In this notebook we have a first look at the data set given.

```
begin
    using Pkg
    Pkg.activate(joinpath(Pkg.devdir(), "MLCourse"))
    using CSV, DataFrames, Distributions, Plots, MLJ, MLJLinearModels, Random,
OpenML
end
```

Exploration

We load the precipitation training data from a csv file on the harddisk to a DataFrame. Our goal is to predict whether there is some precipitation (rain, snow etc.) on the next day in Pully, getting measurements from different weather stations in Switzerland.

Training data properties

```
precipitation_training =
```

	ABO_radiation_1	ABO_delta_pressure_1	ABO_air_temp_1	ABO_sunshine_1	ABO_win
1	-0.166667	-1.2	-5.68333	0.0	2.08333
2	0.333333	0.2	5.16667	0.0	1.43333
3	3.83333	-0.3	9.61667	0.0	1.35
4	16.5	-0.3	6.16667	33.0	0.983333
5	4.66667	-0.1	9.3	0.0	3.9
6	5.33333	-0.6	9.01667	0.0	7.6
7	1.16667	missing	0.0333333	0.0	2.46667
8	9.83333	0.3	7.38333	0.0	7.98333
9	1.66667	-0.3	-0.75	0.0	1.98333
10	10.1667	-1.2	4.81667	0.0	1.8
⋮	more				
3176	17.3333	0.1	14.9333	28.0	4.48333

```
precipitation_training = CSV.read(joinpath(@__DIR__, "..", "data", "project",
"trainingdata.csv"), DataFrame)
```

```
p_training =
```

	variable	mean	min	median	max	nmissing	
1	:ABO_radiation_1	6.25181	-1.66667	2.83333	40.1667	1	Union{M
2	:ABO_delta_pressure_1	-0.51594	-8.0	-0.5	8.8	58	Union{M
3	:ABO_air_temp_1	4.3429	-21.1833	4.88333	24.7	3	Union{M
4	:ABO_sunshine_1	5.95274	0.0	0.0	79.0	2	Union{M
5	:ABO_wind_1	3.69496	0.0	2.05	41.4	11	Union{M
6	:ABO_wind_direction_1	209.203	0.0	225.0	333.0	11	Union{M
7	:ALT_radiation_1	4.66535	-1.66667	1.16667	36.3333	0	Float64
8	:ALT_delta_pressure_1	-0.168485	-10.9	-0.2	10.0	60	Union{M
9	:ALT_air_temp_1	8.26916	-12.8667	8.75	26.9667	0	Float64
10	:ALT_sunshine_1	3.23339	0.0	0.0	51.0	1	Union{M
⋮	more						
529	:precipitation_nextday	0.426322	false	0.0	true	0	Bool

```
p_training = describe(precipitation_training)
```

	variable	mean	min	median	max	nmissing	eltype
1	:ALT_sunshine_4	0.0	0.0	0.0	0.0	0	Float64

```
p_training[p_training.mean .== 0, :]
```

```
(3176, 529)
```

```
size(precipitation_training)
```

```
#dropmissing!(precipitation_training)  #by using this command, it will remove all
the rows containing missing values. We see that it remove 1477 rows.
```

The training data contains:

- 3176 observations
- 529 predictors

The values of variables are Float64, and the value of y is a boolean. There are some missing values in the variables. We will replace them as remove them delete 1477 observations.

Comparison with the other data sets

Sample submission example

precipitation_ss =

	id	precipitation_nextday
1	1	0.564894
2	2	0.560655
3	3	0.777565
4	4	0.968714
5	5	0.110537
6	6	0.344311
7	7	0.831808
8	8	0.508994
9	9	0.558186
10	10	0.57066
⋮ more		
1200	1200	0.426492

```
precipitation_ss = CSV.read(joinpath(@__DIR__, "..", "data", "project",
"sample_submission.csv"), DataFrame)
```

```
(1200, 2)
```

```
size(precipitation_ss)
```

The 2 predictors correspond to the id and the preciptation_nextday columns. As the id does not count in the total of variables, only the precipitation_nextday column interests us.

Test data

precipitation_test =

	ABO_radiation_1	ABO_delta_pressure_1	ABO_air_temp_1	ABO_sunshine_1	ABO_wir
1	3.83333	-2.9	1.8	0.0	2.95
2	-0.666667	-0.9	-1.65	0.0	2.58333
3	3.83333	-0.3	14.3167	0.0	4.8
4	5.66667	0.3	13.9	0.0	1.66667
5	3.83333	1.0	1.33333	0.0	4.43333
6	4.0	-0.5	-3.23333	0.0	7.88333
7	1.33333	0.5	-0.983333	0.0	1.25
8	0.333333	-4.2	10.2667	0.0	2.63333
9	0.166667	-2.0	9.48333	0.0	1.5
10	33.3333	-1.8	1.58333	70.0	0.733333
⋮	more				
1200	12.0	-1.9	8.28333	0.0	1.01667

```
precipitation_test = CSV.read(joinpath(@__DIR__, "..", "data", "project",
"testdata.csv"), DataFrame)
```

p_test =

	variable	mean	min	median	max	nmissing	eltype
1	:ABO_radiation_1	5.91028	-1.83333	2.5	48.8333	0	Float64
2	:ABO_delta_pressure_1	-0.508833	-6.9	-0.5	5.9	0	Float64
3	:ABO_air_temp_1	4.00561	-17.45	4.40833	18.5833	0	Float64
4	:ABO_sunshine_1	6.17167	0.0	0.0	129.0	0	Float64
5	:ABO_wind_1	3.7299	0.0	2.05	31.1333	0	Float64
6	:ABO_wind_direction_1	210.838	0.0	226.25	330.0	0	Float64
7	:ALT_radiation_1	4.59417	-2.16667	1.16667	34.0	0	Float64
8	:ALT_delta_pressure_1	-0.192917	-8.0	-0.15	10.9	0	Float64
9	:ALT_air_temp_1	7.9505	-10.8833	8.05	27.3167	0	Float64
10	:ALT_sunshine_1	3.49333	0.0	0.0	50.0	0	Float64
⋮	more						
528	:SMA_wind_direction_4	154.33	22.1667	160.25	335.333	0	Float64

```
p_test = describe(precipitation_test)
```

	variable	mean	min	median	max	nmissing	eltype
1	:ZER_sunshine_1	0.0	0.0	0.0	0.0	0	Float64
2	:ABO_sunshine_4	0.0	0.0	0.0	0.0	0	Float64
3	:ALT_sunshine_4	0.0	0.0	0.0	0.0	0	Float64
4	:CHU_sunshine_4	0.0	0.0	0.0	0.0	0	Float64
5	:SAM_sunshine_4	0.0	0.0	0.0	0.0	0	Float64

```
p_test[p_test.mean .== 0, :]
```

```
(1200, 528)
```

```
size(precipitation_test)
```

Comparison

These values correspond to the training ones, as the sample submission data contains the precipitation_nextday variable (y), and the test data the 528 variables.

Precipitation_nextday properties

```
[false, false, false, false, false, true, false, true, true, true, false, false, false, t
```

```
precipitation_training.precipitation_nextday[1:end]
```

The y value is a boolean. Let's compare the ratio between true and false values:

True

```
true_val = precipitation_training[precipitation_training.precipitation_nextday .==
1, :]; # select only true
```

```
(1354, 529)
```

```
size(true_val)
```

False

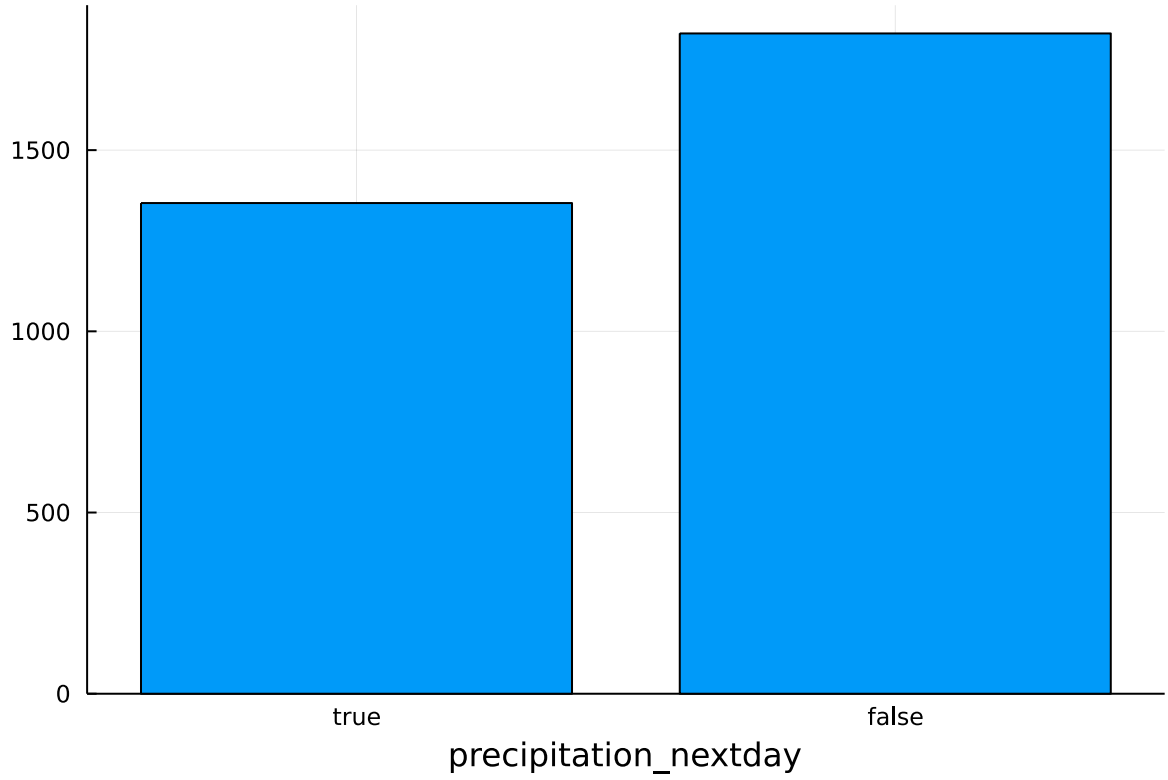
```
false_val = precipitation_training[precipitation_training.precipitation_nextday .==
0, :]; # select only false
```

```
(1822, 529)
```

```
size(false_val)
```

Comparison

There are 1354 true values and 1822 false ones. The total of both numbers is 3176, which corresponds to the size of training data found before. This means that there is no missing value for y.




```
begin
    p1 = bar([0, 1], [1354, 1822],
                xtick = ([0, 1], ["true", "false"]),
                xlabel = "precipitation_nextday", ylim = (0, 1900), xlim = (-.5,
1.5), label = nothing)
    plot(p1)
end
```