, notAvailable, nan,
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110	$tires_driver Rear Condition$	318	[ok, serviceSuggested, nan,
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158 under_vehicle_rearDriveShaft 919 [nan, notAvailable, ok]	
159 under_vehicle_transferCase 3 [notAvailable, ok, serviceSug	ggested.
nan]	,,

${\bf Categorical}$

Index	Column	Number of Null	Levels
		Values	
1	general_fuelType	3	[gasoline, electric, hybrid, diesel, nan]
2	general_make	0	[Porsche, Land Rover, Audi, Cadillac,
			Mercedes
3	$general_model$	0	[Panamera, Discovery Sport, 911, R8,
			Escalade,
4	$general_roofType$	3	[hardTop, softTopConvertible,
			hardTopConvertib
5	general_transmission	105	[automatic, manual, nan]
6	general_trim	2	[4 4D Sedan, P250 S 4D Utility, Carrera 4S
			2D
7	general_warrantyProvi	delr094	[nan, Audi, BMW, , Tesla, GM, Land
	· ·		Rover, JL
8	general_year	0	[2021.0, 2020.0, 2018.0, 2014.0, 2017.0,
			2022
9	interior_odors	928	[nan, No, food, air freshener, no, smoke,
	_		Col
10	$interior_seatsMaterial$	537	[leather, nan, cloth]
11	vehicle_lead_source	0	[DDC, MQL, FAMILY, AUTOZEN]

Binary

Index	Column	Number of Null Values	Levels
1	general_dashWarningLights	221	[no, yes, nan]
2	$interior_carSmokedIn$	202	[no, nan, yes]
3	interior_navigationEquipped	451	[yes, no, nan]
4	interior_rearCameraEquipped	459	[yes, nan, no]
5	interior_sunroofEquipped	463	[yes, no, nan]
6	$test_drive_testDriveCompleted$	742	[yes, nan, no]
7	$tires_aftermarketWheelsTires$	1233	[nan, no, yes]
8	$tires_extraSetOfWheelsTiresAvailable$	479	[no, yes, nan]
9	tires_oemAvailable	1231	[nan, yes, no]
10	tires_oemFactoryWheelsAvailable	479	[yes, no, nan]
11	$tires_secondSetOfTirePartOfDeal$	745	[no, nan, yes]

Features to Drop

Index	Column	Number of Null Values	Levels
1	general_vinNumber	0	[WP0AJ2A7XML112205, 1C3BCBFG4DN534082, WP0AB2A
2	id	0	[20WcRvcCQGcK0Xf87xCKftZgRzU, 26OiyX6eaafIwuwo
3	id_x	0	[20WRkuq4E3coq8yxkiee0J1CtEV, 26OiyK87l6U4HKMG
4	id_y	0	[20WRgbecgCUroEiUjdfUG5lF5kd, 26Oilnuea9KtA6RM
5 6	$interior_dashboardDriverSide\\interior_dashboardPassengerSide$	1325 1325	[nan]

Index	Column	Number of Null Values	Levels
7	num_auctions	0	[1, 3, 2, 4, 6, 12, 7, 5, 11, 26]
8	product_id	0	[20WRgbecgCUroEiUjdfUG5lF5kd,
			26Oilnuea9KtA6RM
9	seller_type	0	[consumer]
10	test_drive_brakingSystemIncluding	ng1 ASB5	[nan]
11	$tires_aftermarket Wheels Tires Head$	der 325	[nan]
12	tires_confirmCustomerSecondWhe	ee l\$2 5	[nan]
13	$tires_extraSetOfWheelsTires$	1325	[nan]
14	$tires_passengervPressure$	1325	[nan]
15	under_the_hood_batteryStrength	n M325 urement	[nan]
16	valuation_cbb_base_retail_avg	1325	[nan]
17	vehicle_mileage	0	[7697.0, 3500.0, 64971.0, 12481.0,
			26000.0, 19
18	vehicle_vin	0	[WP0AJ2A7XML112205,
			1C3BCBFG4DN534082, WP0AB2A