HOCHSCHULE DER MEDIEN

Seaborn

Introduction

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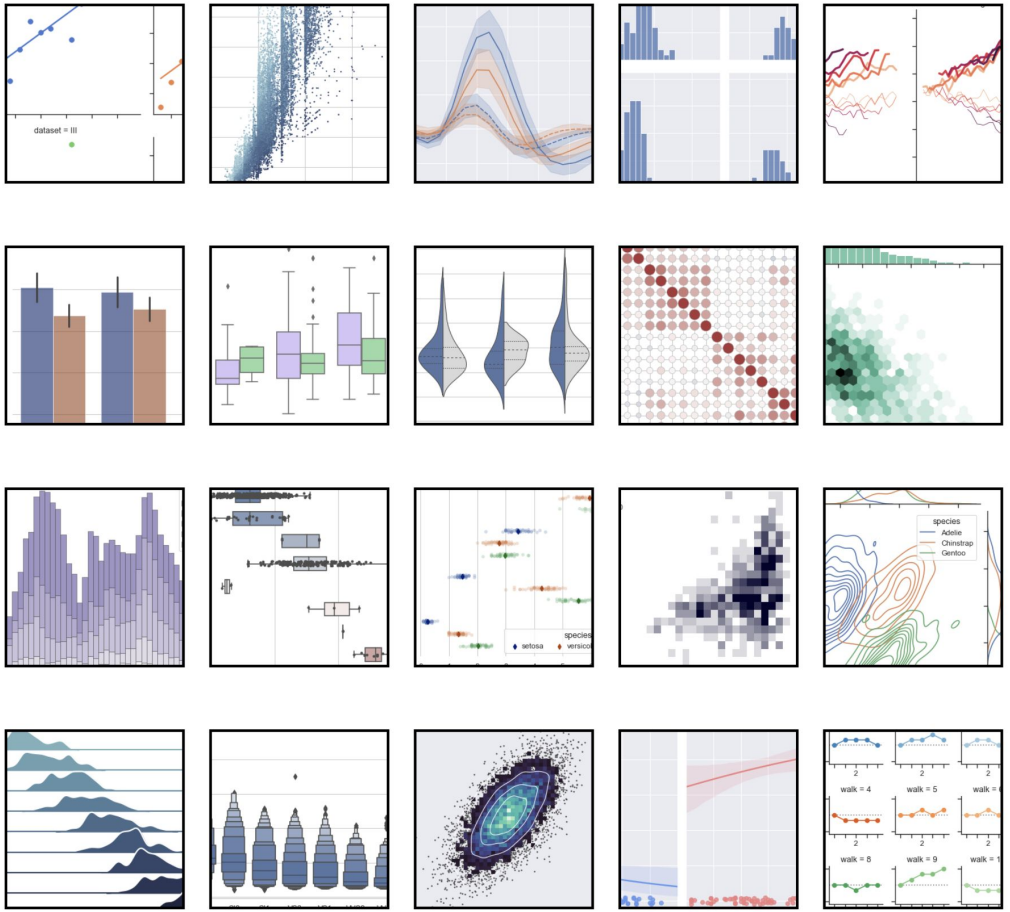
Seaborn helps you explore and understand your data

seaborn


dataset = III
species
Adelie
Chinstrap
Gentoo
setosa
walk = 4
walk = 5
walk = 8
walk = 9

We use Jupyter Notebooks with this Setup

Magic command:

%matplotlib inline

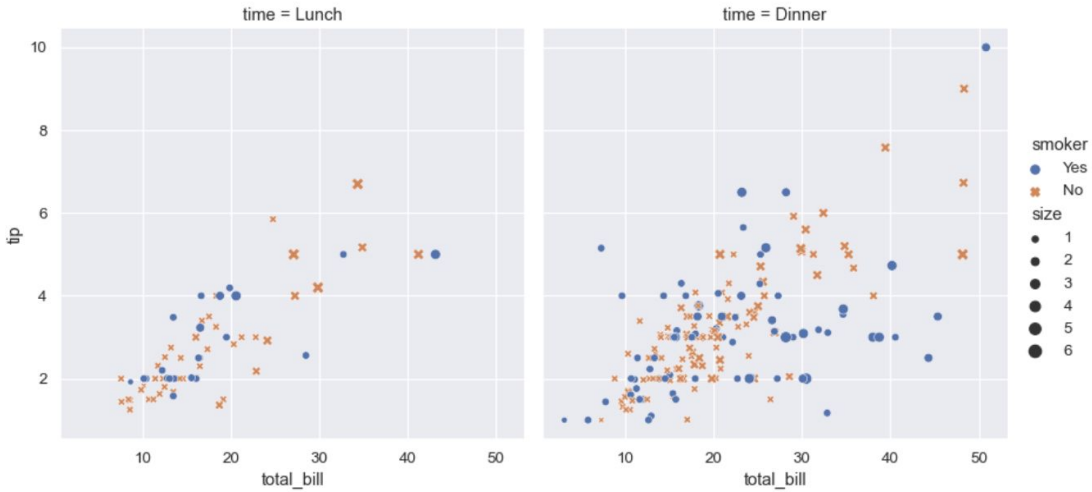
Our first seaborn plot

```python
# Import seaborn
import seaborn as sns

# Apply the default theme
sns.set_theme()

# Load an example dataset
tips = sns.load_dataset("tips")

# Create a visualization
sns.relplot(
    data=tips,
    x="total_bill", y="tip", col="time",
    hue="smoker", style="smoker", size="size",
)
```



Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

Import the library seaborn as **sns**

```
# Import seaborn
import seaborn as sns
```

```
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# Create a visualization
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    data=tips,
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    hue="smoker", style="smoker", size="size",
)
```

- Seaborn is the only library we need to **import**
- By convention, it is imported with the shorthand **sns**.

Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

Apply the default **theme**

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# Load an example dataset
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# Create a visualization
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    x="total_bill", y="tip", col="time",
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)
```

- This will affect your plot look
- There are different seaborn **themes** like darkgrid, whitegrid, dark, white, and ticks.

Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

We load the example **dataset** tips

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# Create a visualization
sns.relplot(
    data=tips,
    x="total_bill", y="tip", col="time",
    hue="smoker", style="smoker", size="size",
)
```

- Most examples use **pandas dataframes** (tabular format like spreadsheets)
- Seaborne can use many data structures
- Dataset tips:

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

The **relplot** function plots relationships

```
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# Create a visualization
sns.relplot(
    data=tips,
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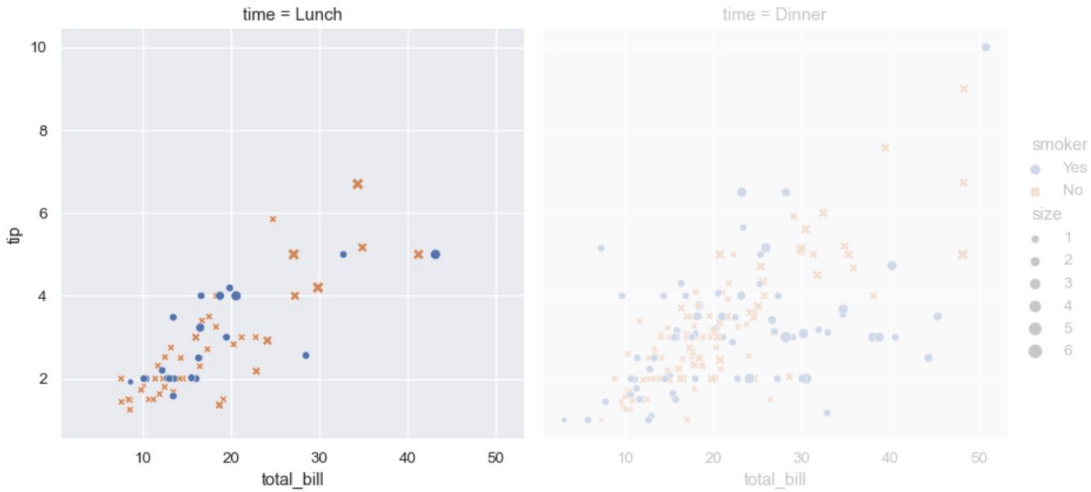
)
```

- **relplot** shows the **relationship** between two variables (total_bill and tip)



Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

Provide the name of the **dataset**

```
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# Load an example dataset
tips = sns.load_dataset("tips")

# Create a visualization
sns.relplot(
    data=tips,
    x="total_bill", y="tip", col="time",
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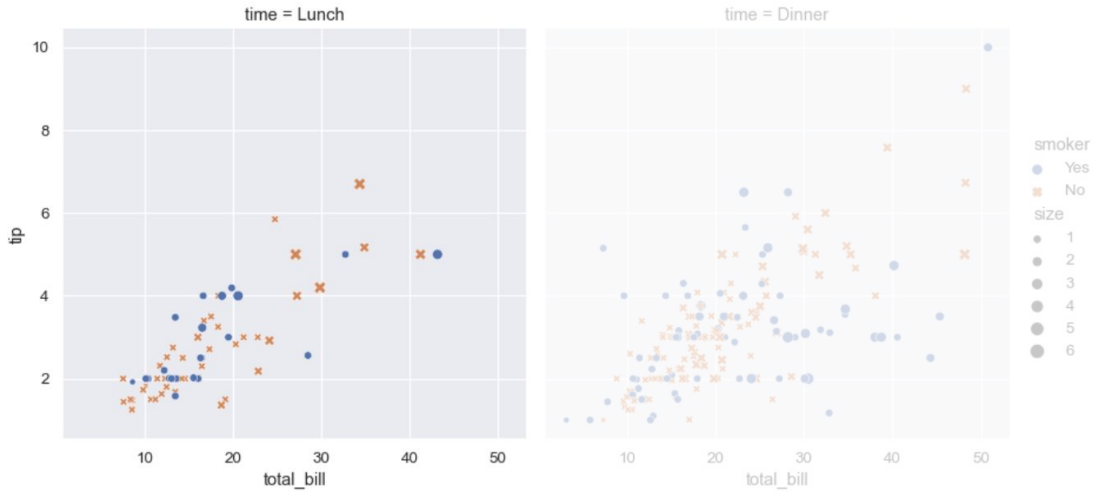
)
```

- Usually this is the name of your pandas dataframe object



Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

Provide the name of the **x** and **y** variables

```
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# Create a visualization
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    data=tips,
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)
```

- These are the main variables for our plot: x = total_bill and y = tip

Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

Use **col** to create multiple plots next to each other

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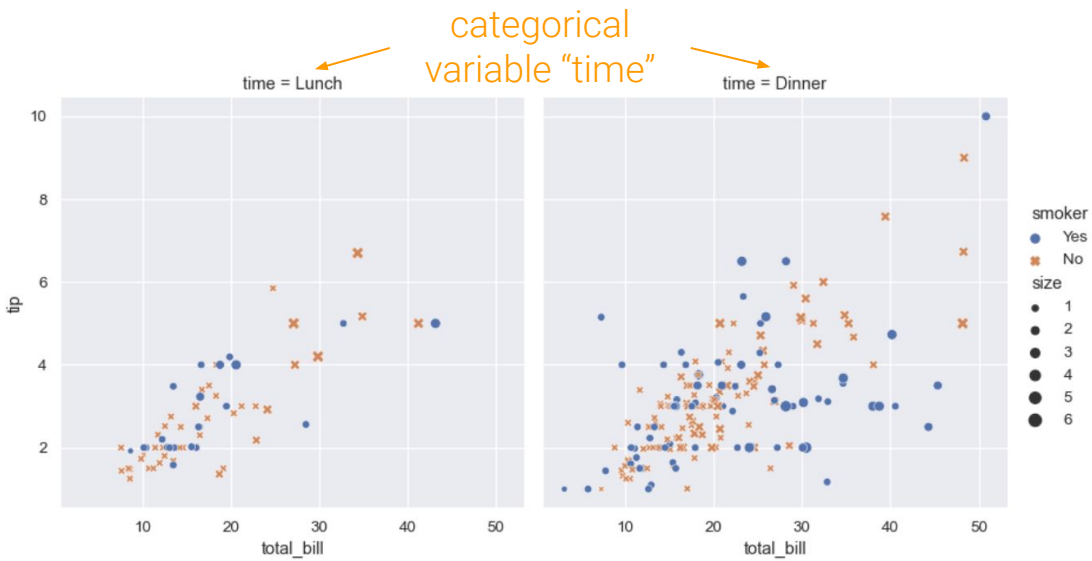
# Create a visualization
sns.relplot(
    data=tips,
    x="total_bill", y="tip", col="time",
    hue="smoker", style="smoker", size="size",
)
```

- We can use **col** (column) to include a categorical variable with different conditions



Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

hue uses colour encoding

```
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# Load an example dataset
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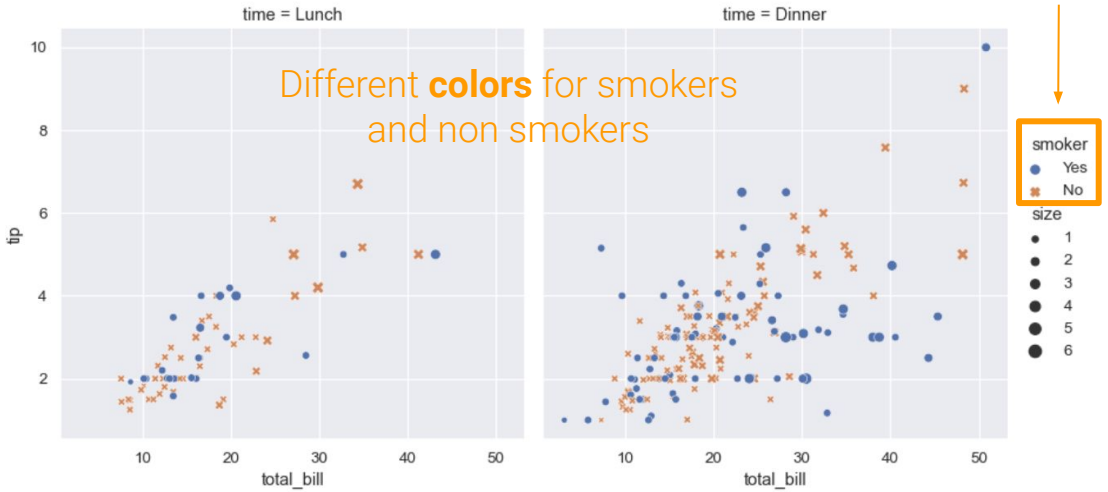
# Create a visualization
sns.relplot(
    data=tips,
    x="total_bill", y="tip", col="time",
    hue="smoker", style="smoker", size="size",
)
```

- Assigning a variable to **hue** will map its levels to the color of the points.

variable "smoker"



Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

style changes the markers

```
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# Apply the default theme
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# Load an example dataset
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# Create a visualization
sns.relplot(
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    hue="smoker", style="smoker", size="size",
)
```

- Assigning the same variable to **style** will also vary the **markers** and create a more accessible plot (you can also use a new variable)

variable "smoker"

Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

size changes the size of our markers

```
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# Apply the default theme
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# Load an example dataset
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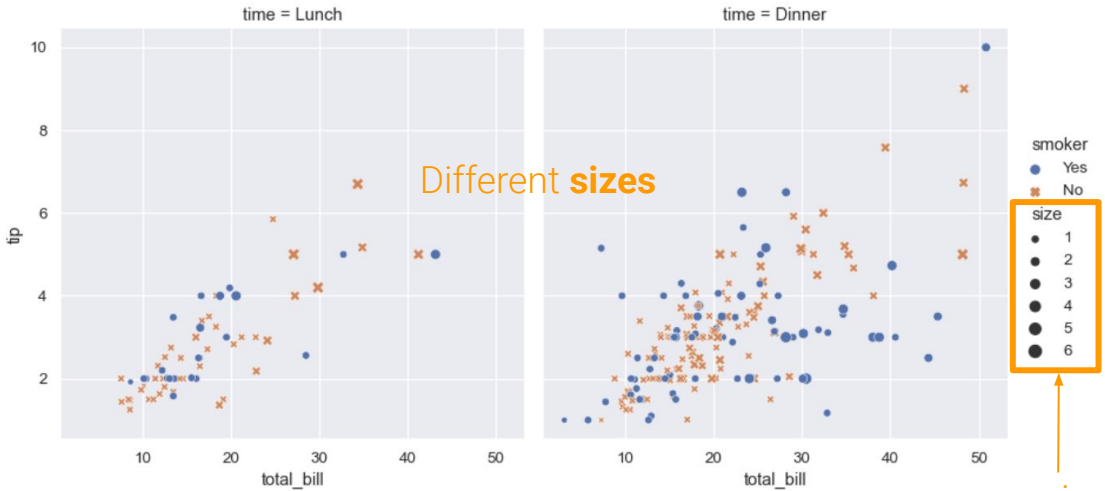
# Create a visualization
sns.relplot(
    data=tips,
    x="total_bill", y="tip", col="time",
    hue="smoker", style="smoker", size="size",
)
```

- **Size** uses numerical data to present the observations in different sizes



Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

There are five variables in one plot!

```
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# Apply the default theme
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# Load an example dataset
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# Create a visualization
sns.relplot(
    data=tips,
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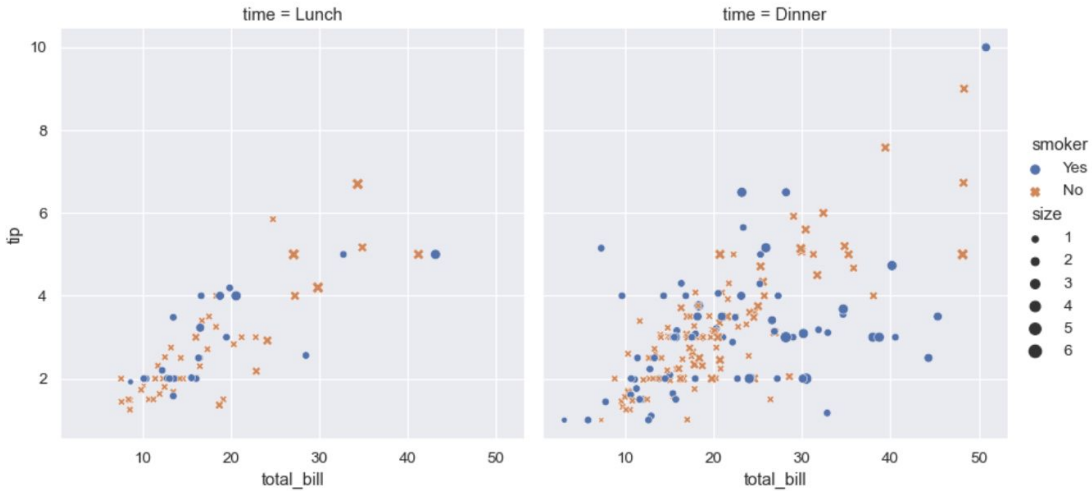
)
```

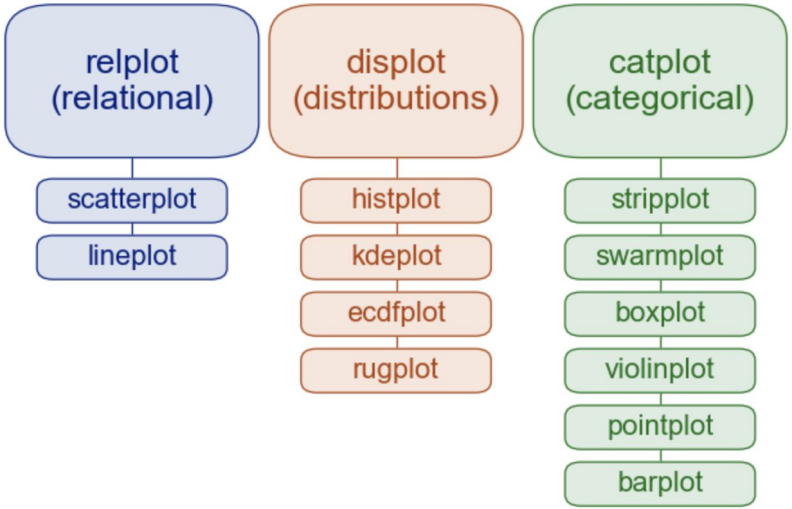


Source: Seaborn documentation http://seaborn.pydata.org/introduction.html

Similar functions
for similar tasks

Similar functions for similar tasks

- Relational plots
- Distribution plots
- Categorical plots
- Regression plots
- Matrix plots
- Multi-plot grids
  - Facet grids (conditional relationships)
  - Pair grids (pairwise relationships)
  - Joint grids



Source: Seaborn documentation https://seaborn.pydata.org/tutorial/function_overview.htm

Relational plots

Relational plots

`relplot`	Figure-level interface for drawing relational plots onto a FacetGrid.
`scatterplot`	Draw a scatter plot with possibility of several semantic groupings.
`lineplot`	Draw a line plot with possibility of several semantic groupings.

Source: Seaborn documentation: https://seaborn.pydata.org/index.html

Relational plots

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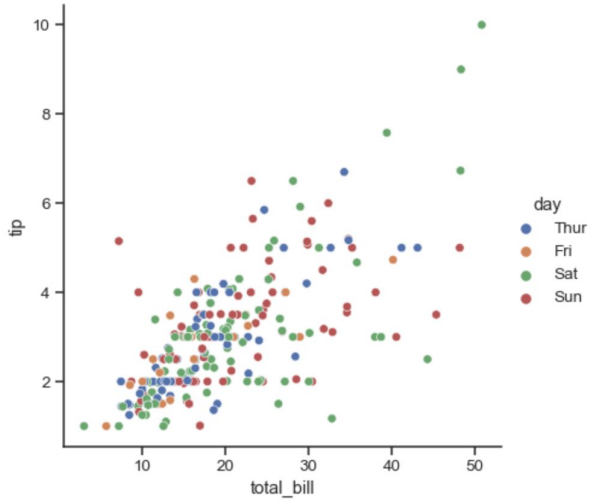
	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

```
sns.relplot(data=tips, x="total_bill", y="tip", hue="day")
```



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	total_bill	tip	sex	smoker	day	time	size
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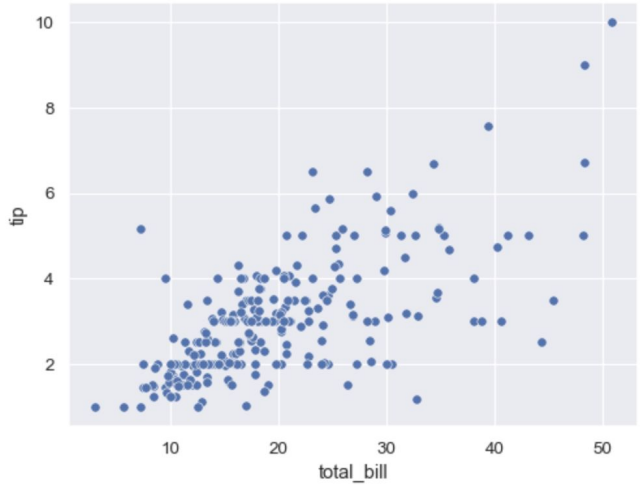
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

```
sns.scatterplot(data=tips, x="total_bill", y="tip")
```



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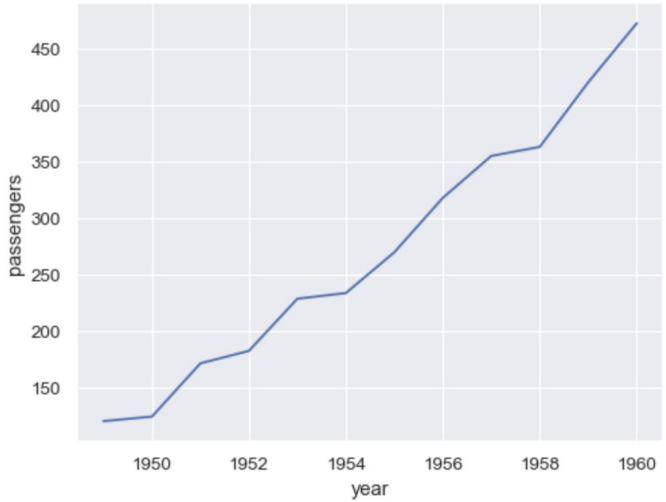
	year	month	passengers
0	1949	Jan	112
1	1949	Feb	118
2	1949	Mar	132
3	1949	Apr	129
4	1949	May	121

To draw a line plot using long-form data, assign the `x` and `y` variables:

```
may_flights = flights.query("month == 'May'")
sns.lineplot(data=may_flights, x="year", y="passengers")
```



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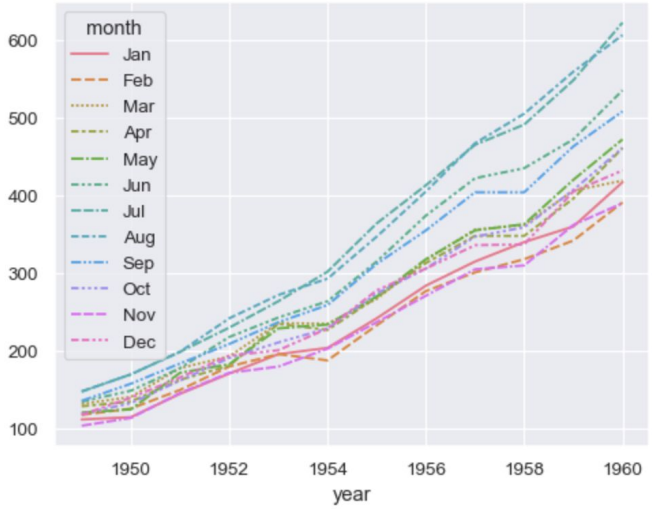
Pivot the dataframe to a wide-form representation:

```
flights_wide = flights.pivot("year", "month", "passengers")
flights_wide.head()
```

month year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1949	112	118	132	129	121	135	148	148	136	119	104	118
1950	115	126	141	135	125	149	170	170	158	133	114	140
1951	145	150	178	163	172	178	199	199	184	162	146	166
1952	171	180	193	181	183	218	230	242	209	191	172	194
1953	196	196	236	235	229	243	264	272	237	211	180	201

Passing the entire wide-form dataset to `data` plots a separate line for each column:

```
sns.lineplot(data=flights_wide)
```



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Distribution plots

Distribution plots

`displot`	Figure-level interface for drawing distribution plots onto a FacetGrid.
`histplot`	Plot univariate or bivariate histograms to show distributions of datasets.
`kdeplot`	Plot univariate or bivariate distributions using kernel density estimation.
`ecdfplot`	Plot empirical cumulative distribution functions.
`rugplot`	Plot marginal distributions by drawing ticks along the x and y axes.
`distplot`	DEPRECATED: Flexibly plot a univariate distribution of observations.

Distribution plots

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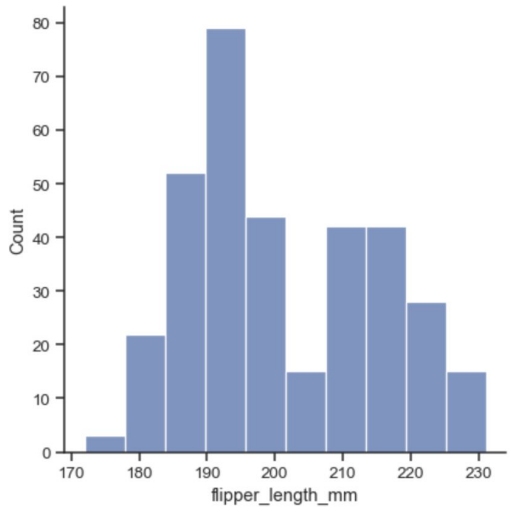
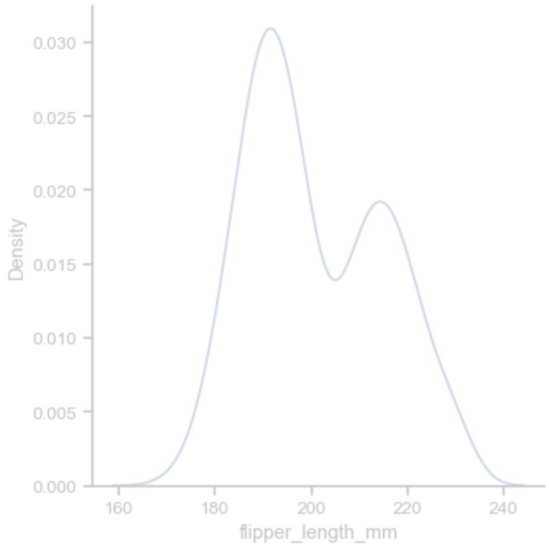
```
penguins = sns.load_dataset("penguins")
sns.displot(data=penguins, x="flipper_length_mm")
```




```
sns.displot(data=penguins, x="flipper_length_mm", kind="kde")
```




```
sns.displot(data=penguins, x="flipper_length_mm", kde=True)
```

Distribution plots

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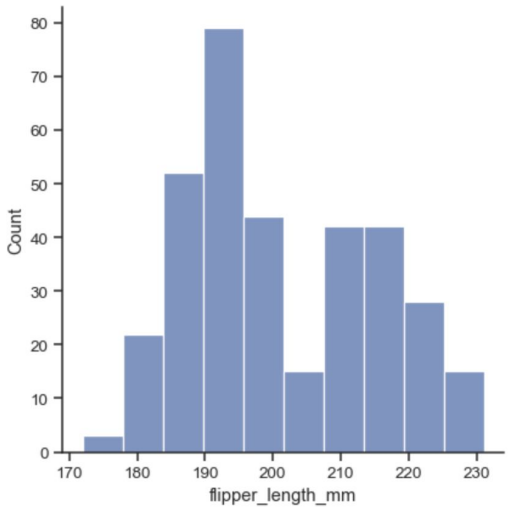
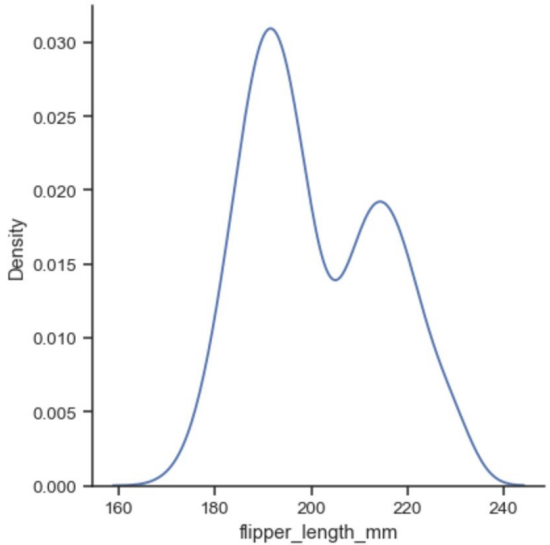



```
sns.displot(data=penguins, x="flipper_length_mm", kind="kde")
```




```
sns.displot(data=penguins, x="flipper_length_mm", kde=True)
```

Distribution plots

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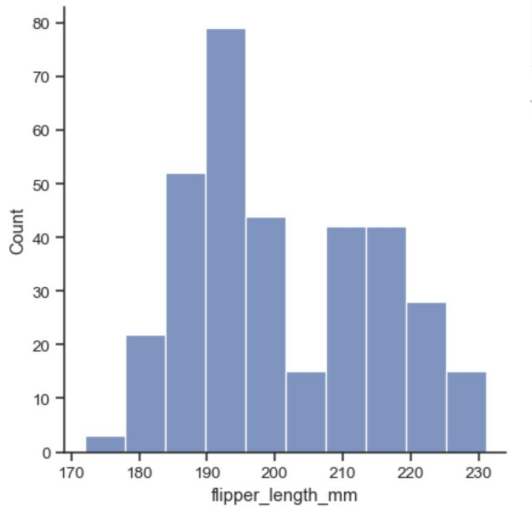
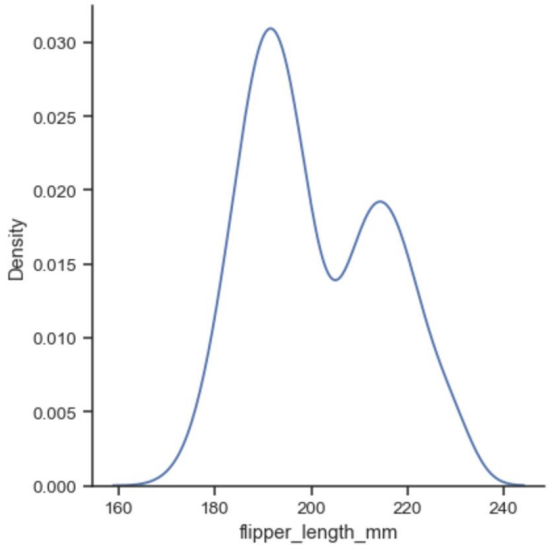
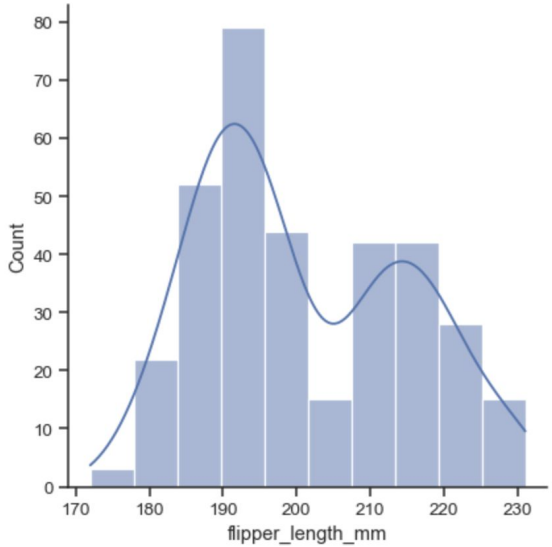



```
sns.displot(data=penguins, x="flipper_length_mm", kind="kde")
```




```
sns.displot(data=penguins, x="flipper_length_mm", kde=True)
```



Distribution plots

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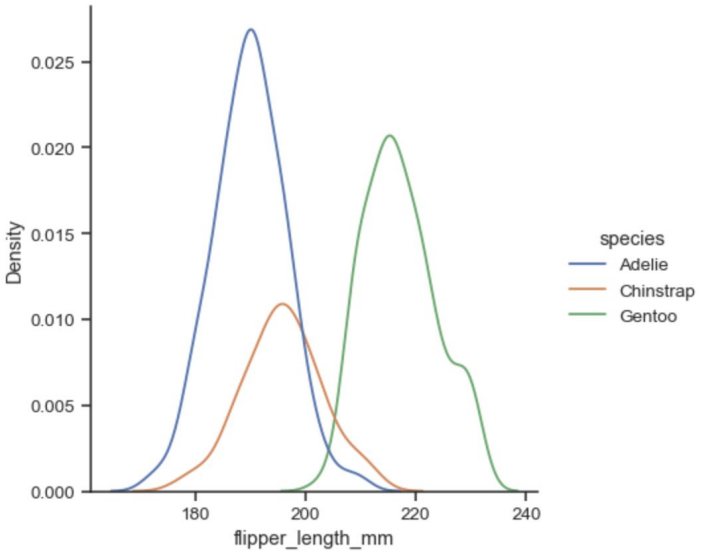
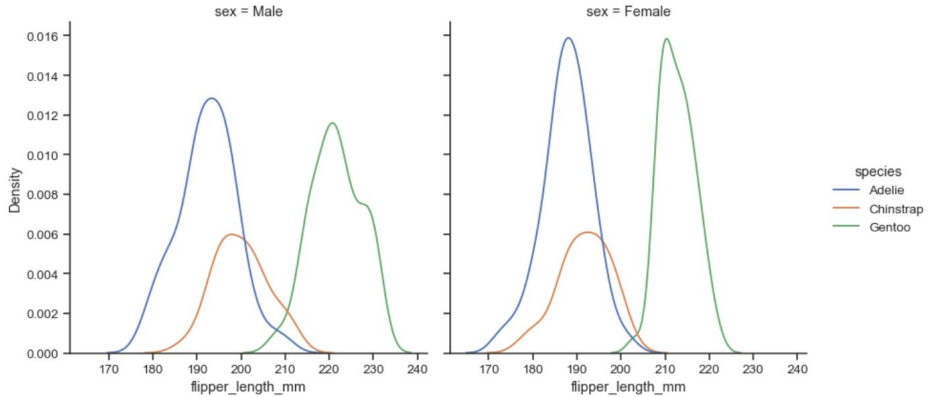
`histplot`	Plot univariate or bivariate histograms to show distributions of datasets.

```
sns.displot(data=penguins, x="flipper_length_mm", hue="species", kind="kde")
```




```
sns.displot(data=penguins, x="flipper_length_mm", hue="species", col="sex", kind="kde")
```



Distribution plots

`displot`	Figure-level interface for drawing distribution plots onto a FacetGrid.
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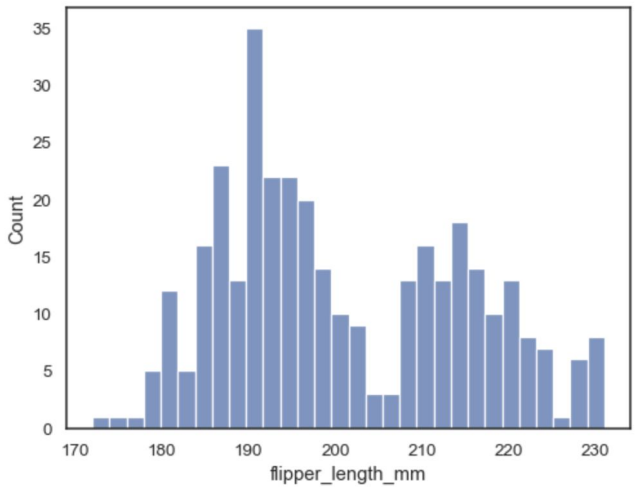
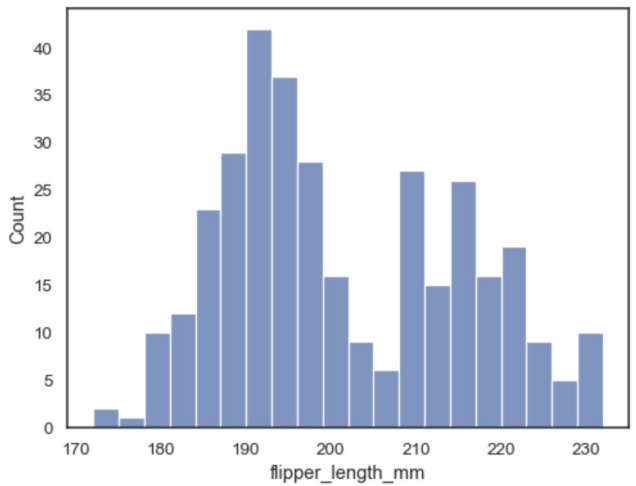
`kdeplot`	Plot univariate or bivariate distributions using kernel density estimation.

```
sns.histplot(data=penguins, x="flipper_length_mm", bins=30)
```




```
sns.histplot(data=penguins, x="flipper_length_mm", binwidth=3)
```



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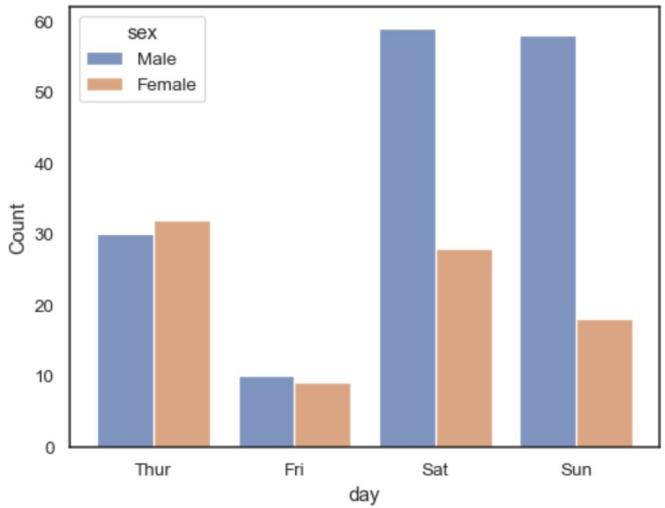
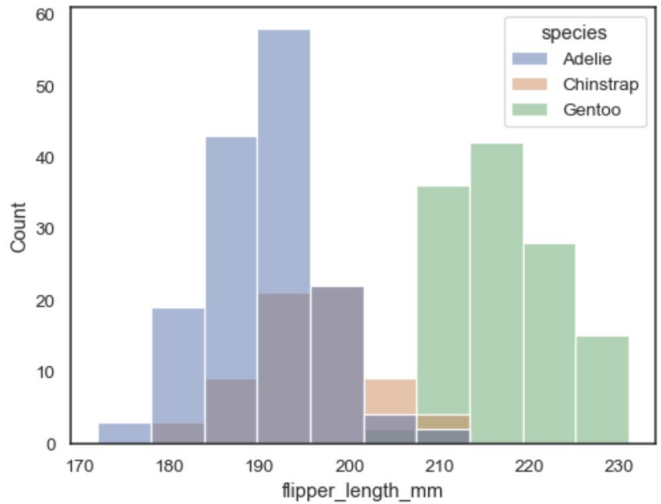
```
sns.histplot(data=tips, x="day", hue="sex", multiple="dodge", shrink=.8)
```




```
sns.histplot(data=penguins, x="flipper_length_mm", hue="species")
```



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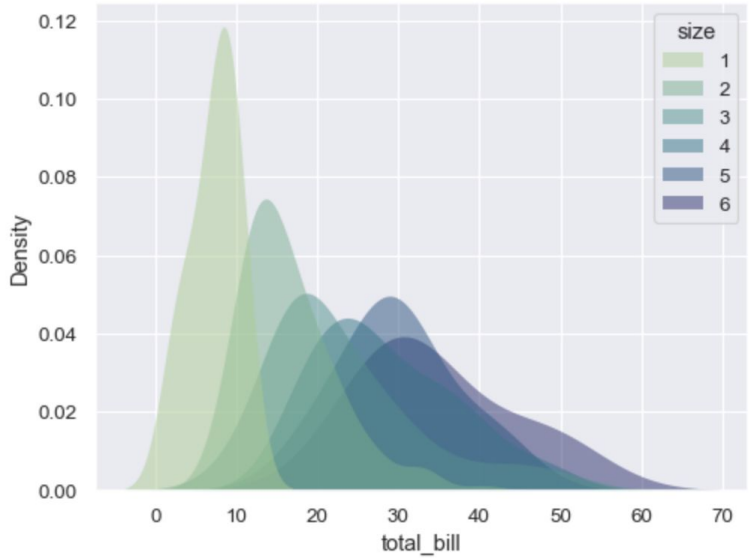
`kdeplot`	Plot univariate or bivariate distributions using kernel density estimation.
`ecdfplot`	Plot empirical cumulative distribution functions.
`rugplot`	Plot marginal distributions by drawing ticks along the x and y axes.
`distplot`	DEPRECATED: Flexibly plot a univariate distribution of observations.

```
sns.kdeplot(
   data=tips, x="total_bill", hue="size",
   fill=True, common_norm=False, palette="crest",
   alpha=.5, linewidth=0,
)
```



Categorical plots

Categorical plots

`catplot`	Figure-level interface for drawing categorical plots onto a FacetGrid.
`stripplot`	Draw a scatterplot where one variable is categorical.
`swarmplot`	Draw a categorical scatterplot with non-overlapping points.
`boxplot`	Draw a box plot to show distributions with respect to categories.
`violinplot`	Draw a combination of boxplot and kernel density estimate.
`boxenplot`	Draw an enhanced box plot for larger datasets.
`pointplot`	Show point estimates and confidence intervals using scatter plot glyphs.
`barplot`	Show point estimates and confidence intervals as rectangular bars.
`countplot`	Show the counts of observations in each categorical bin using bars.