# Data Manipulation

# File Formats

# .csv

```
"name","surname","email","phone"
"Herminia","Marshall","herminia.marshall@example.com","678-313-8625"
"Bernice","Richardson","bernice.richardson@example.com","406-640-0952"
"Maeleachlainn","Albertson","maeleachlainn.albertson@example.com","936-514-5533"
"Laloecen","Darwin","laloecen.darwin@example.com","772-216-4633"
"Shib","Payton","shib.payton@example.com","817-657-1845"
"Marcos","Bertolini","marcos.bertolini@example.com","209-977-7112"
"Daniël","Teague","daniël.teague@example.com","773-750-0852"
"Ikaros","Garber","ikaros.garber@example.com","615-289-1387"
"Regulus","Cornell","regulus.cornell@example.com","832-572-5442"
"Lars","Simen","lars.simen@example.com","843-441-7001"
```

```python
data_csv = pd.read_csv("path/to/file/users.csv")
```

# .tsv

```
"name"	"surname"	"email"	"phone"
"Herminia"	"Marshall"	"herminia.marshall@example.com"	"678-313-8625"
"Bernice"	"Richardson"	"bernice.richardson@example.com"	"406-640-0952"
"Maeleachlainn"	"Albertson"	"maeleachlainn.albertson@example.com"	"936-514-5533"
"Laloecen"	"Darwin"	"laloecen.darwin@example.com"	"772-216-4633"
"Shib"	"Payton"	"shib.payton@example.com"	"817-657-1845"
"Marcos"	"Bertolini"	"marcos.bertolini@example.com"	"209-977-7112"
"Daniël"	"Teague"	"daniël.teague@example.com"	"773-750-0852"
"Ikaros"	"Garber"	"ikaros.garber@example.com"	"615-289-1387"
"Regulus"	"Cornell"	"regulus.cornell@example.com"	"832-572-5442"
"Lars"	"Simen"	"lars.simen@example.com"	"843-441-7001"
```

```
data_tsv = pd.read_csv("path/to/file/users.tsv", sep="\t")
```

# .json

```
data_json = pd.read_json("path/to/file/users.json")
```

# .xlsx

```
data_xlsx = pd.read_excel("path/to/file/users.xlsx")
```

# SQL

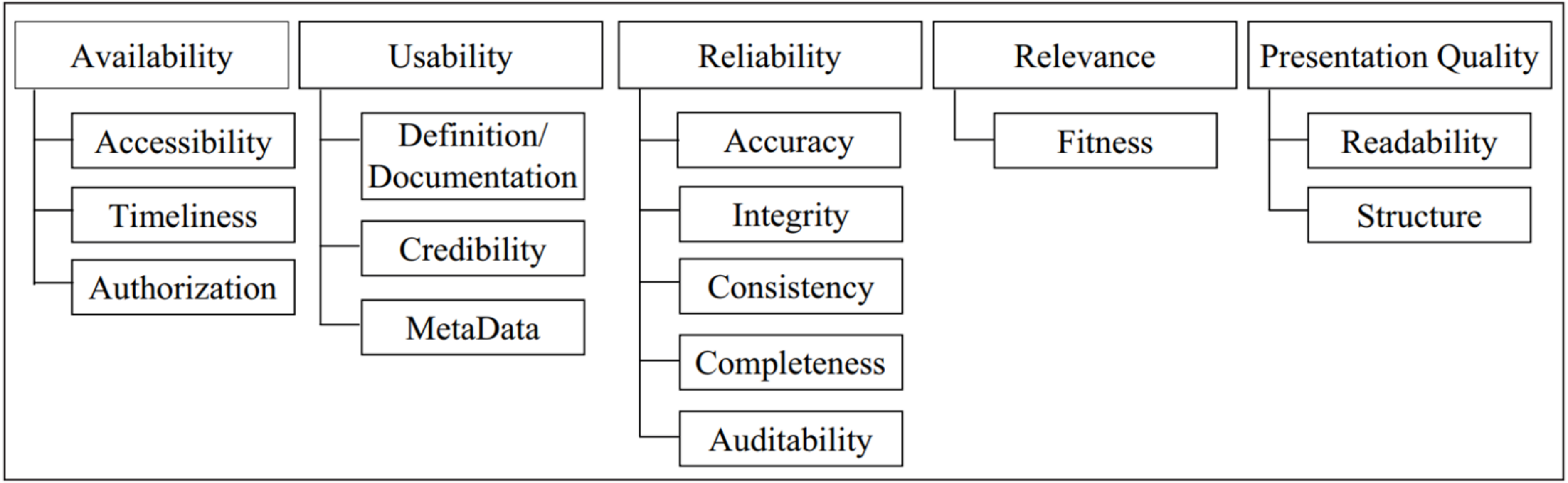
```
conn = sql.connect("path/to/file/users.db")
data_sql = pd.read_sql("SELECT * FROM users;", conn)
conn.close()
```

# URL

```
data_url = pd.read_csv("https://example.com/path/to/file/users.csv")
```

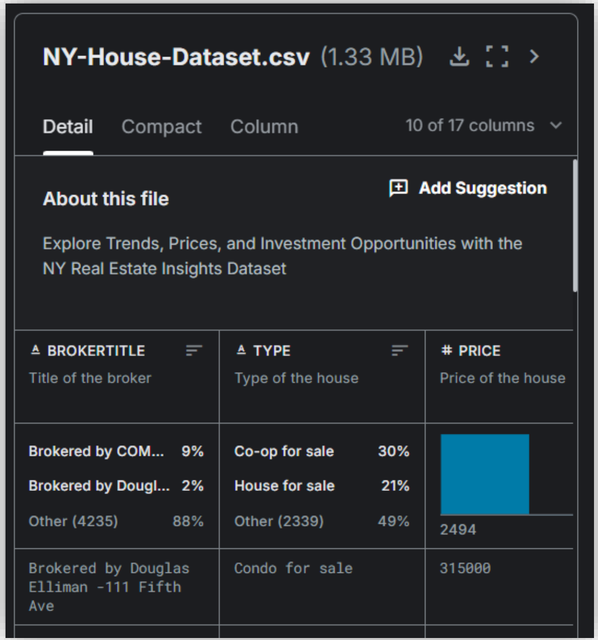
# How to assess data quality

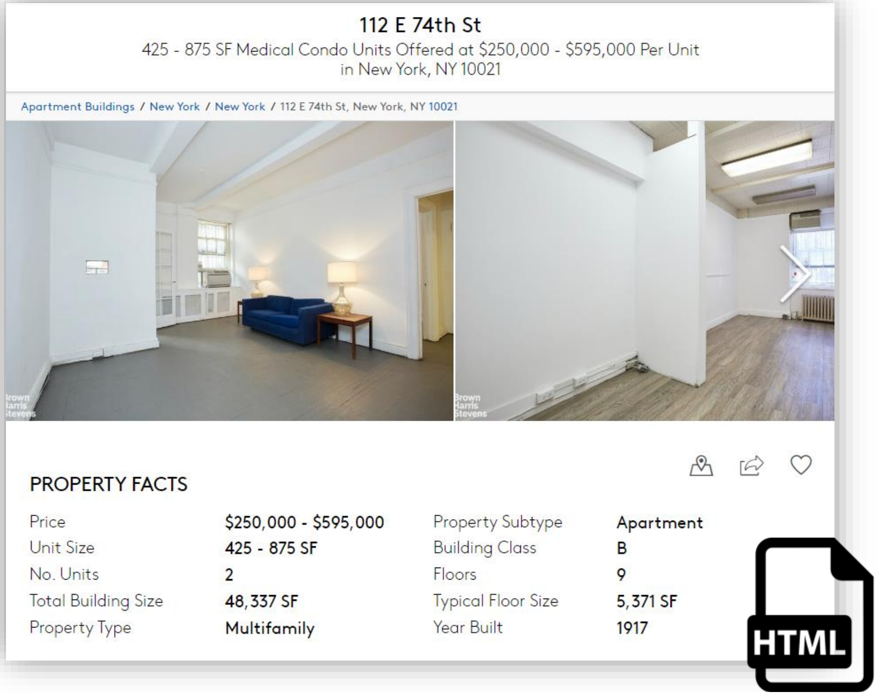
# How to assess data quality



# Availability

# Accessibility



# Timeliness

# Timeliness

# Timeliness


2012
My super model
for predicting
house prices
My data 😟
2024

# Authorization

otodom Analytics

# Authorization

otodom Analytics

**1899 zł** /30 dni

dostępny dla deweloperów współpracujących z obido

# Authorization

## 2. Postanowienia Ogólne

3. Treści publikowane w Serwisie, w tym w szczególności Ogłoszenia, niezależnie od ich formy, tj. materiały tekstowe, graficzne oraz wideo, są przedmiotem ochrony praw własności intelektualnej, w tym prawa autorskiego oraz praw własności przemysłowej, Grupy OLX, Użytkowników lub osób trzecich. Zabrania się w szczególności:
   a. jakiegokolwiek wykorzystywania tych treści bez pisemnej zgody uprawnionych;
   b. jakiegokolwiek agregowania i przetwarzania danych oraz innych informacji dostępnych w Serwisie w celu ich dalszego udostępniania osobom trzecim w ramach innych serwisów internetowych jak i poza Internetem;
   c. wykorzystywania oznaczeń Serwisu oraz Grupy OLX, w tym charakterystycznych elementów grafiki bez zgody Grupy OLX.

# Usability

# Credibility

CENTRALNA KOMISJA EGZAMINACYJNA

## Wyniki egzaminu maturalnego w 2024 roku

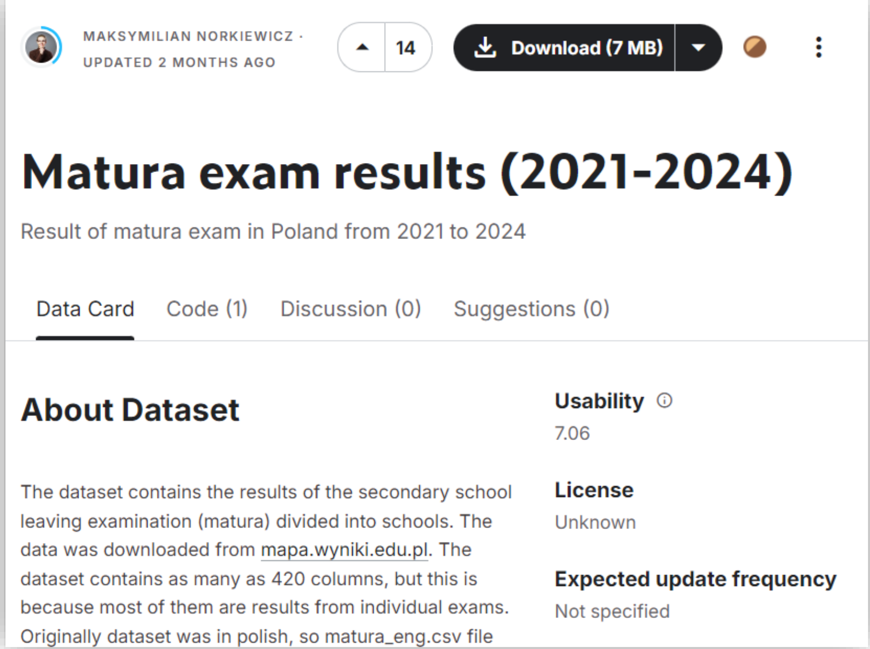
- Wstępne informacje o wynikach egzaminu maturalnego 2024
- Wstępne informacje o wynikach egzaminu maturalnego 2024_CENTYLE
- Wstępne informacje o wynikach egzaminu maturalnego 2024_STANINY POL
- Wstępne informacje o wynikach egzaminu maturalnego 2024_STANINY ENG
- Wyniki egzaminu maturalnego 2024 PREZENTACJA
- Mapki z wynikami egzaminu maturalnego

# Credibility

CENTRALNA KOMISJA EGZAMINACYJNA

## Wyniki egzaminu maturalnego w 2024 roku

- Wstępne informacje o wynikach egzaminu maturalnego 2024
- Wstępne informacje o wynikach egzaminu maturalnego 2024_CENTYLE
- Wstępne informacje o wynikach egzaminu maturalnego 2024_STANINY POL
- Wstępne informacje o wynikach egzaminu maturalnego 2024_STANINY ENG
- Wyniki egzaminu maturalnego 2024 PREZENTACJA
- Mapki z wynikami egzaminu maturalnego



MAKSYMILIAN NORKIEWICZ · UPDATED 2 MONTHS AGO

14

Download (7 MB)

## Matura exam results (2021-2024)

Result of matura exam in Poland from 2021 to 2024

Data Card | Code (1) | Discussion (0) | Suggestions (0)

### About Dataset

The dataset contains the results of the secondary school leaving examination (matura) divided into schools. The data was downloaded from mapa.wyniki.edu.pl. The dataset contains as many as 420 columns, but this is because most of them are results from individual exams. Originally dataset was in polish, so matura_eng.csv file

**Usability**

7.06

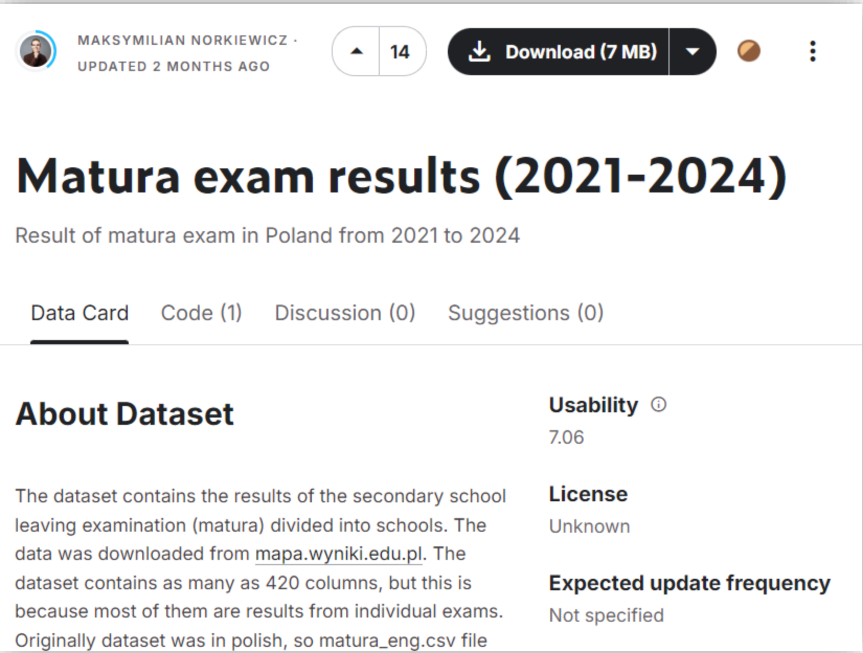
**License**

Unknown

**Expected update frequency**

Not specified

# Credibility

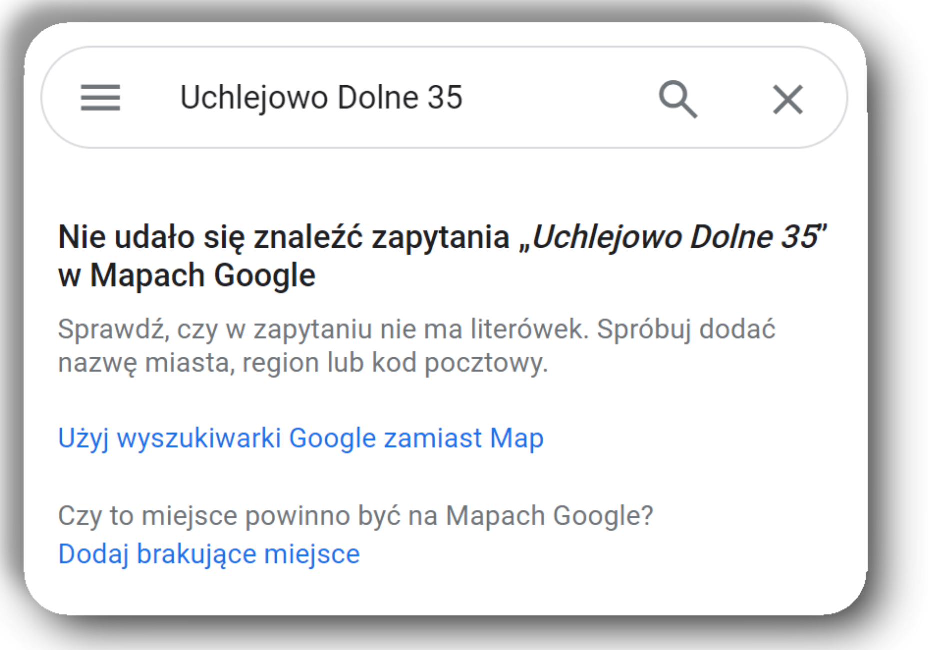
# Reliability

# Accuracy

| | name | surname | address |
|---|---|---|---|
| 0 | Kevin | McCallistera | Uchlejowo Dolne 35 |

# Accuracy

| | name | surname | address |
|---|---|---|---|
| 0 | Kevin | McCallistera | Uchlejowo Dolne 35 |

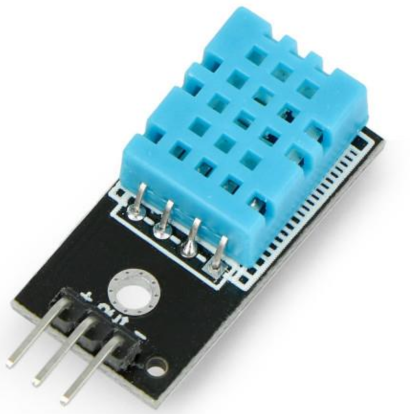


# Accuracy

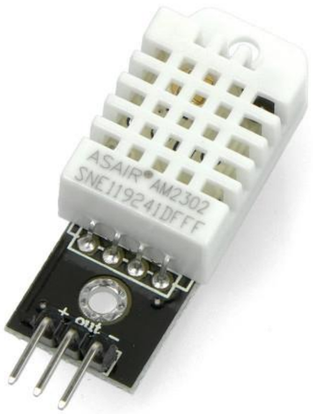
| | name | surname | address |
|---|---|---|---|
| 0 | Kevin | McCallistera | Chicago, IL |

| | name | surname | address |
|---|---|---|---|
| 0 | Kevin | McCallistera | 671 Lincoln Avenue, Chicago, IL 60614 |

# Accuracy




🌡 $\pm 1^{\circ}\mathrm{C}$



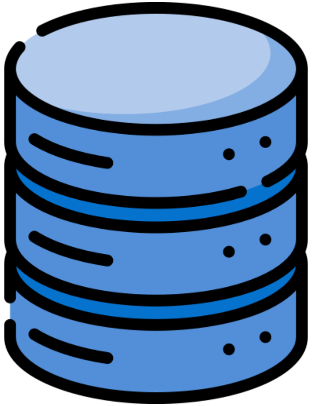

🌡 $\pm 0.5^{\circ}\mathrm{C}$

# Consistency


| | name | surname | address |
|---|---|---|---|
| 0 | Kevin | McCallistera | 671 Lincoln Avenue, Chicago |

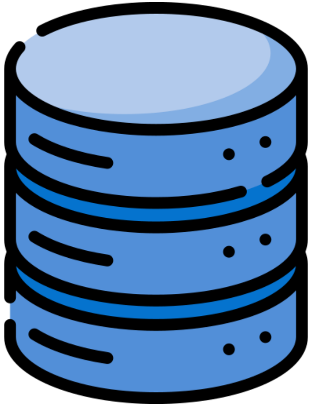
# Consistency

1



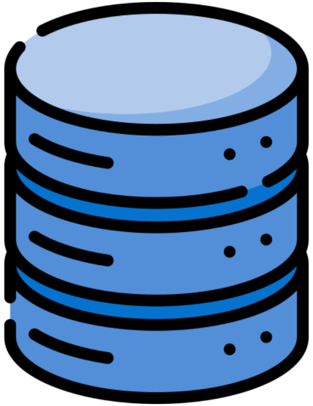
|   | name | surname | address |
|---|---|---|---|
| 0 | Kevin | McCallistera | 671 Lincoln Avenue, Chicago |

2



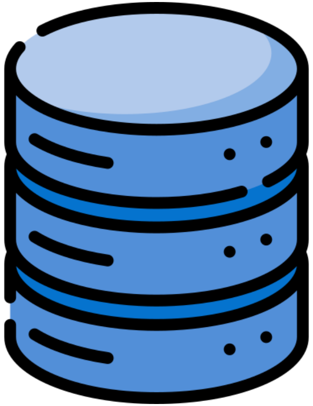
|   | name | surname | address |
|---|---|---|---|
| 0 | Kevin | McCallistera | 352 Lincoln Avenue, Chicago |

# Consistency



| | name | surname | age |
|---|---|---|---|
| 0 | Kevin | McCallistera | 13 |

# Consistency



| | name | surname | age | marital_status |
|---|---|---|---|---|
| 0 | Kevin | McCallistera | 13 | divorced |

# Completeness

| | price (PLN) | country | vintage | volume (liters) | kind | medals | wegan | natural | punctation |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 49.0 | Argentyna | 2021.0 | 0.75 | NaN | NaN | False | False | NaN |
| 1 | 75.0 | Węgry | 2019.0 | 0.75 | NaN | NaN | False | False | NaN |
| 2 | 99.0 | Hiszpania | 2018.0 | 0.75 | NaN | NaN | False | True | NaN |
| 3 | 1163.0 | Francja | 2019.0 | 0.75 | NaN | NaN | False | False | NaN |
| 4 | 128.0 | USA | 2018.0 | 0.75 | NaN | NaN | True | False | NaN |

# Presentation Quality

# Readability

| | name | weight | horsepower | model_year | col5 |
|---|---|---|---|---|---|
| 0 | chevrolet chevelle malibu | 3504 | 130.0 | 70 | 18.0 |
| 1 | buick skylark 320 | 3693 | 165.0 | 70 | 15.0 |
| 2 | plymouth satellite | 3436 | 150.0 | 70 | 18.0 |
| 3 | amc rebel sst | 3433 | 150.0 | 70 | 16.0 |
| 4 | ford torino | 3449 | 140.0 | 70 | 17.0 |

# Readability

| | name | weight | horsepower | model_year | fuel_consumption |
|---|---|---|---|---|---|
| 0 | chevrolet chevelle malibu | 3504 | 130.0 | 70 | 18.0 |
| 1 | buick skylark 320 | 3693 | 165.0 | 70 | 15.0 |
| 2 | plymouth satellite | 3436 | 150.0 | 70 | 18.0 |
| 3 | amc rebel sst | 3433 | 150.0 | 70 | 16.0 |
| 4 | ford torino | 3449 | 140.0 | 70 | 17.0 |

# Readability

l/100km (liters per 100km)

MPG (miles per gallon)

| | name | weight | horsepower | model_year | fuel_consumption |
|---|---|---|---|---|---|
| 0 | chevrolet chevelle malibu | 3504 | 130.0 | 70 | 18.0 |
| 1 | buick skylark 320 | 3693 | 165.0 | 70 | 15.0 |
| 2 | plymouth satellite | 3436 | 150.0 | 70 | 18.0 |
| 3 | amc rebel sst | 3433 | 150.0 | 70 | 16.0 |
| 4 | ford torino | 3449 | 140.0 | 70 | 17.0 |

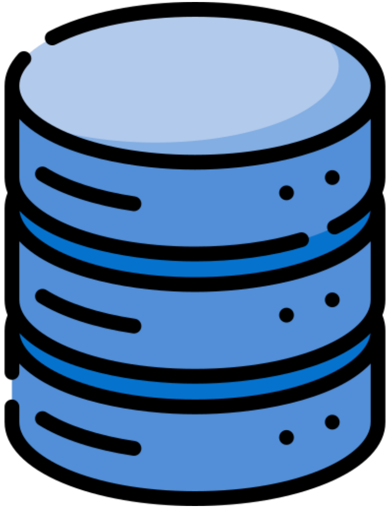
# Structure

## .csv, .tsv

```
"name","surname","email"
"Herminia","Marshall","herminia.marshall@example.com"
"Bernice","Richardson","bernice.richardson@example.com"
"Maeleachlainn","Albertson","maeleachlainn.albertson@example.com"
"Laloecen","Darwin","laloecen.darwin@example.com"
"Shib","Payton","shib.payton@example.com"
"Marcos","Bertolini","marcos.bertolini@example.com"
"Daniël","Teague","daniël.teague@example.com"
"Ikaros","Garber","ikaros.garber@example.com"
"Regulus","Cornell","regulus.cornell@example.com"
"Lars","Simen","lars.simen@example.com"
```

# Structure

SQL



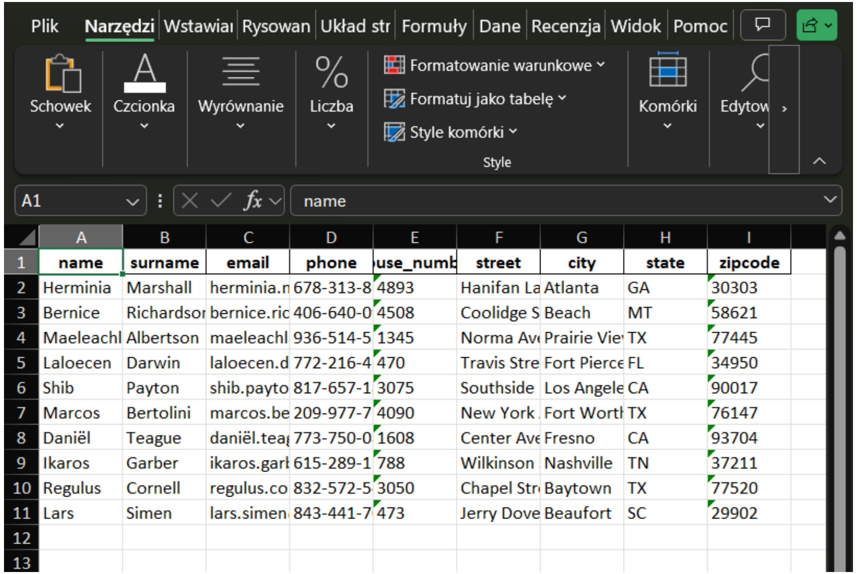
# Structure

## .json

```
{
    "name":{
        "0":"Herminia",
        "1":"Bernice",
        "2":"Maeleachlainn",
        "3":"Laloecen",
        "4":"Shib",
        "5":"Marcos",
        "6":"Dani\u00ebl",
        "7":"Ikaros",
        "8":"Regulus",
        "9":"Lars"
    },
    "surname":{
        "0":"Marshall",
        "1":"Richardson",
        "2":"Albertson",
        "3":"Darwin",
        "4":"Payton",
        "5":"Bertolini",
        "6":"Teague",
```

# Structure

## Excel

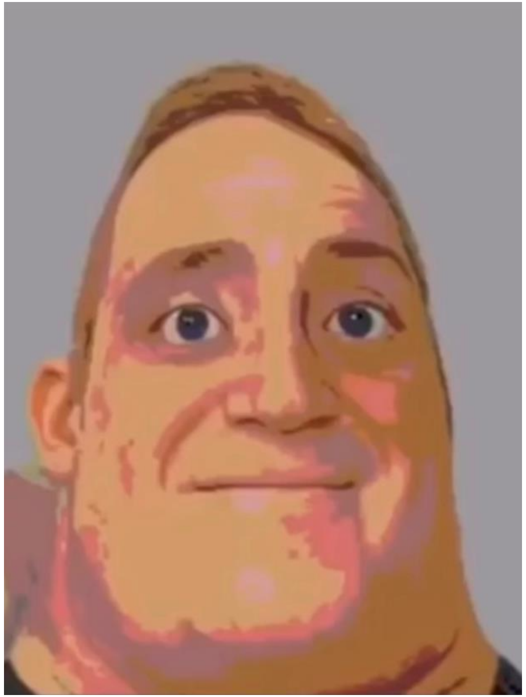



| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | name | surname | email | phone | use_numb | street | city | state | zipcode |
| 2 | Herminia | Marshall | herminia.n | 678-313-8 | 4893 | Hanifan La | Atlanta | GA | 30303 |
| 3 | Bernice | Richardsoı | bernice.ric | 406-640-0 | 4508 | Coolidge S | Beach | MT | 58621 |
| 4 | Maeleachl | Albertson | maeleachl | 936-514-5 | 1345 | Norma Av | Prairie Vie | TX | 77445 |
| 5 | Laloecen | Darwin | laloecen.d | 772-216-4 | 470 | Travis Stre | Fort Pierce | FL | 34950 |
| 6 | Shib | Payton | shib.payto | 817-657-1 | 3075 | Southside | Los Angele | CA | 90017 |
| 7 | Marcos | Bertolini | marcos.be | 209-977-7 | 4090 | New York | Fort Wortl | TX | 76147 |
| 8 | Daniël | Teague | daniël.tea | 773-750-0 | 1608 | Center Ave | Fresno | CA | 93704 |
| 9 | Ikaros | Garber | ikaros.garl | 615-289-1 | 788 | Wilkinson | Nashville | TN | 37211 |
| 10 | Regulus | Cornell | regulus.co | 832-572-5 | 3050 | Chapel Stre | Baytown | TX | 77520 |
| 11 | Lars | Simen | lars.simen | 843-441-7 | 473 | Jerry Dove | Beaufort | SC | 29902 |
| 12 | | | | | | | | | |
| 13 | | | | | | | | | |

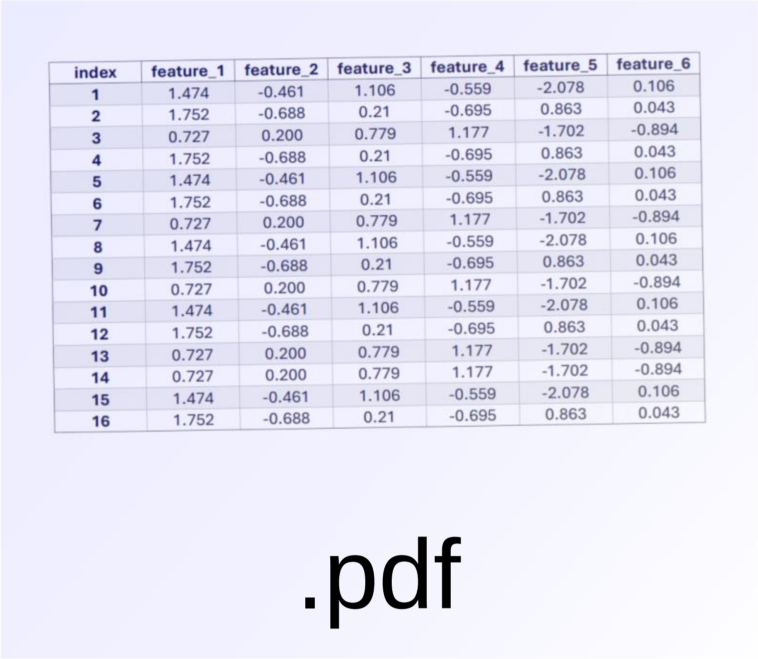
# Structure

| index | feature_1 | feature_2 | feature_3 | feature_4 | feature_5 | feature_6 |
|---|---|---|---|---|---|---|
| 1 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 2 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 3 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 4 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 5 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 6 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 7 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 8 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 9 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 10 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 11 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 12 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 13 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 14 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 15 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 16 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |

.pdf



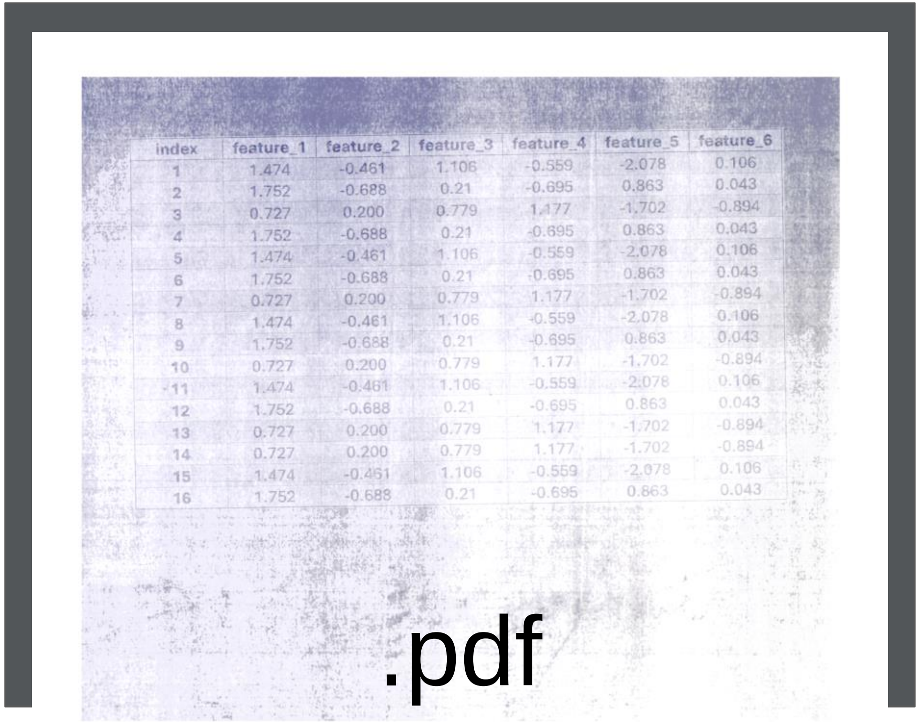
# Structure



| index | feature_1 | feature_2 | feature_3 | feature_4 | feature_5 | feature_6 |
|---|---|---|---|---|---|---|
| 1 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 2 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 3 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 4 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 5 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 6 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 7 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 8 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 9 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 10 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 11 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 12 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 13 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 14 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 15 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 16 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |

.pdf

# Structure

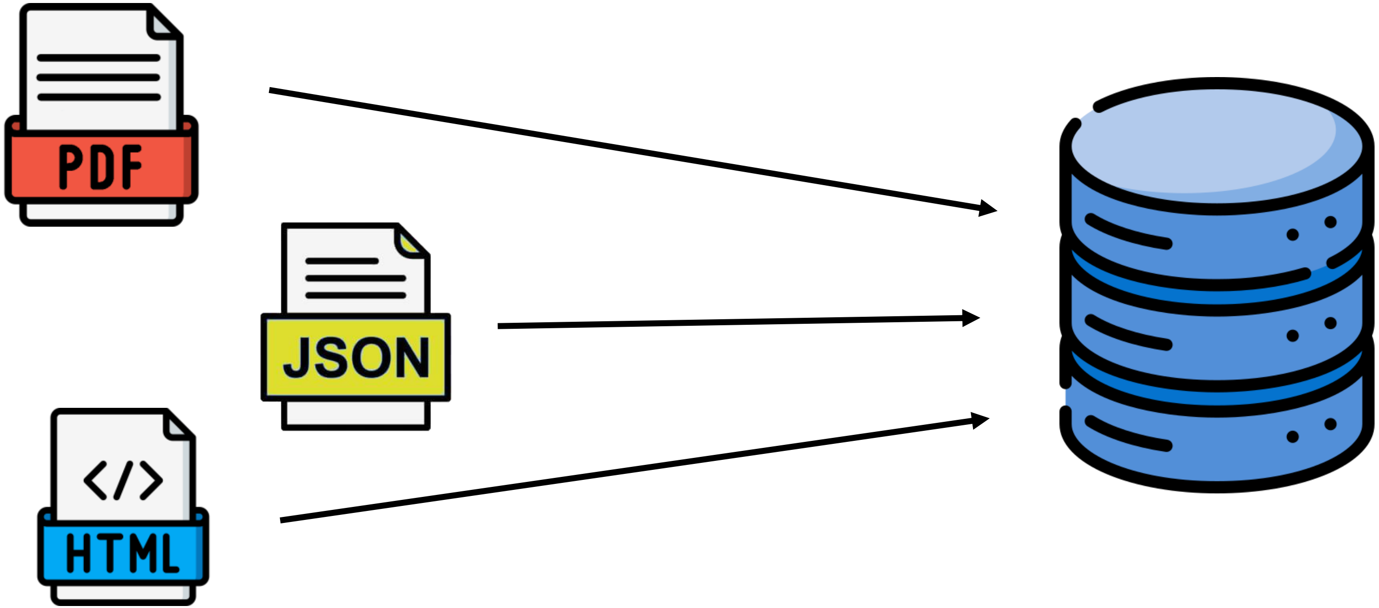


| index | feature_1 | feature_2 | feature_3 | feature_4 | feature_5 | feature_6 |
|---|---|---|---|---|---|---|
| 1 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 2 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 3 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 4 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 5 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 6 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 7 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 8 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 9 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 10 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 11 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 12 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |
| 13 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 14 | 0.727 | 0.200 | 0.779 | 1.177 | -1.702 | -0.894 |
| 15 | 1.474 | -0.461 | 1.106 | -0.559 | -2.078 | 0.106 |
| 16 | 1.752 | -0.688 | 0.21 | -0.695 | 0.863 | 0.043 |



# Data cleaning

# From unstructured data to structured data



# Removing irrelevant data

| | name | weight (lbs) | horsepower | model_year | mpg | link |
|---|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 75 | 24.0 | https://pl.wikipedia.org/wiki/Toyota_Corona |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 73 | 15.0 | https://pl.wikipedia.org/wiki/Chevrolet_Monte_... |
| 2 | opel manta | 2158 | 75.0 | 73 | 24.0 | https://pl.wikipedia.org/wiki/Opel_Manta |
| 3 | honda civic 1500 gl | 1850 | NaN | 80 | 44.6 | https://pl.wikipedia.org/wiki/Honda_Civic |
| 4 | chevrolet vega | 2401 | 72.0 | 73 | 21.0 | https://pl.wikipedia.org/wiki/Chevrolet_Vega |
| 5 | chevrolet vega | 2408 | 90.0 | 72 | 20.0 | https://pl.wikipedia.org/wiki/Chevrolet_Vega |

# Removing irrelevant data

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 75 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 73 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 73 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 80 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 73 | 21.0 |
| 5 | chevrolet vega | 2408 | 90.0 | 72 | 20.0 |

# Removing duplicates

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 75 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 73 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 73 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 80 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 73 | 21.0 |
| 5 | chevrolet vega | 2408 | 90.0 | 72 | 20.0 |

# Removing duplicates

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 75 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 73 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 73 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 80 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 73 | 21.0 |
| 5 | chevrolet vega | 2408 | 90.0 | 72 | 20.0 |

# Removing duplicates

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 75 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 73 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 73 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 80 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 73 | 21.0 |

# Type conversions

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 75 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 73 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 73 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 80 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 73 | 21.0 |

`numpy.int64`

# Type conversions

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 1975-01-01 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 1973-01-01 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 1973-01-01 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 1980-01-01 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 1973-01-01 | 21.0 |

`pandas._libs.tslibs.timestamps.Timestamp`

# Units conversion

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 1975-01-01 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 1973-01-01 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 1973-01-01 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 1980-01-01 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 1973-01-01 | 21.0 |

# Units conversion

pounds

mile per gallon

| | name | weight (lbs) | horsepower | model_year | mpg |
|---|---|---|---|---|---|
| 0 | toyota corona | 2702 | 96.0 | 1975-01-01 | 24.0 |
| 1 | chevrolet monte carlo s | 4082 | 145.0 | 1973-01-01 | 15.0 |
| 2 | opel manta | 2158 | 75.0 | 1973-01-01 | 24.0 |
| 3 | honda civic 1500 gl | 1850 | NaN | 1980-01-01 | 44.6 |
| 4 | chevrolet vega | 2401 | 72.0 | 1973-01-01 | 21.0 |

# Units conversion

kilograms

liters per 100 km

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Dealing with missing values

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Dealing with missing values

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Dealing with missing values

Delete

# Dealing with missing values

Delete or Impute

# Deleting rows

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Deleting columns

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Imputing value

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Mean

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Mean

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Mean

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | 97.0 | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

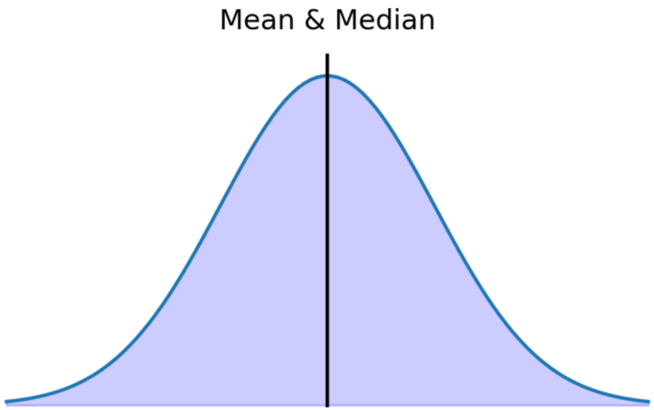
# Median

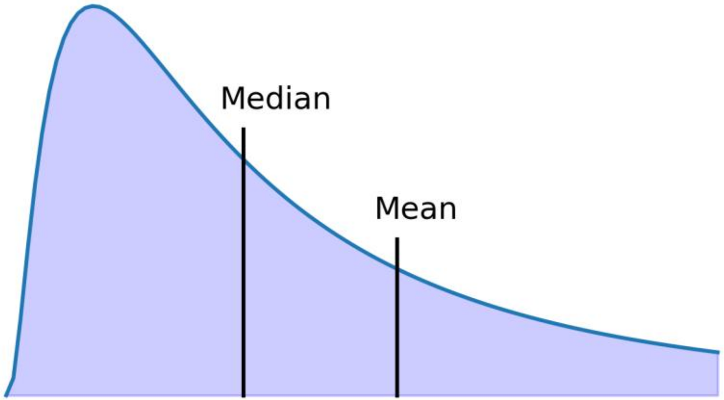
| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | NaN | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Median

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | 85.5 | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Mean vs. Median



# Generate random numbers

$\mu = 97$

| horsepower |
| --- |
| 96.0 |
| 145.0 |
| 75.0 |
| NaN |
| 72.0 |

# Generate random numbers

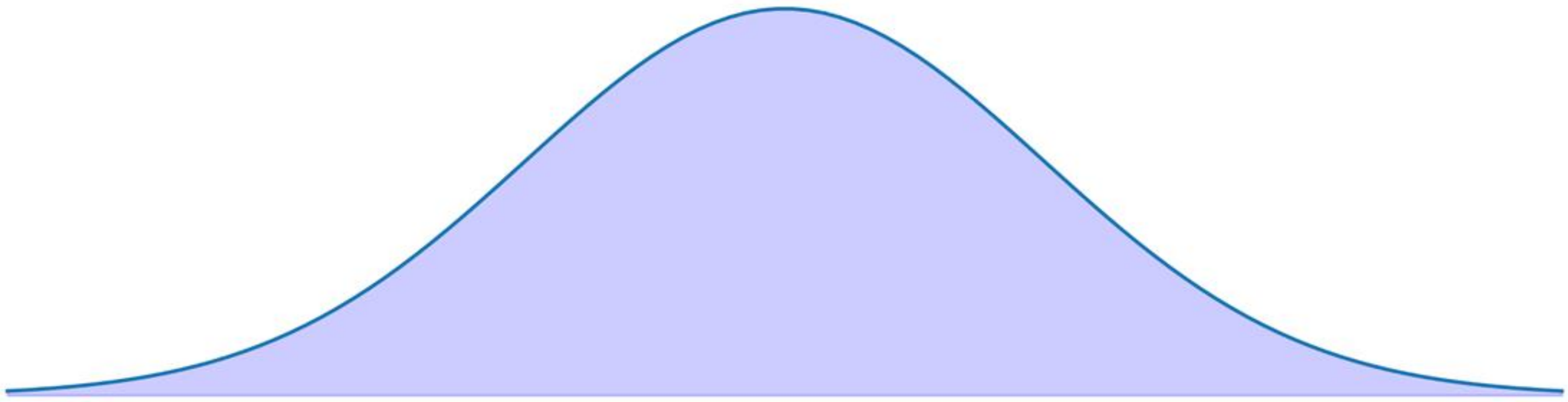
$\mu = 97$

$\sigma = 34$

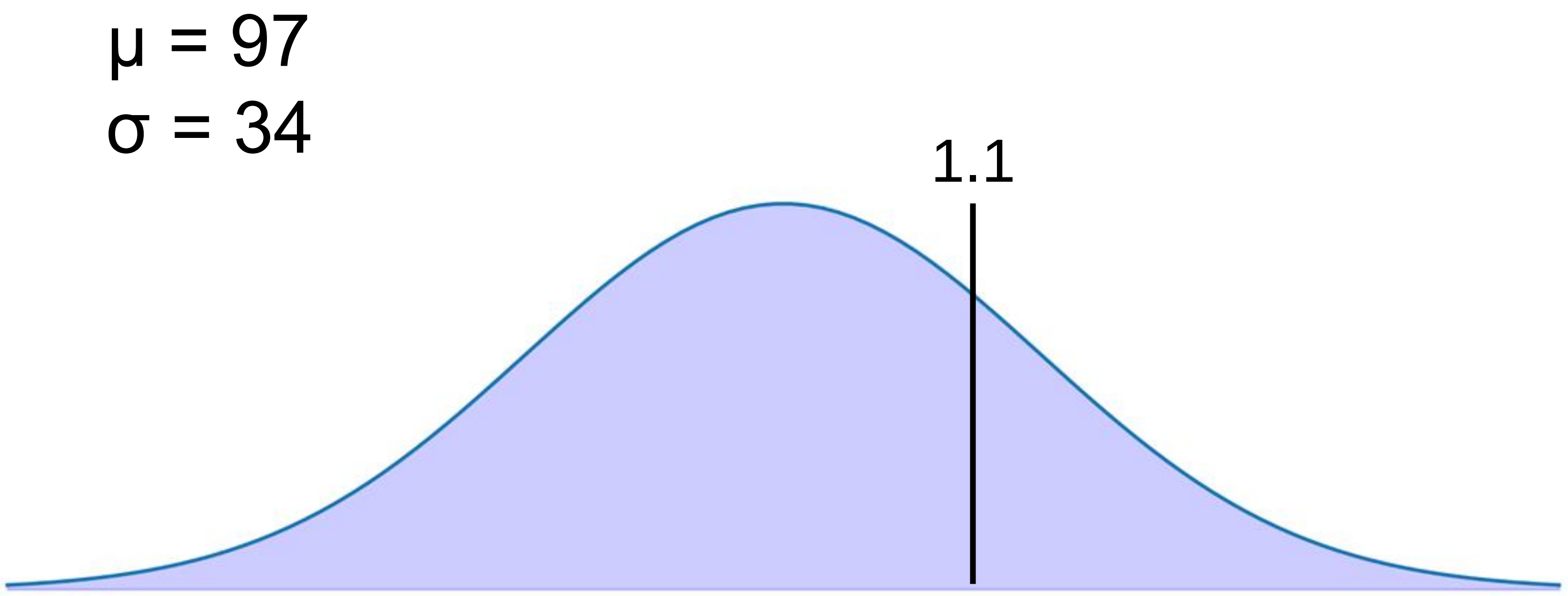
| horsepower |
| --- |
| 96.0 |
| 145.0 |
| 75.0 |
| NaN |
| 72.0 |

# Generate random numbers

$\mu = 97$
$\sigma = 34$



# Generate random numbers



# Linear regression

| weight (kg) | horsepower | model_year | l/100km |
| --- | --- | --- | --- |
| 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 839.1 | NaN | 1980-01-01 | 5.27 |
| 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Linear regression

training features

| weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|
| 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 839.1 | NaN | 1980-01-01 | 5.27 |
| 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Linear regression

training features
training targets

| weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|
| 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 839.1 | NaN | 1980-01-01 | 5.27 |
| 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Linear regression

training features
training targets

features for prediction

| weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|
| 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 839.1 | NaN | 1980-01-01 | 5.27 |
| 1089.1 | 72.0 | 1973-01-01 | 11.20 |

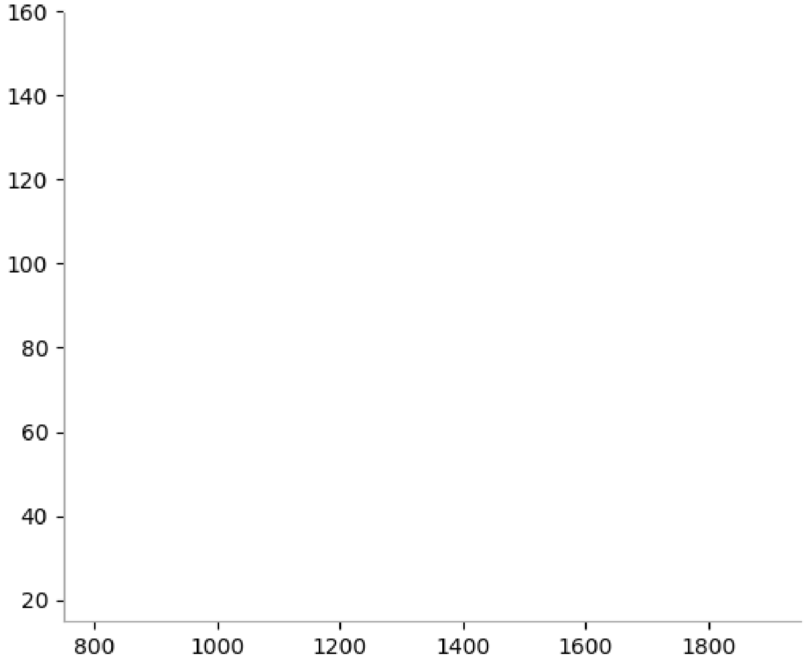
# Linear regression

training features
training targets

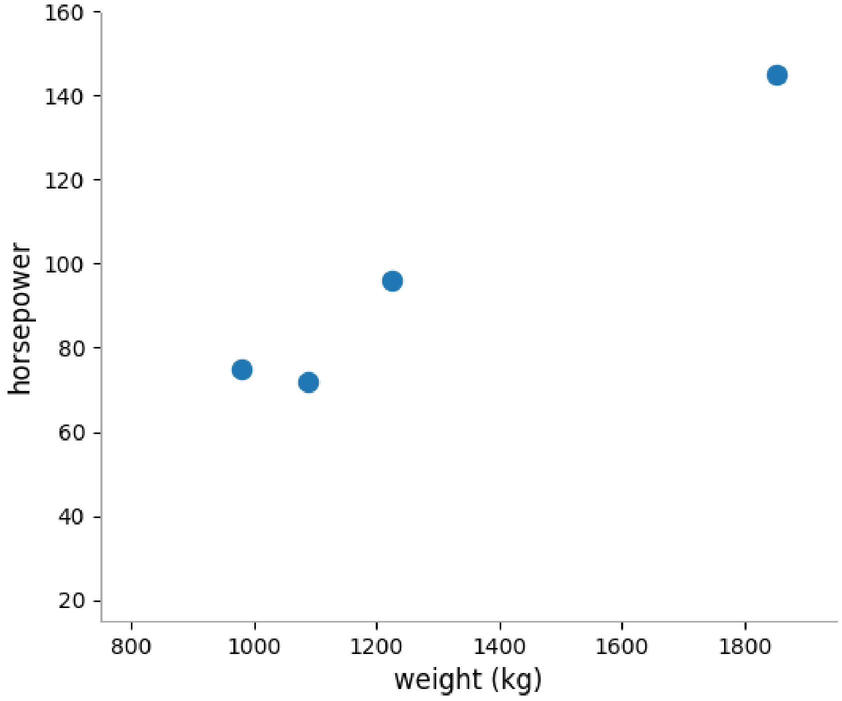
features for prediction
missing values

| weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|
| 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 839.1 | NaN | 1980-01-01 | 5.27 |
| 1089.1 | 72.0 | 1973-01-01 | 11.20 |

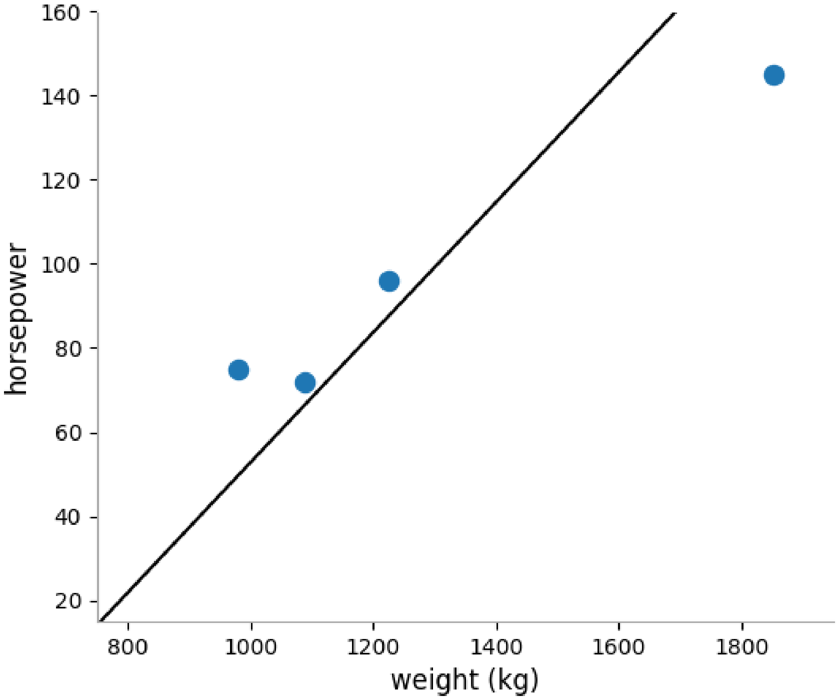
# Linear regression



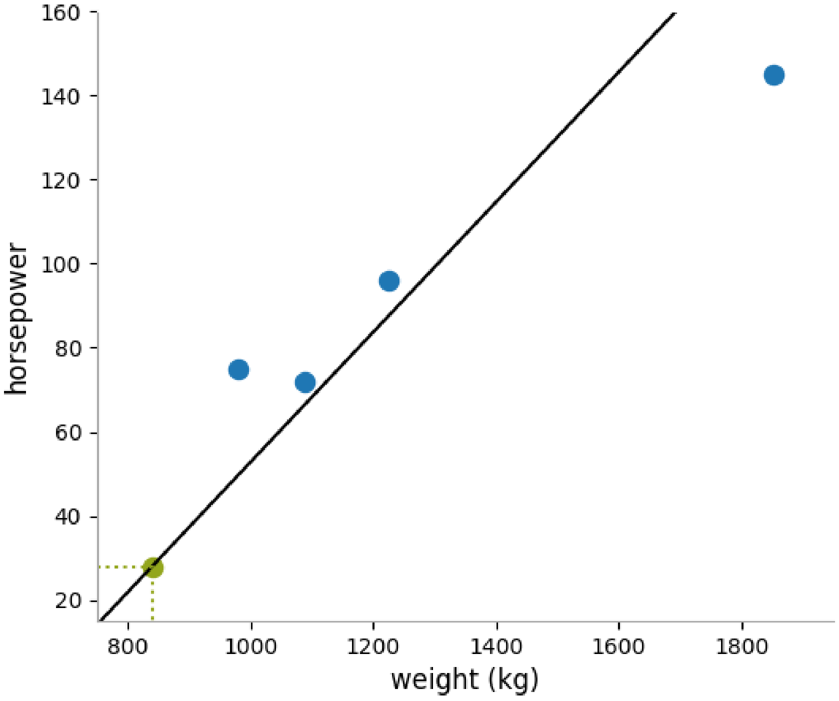
# Linear regression



# Linear regression



# Linear regression



# Linear regression

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | 27.9 | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# Flags

| | name | weight (kg) | horsepower | model_year | l/100km |
|---|---|---|---|---|---|
| 0 | toyota corona | 1225.6 | 96.0 | 1975-01-01 | 9.80 |
| 1 | chevrolet monte carlo s | 1851.6 | 145.0 | 1973-01-01 | 15.68 |
| 2 | opel manta | 978.9 | 75.0 | 1973-01-01 | 9.80 |
| 3 | honda civic 1500 gl | 839.1 | missing | 1980-01-01 | 5.27 |
| 4 | chevrolet vega | 1089.1 | 72.0 | 1973-01-01 | 11.20 |

# References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