Vehicle Reliability Ranking

Spring 2022: Data Science Final Project Presentation
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Introduction

- “Japanese cars are reliable”
- “Hondas and Toyotas run for hundreds of thousands of miles”
- “German cars are precise but expensive to repair:
- “Regular oil changes can extend the life of any vehicle”

How do we get the data

- Compare based on
  - Parts prices
  - Repair center/mechanic database
  - Average mileage
  - Number and age cars taken to junk/scrap yard
- Data is very hard to find but mileage price and service history can help

Carfax

- All cars run and drive
- Repair history is always available
- Can sort such that cars have no reported accidents
- Reliable information
- https://www.carfax.com/vehicle/19UDE2F38KA015389

Scraping the web and making API Calls

- Done in python outputted to a CSV
- Web Scraping is the least elegant task a programmer ever has to do
- Reverse engineering
- Not knowing problems until they come up
- CAPTCHA
- Very time consuming
- VIN can be decoded using an API
- Nice thing is that the data is in the exact format I need

Code Walkthroughd

Scraping the web and making API Calls

https://github.com/rayogunjimi/Reliability-Ranker/blob/main/get_vins.py

https://github.com/rayogunjimi/Reliability-Ranker/blob/main/vin_lookup.py

Wrangling

- CSV is imported
- Show service possibilities
- Count service per category
    - Powertrain repair (engine, transmission), maintenance service (oil, brake, tire), suspension, cosmetic

Wrangling

https://github.com/rayogunjimi/Reliability-Ranker/blob/main/reliability_ranker.Rmd

Outcomes and Visualizing

- Most common vehicle
- Average price based on body type, based on make
- Most common service
- Most common service center/mechanic
- Average car prices per make model year and mileage
- Number of repairs per 1000 miles (exclude low number of samples)

Most Popular Services

services <chr>	n <int>
Oil and filter changed	19541
Maintenance inspection completed	18154
Pre-delivery inspection completed	7881
Tires rotated	7490
Emissions or safety inspection performed	6207
Tire condition and pressure checked	6086
Vehicle washed/detailed	5877
Emissions inspection performed	5015
Brakes checked	3828
Fluids checked	3766

Most Popular Services Locations

pop_n_cat_of_place$service_locations <chr>	n <int>
vioc.com	955
pepboys.com	341
reedman.com	270
jeffdambrosiochryslerjeepdodge.com	268
turnersvilleautocomplex.com	230
midas.com	228
yourmercedes.com	205
sussmanauto.com	201
flemington.com	192
meineke.com	180

Most Popular Car Makes

CHEVROLET	557
AUDI	496
NISSAN	392
TOYOTA	352
HONDA	346
BMW	344
KIA	344
MERCEDES-BENZ	341
FORD	334
LEXUS	236
HYUNDAI	231
ACURA	221
SUBARU	205
JEEP	200
LINCOLN	192

Most Popular Car Models

	make <chr>	model <chr>	n <int>
2	SUBARU	Outback	84
3	MERCEDES-BENZ	GLC-Class	81
4	ACURA	RDX	67
5	TOYOTA	Highlander	67
6	CHEVROLET	Corvette	64
7	ALFA ROMEO	Giulia (952)	62
8	AUDI	Q5	62
9	ACURA	TLX	59
10	AUDI	Q7	57
11	MERCEDES-BENZ	C-Class	56

Most Popular Car Models and Years

make <chr>	model <chr>	year <chr>
INFINITI	QX50	2019
MERCEDES-BENZ	GLC-Class	2019
SUBARU	Outback	2019
LINCOLN	MKC	2019
ACURA	RDX	2019
SUBARU	Impreza	2019
TOYOTA	Highlander	2019
ALFA ROMEO	Giulia (952)	2019
AUDI	Q5	2019
AUDI	Q8	2019
ACURA	MDX	2019
ACURA	TLX	2019
LINCOLN	Aviator	2020
VOLVO	S60	2019
ALFA ROMEO	Giulia (952)	2018

Makes with Most Mileage

make <chr>	average_mileage <dbl>
SUZUKI	110728.333
MERCURY	108113.800
SAAB	103454.500
PONTIAC	83774.000
SATURN	68774.000
HUMMER	65382.000
JEEP	63538.041
TOYOTA	62340.568
RAM	59630.244
HONDA	58748.940
DODGE	58220.673
CHRYSLER	57678.388
HYUNDAI	52846.878
BUICK	50483.260
NISSAN	49957.885

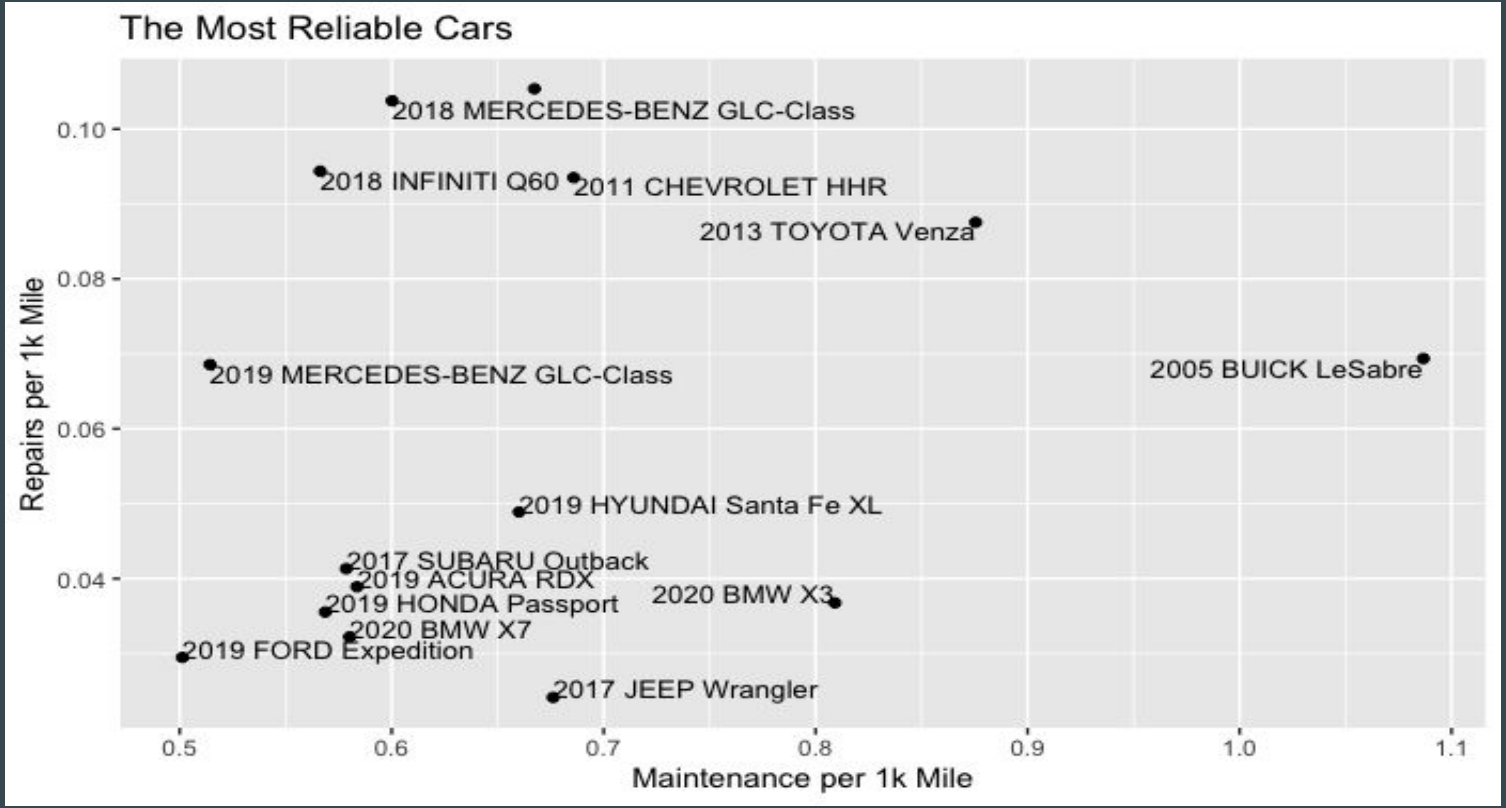
Models with Most Mileage

make <chr>	model <chr>	average_mileage <dbl>
MAZDA	Millenia	214506.000
DODGE	Dakota	203726.000
CHEVROLET	Astro Van	186341.000
TOYOTA	Echo	185843.000
INFINITI	FX35	174272.000
GMC	Safari	159613.000
TOYOTA	Corolla Matrix	157329.000
MAZDA	Mazda2	155783.000
FORD	Windstar	152310.000
MERCURY	Milan	151929.000

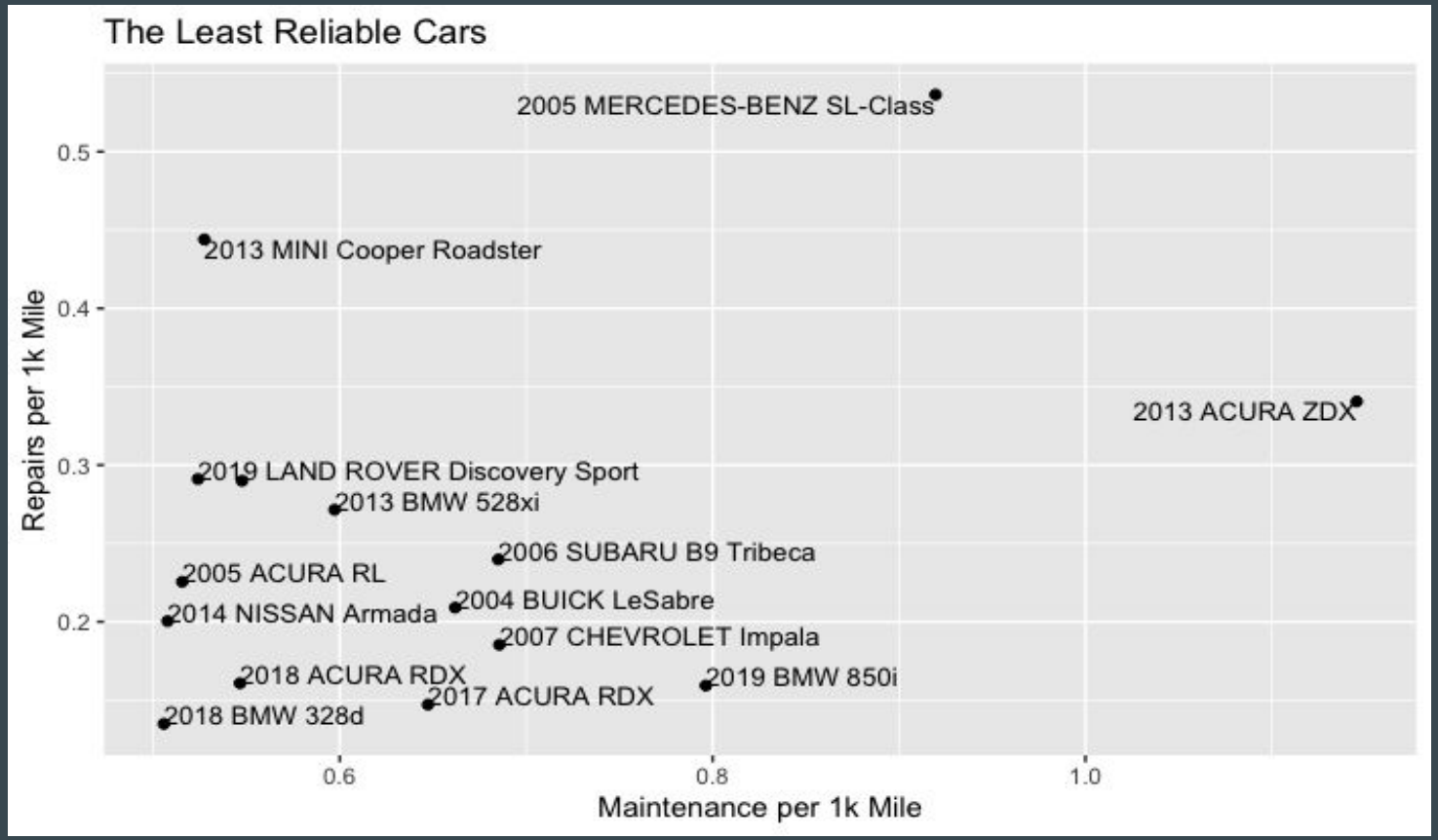
Model Years with Most Mileage

make <chr>	model <chr>	year <chr>	average_mileage <dbl>
TOYOTA	FJ Cruiser	2008	277598.00
LEXUS	GX	2007	250952.00
TOYOTA	Land Cruiser	2000	247578.00
NISSAN	Titan	2015	246081.00
NISSAN	NV200	2018	239622.00
LEXUS	LX	2006	224842.00
HONDA	Ridgeline	2011	220525.00
MAZDA	Millenia	2001	214506.00
CHEVROLET	HHR	2007	213695.00
CHEVROLET	Trailblazer	2006	210038.00

Most Reliable



Least Reliable



Fast Depreciation

make <chr>	model <chr>	year <chr>	coefficient <chr>	intercept <chr>	freq <int>
MERCEDES-BENZ	S-Class	2019	-1.75218557618863	142630.395472007	15
MASERATI	Levante	2019	-0.592832870105253	81664.5232770117	12
FORD	Transit	2020	-0.499125509560411	73978.6497535879	17
LAND ROVER	Defender	2020	-0.486787749519915	90662.4145658607	12
LAND ROVER	Range Rover Sport	2019	-0.419562200934997	90262.8818195689	11
MASERATI	Granturismo	2018	-0.411803227701	94023.6802545886	11
PORSCHE	Panamera	2018	-0.373510936023459	92142.1739993318	14
PORSCHE	Cayenne	2019	-0.332623016927105	82768.6398230747	15
LINCOLN	MKX	2018	-0.317051115087406	48096.7222329653	14
NISSAN	Titan	2019	-0.316372969090647	49601.6375629378	14

Slow Depreciation (...and Appreciation?)

make <chr>	model <chr>	year <chr>	coefficient <chr>	intercept <chr>	freq <int>
NISSAN	Altima	2019	0.117760714339714	18983.0262054863	19
RAM	1500	2019	0.100350784445154	35048.1436293346	15
TOYOTA	Tacoma	2019	0.054238022601273	34268.6518782232	11
JEEP	Compass	2018	0.0528961499408305	21624.8903683508	12
JEEP	Gladiator	2020	0.036083900702	48683.3474843446	20
LAND ROVER	Range Rover Velar	2019	0.011434400609587	57611.6311337384	12
GENESIS	G70	2019	0.0065366863953576	37302.035963868	11
HONDA	Civic	2019	-0.00232940467528552	23533.2585222751	19
GMC	Canyon	2019	-0.00358263402109176	38349.8520290326	12
BMW	X4	2019	-0.00876791825644928	48285.6807160439	17

Where to next

- So much more to learn from this dataset
- How much do the repair cost?
- Average price of parts and difficulty of repair
  - https://www.rockauto.com/repairindex/
- Expand to new zip codes
  - Do hills put more wear on the powertrain
  - Does rain and snow cause more chassis/frame/undercarriage rust
- All open source and available on GitHub