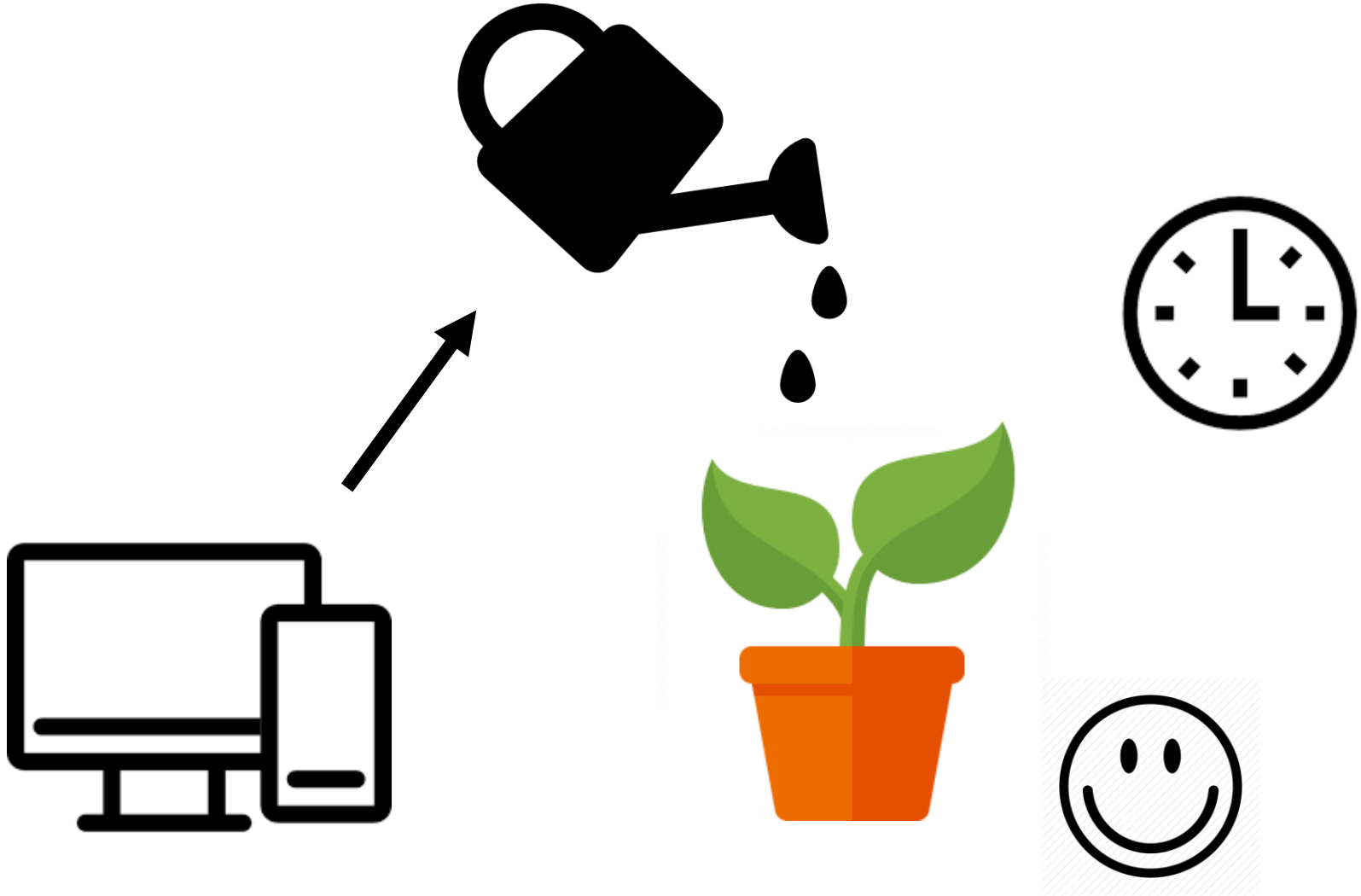
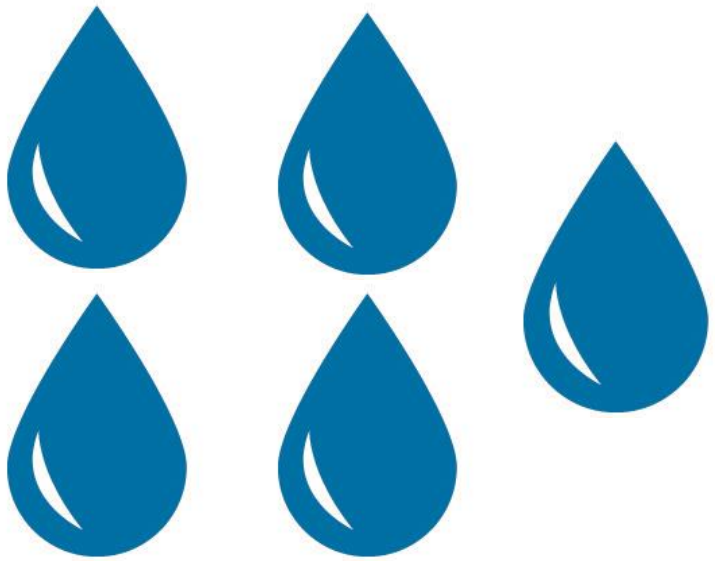
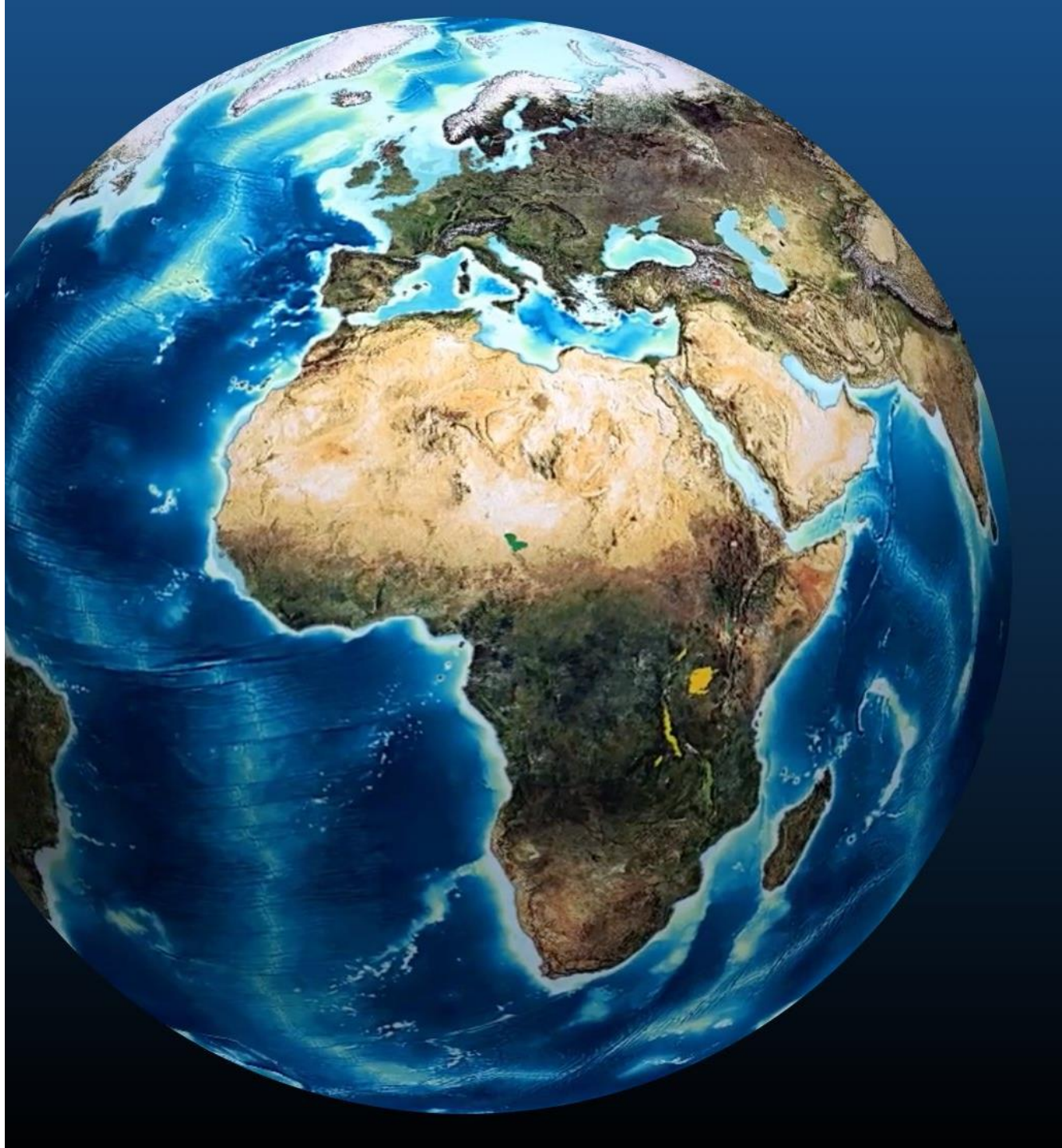
Irrigation Prediction

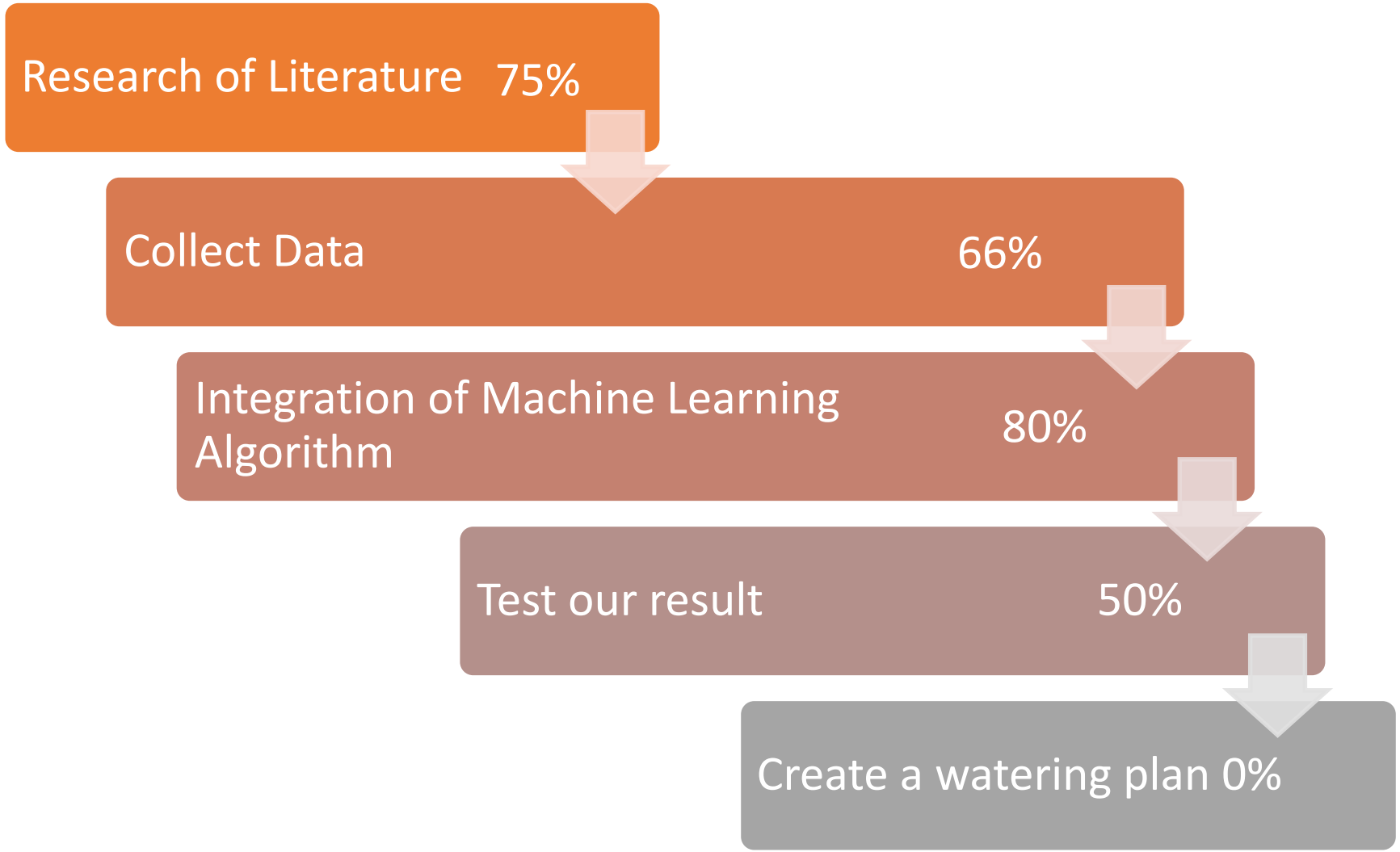
Adrien Chabert



200’000 km^3 of fresh water



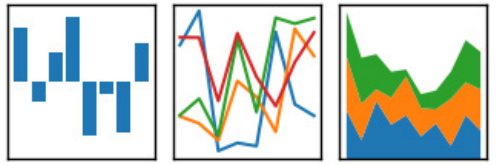


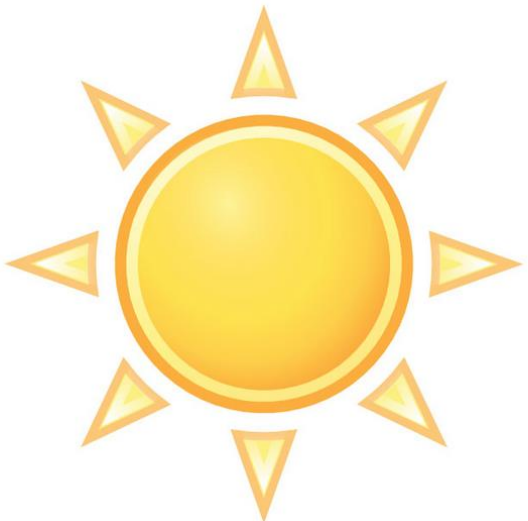

Research of Literature 75%
Collect Data 66%
Integration of Machine Learning Algorithm 80%
Test our result 50%
Create a watering plan 0%

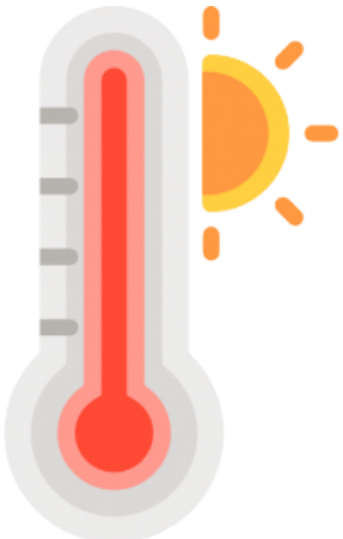
Basilic, onion, spinach

pandas

$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$

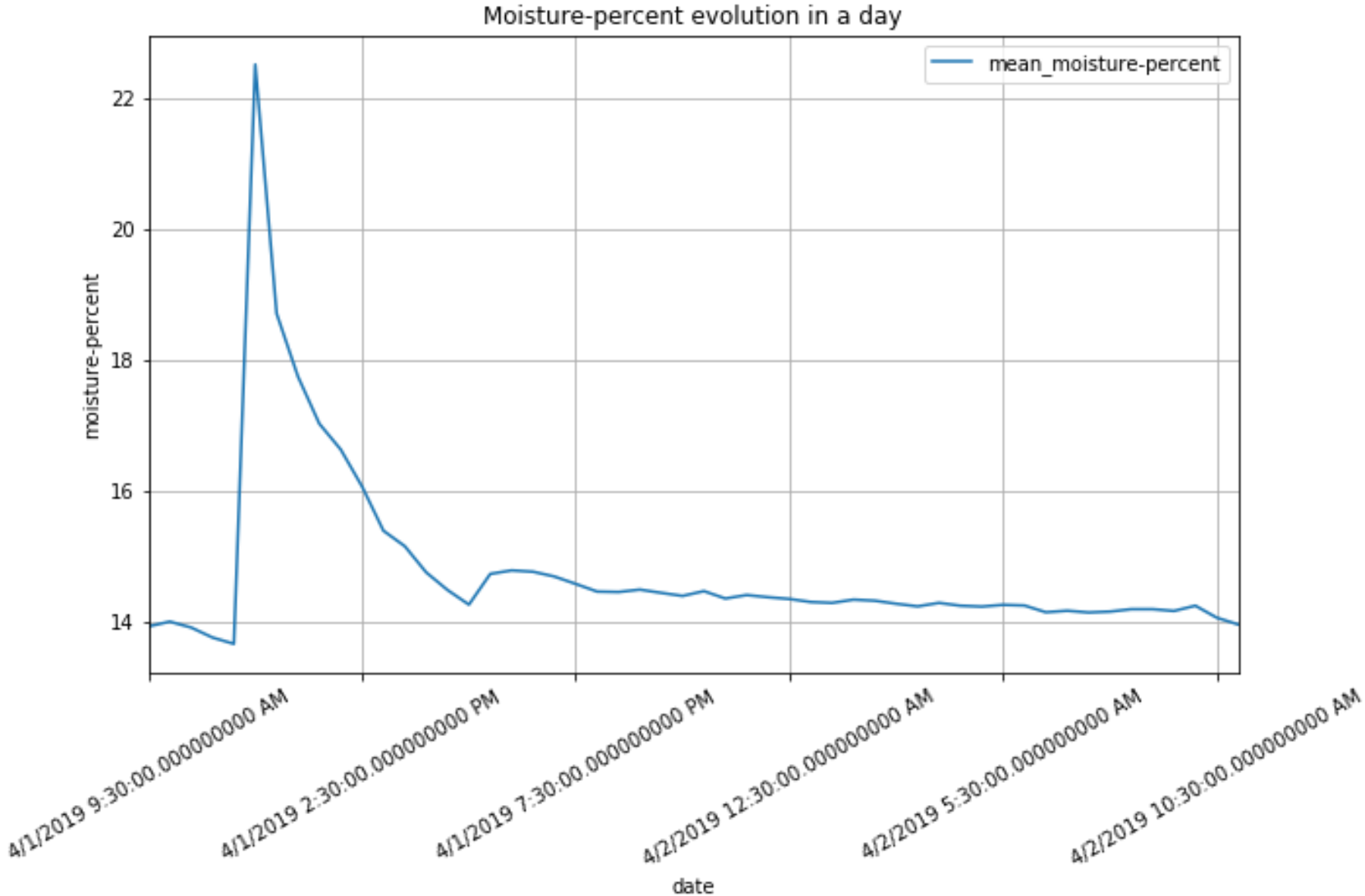






Problems from last meeting

- Position of the humidity sensor
- Defective Captor
- Pandas and Matplotlib not working on Jupyter
- Difficulty to implement ML
- Lack of knowledge of ML


Moisture-percent evolution in a day
mean_moisture-percent
moisture-percent
22
20
18
16
14
4/1/2019 9:30:00.000000000 AM
4/1/2019 2:30:00.000000000 PM
4/1/2019 7:30:00.000000000 PM
4/2/2019 12:30:00.000000000 AM
4/2/2019 5:30:00.000000000 AM
4/2/2019 10:30:00.000000000 AM
date

What I did with my data

Reading data in dataframe

Add information on my dataframe

Eliminate NaN value

Implement some different strategy

Analyse result

jupyter MLDemeter (unsaved changes)

Logout

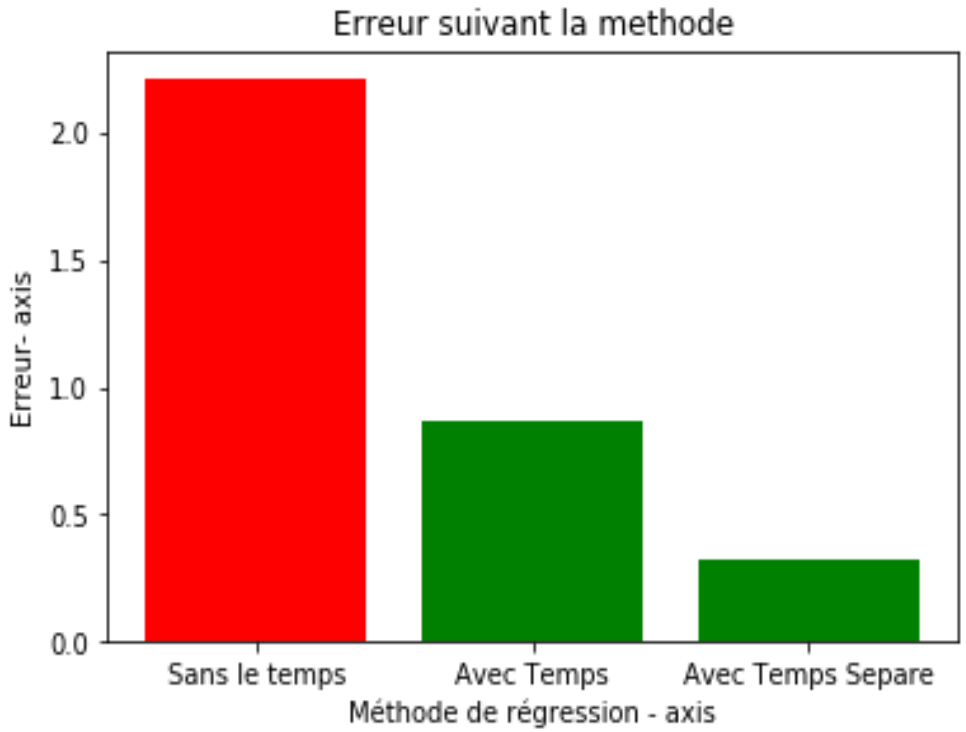
File Edit View Insert Cell Kernel Help Trusted Python 3

Run Code

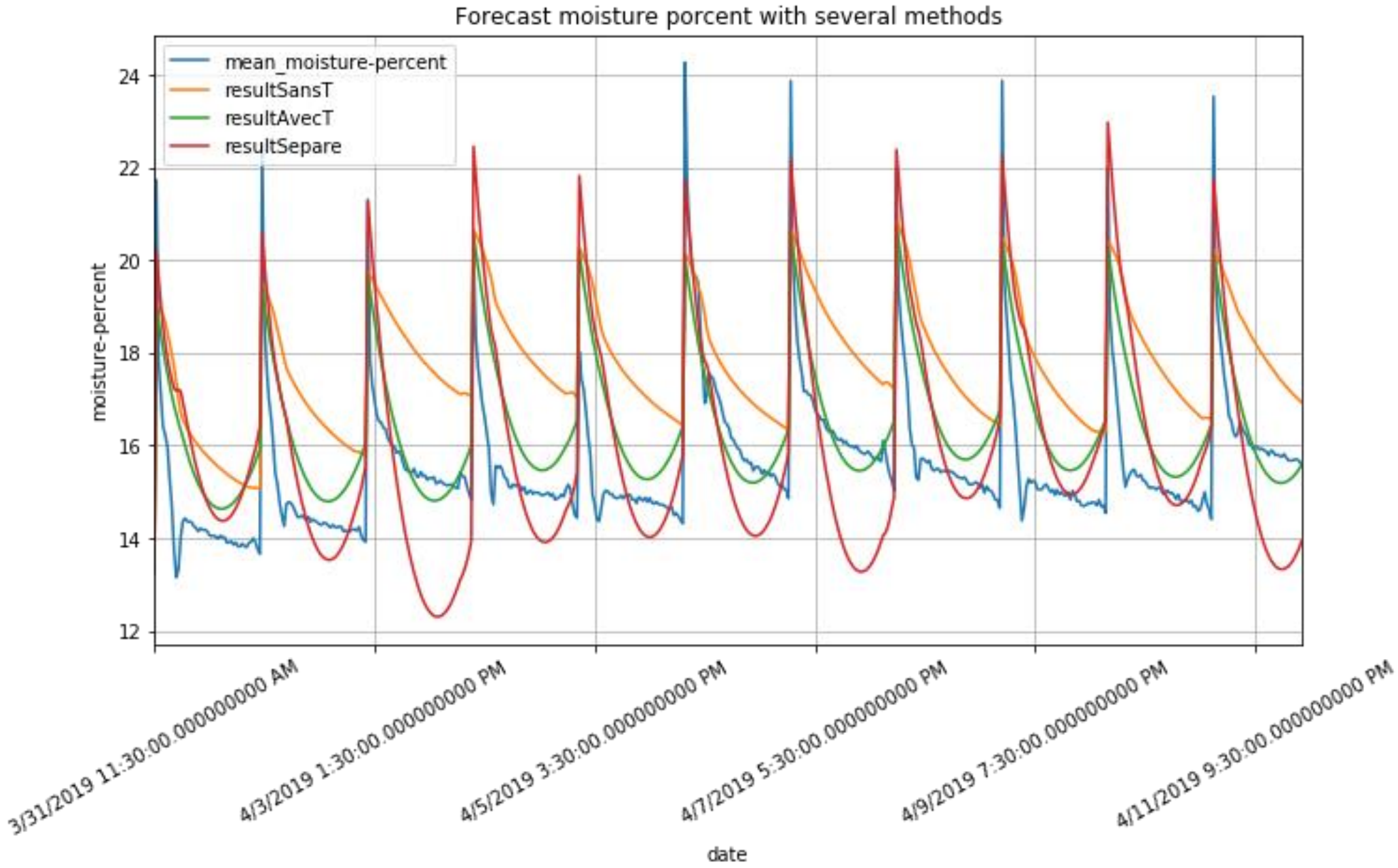
```
df.iloc[range(30,60),:]
```

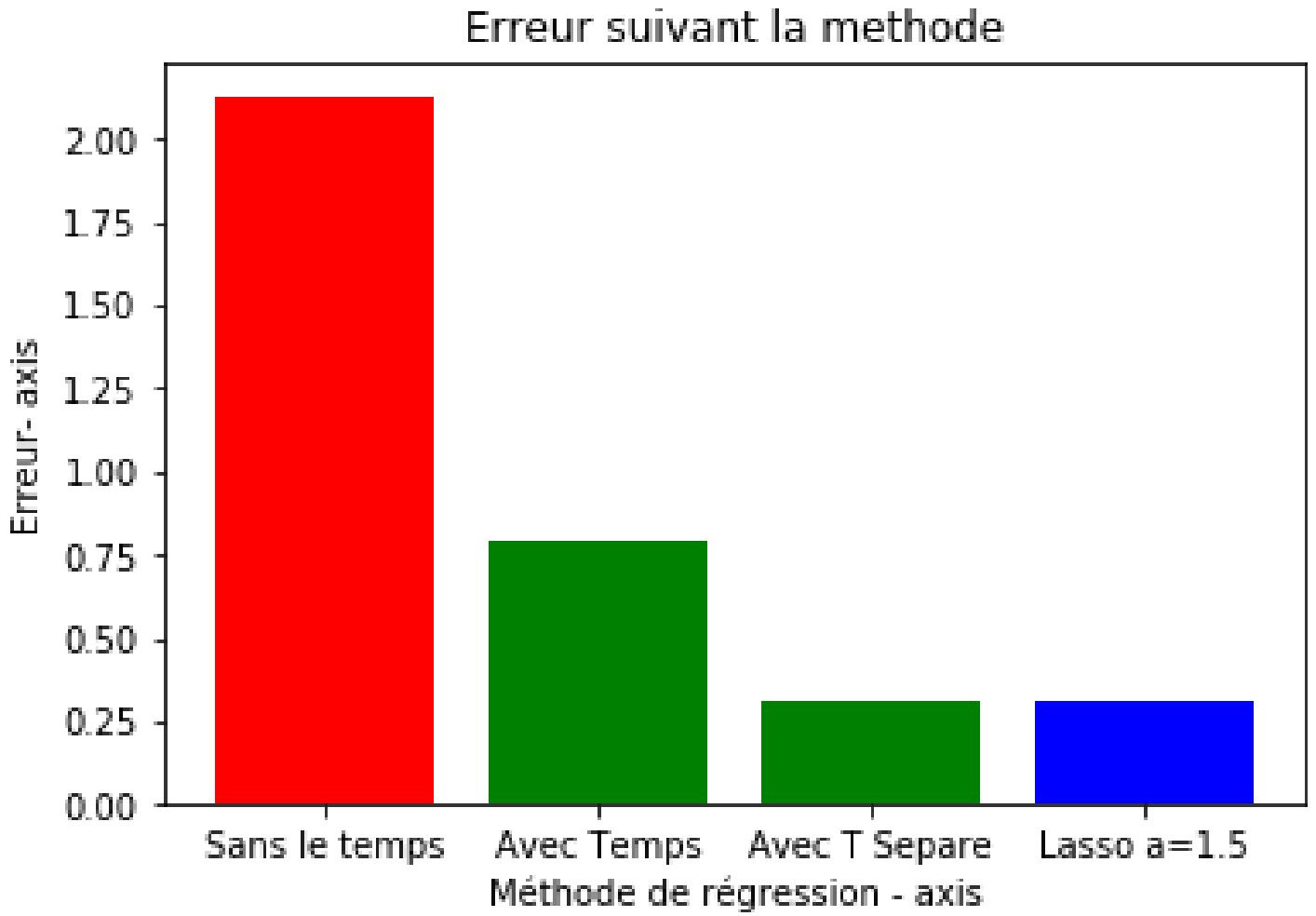
Out[4]:

	date	mean_moisture-percent	mean_temperature	moistureAdd	temperatureAdd	Arrosage	TAfterArrosage
30	3/8/2019 7:00:00.000000000 AM	32.078333	24.533333	-0.245000	0.100000	0	900
31	3/8/2019 7:30:00.000000000 AM	31.833333	24.633333	0.100000	0.061667	0	930
32	3/8/2019 8:00:00.000000000 AM	31.933333	24.695000	-0.136667	0.020000	0	960
33	3/8/2019 8:30:00.000000000 AM	31.796667	24.715000	0.093333	0.623333	0	990
34	3/8/2019 9:00:00.000000000 AM	31.890000	25.338333	-0.090000	0.300000	0	1020
35	3/8/2019 9:30:00.000000000 AM	31.800000	25.638333	-0.006667	0.138333	0	1050
36	3/8/2019 10:00:00.000000000 AM	31.793333	25.776667	0.175000	0.023333	0	1080
37	3/8/2019 10:30:00.000000000 AM	31.968333	25.800000	5.885000	0.316667	10	0
38	3/8/2019 11:00:00.000000000 AM	37.853333	26.116667	-2.026667	1.041667	0	30
39	3/8/2019 11:30:00.000000000 AM	35.826667	27.158333	-0.570000	0.076667	0	60
40	3/8/2019 12:00:00.000000000 PM	35.256667	27.235000	-0.340000	-0.155000	0	90
41	3/8/2019 12:30:00.000000000 PM	34.916667	27.080000	-0.310000	0.135000	0	120
42	3/8/2019 1:00:00.000000000 PM	34.606667	27.215000	-0.493333	0.163333	0	150
43	3/8/2019 1:30:00.000000000 PM	34.113333	27.378333	-0.083333	-0.686667	0	180
44	3/8/2019 2:00:00.000000000 PM	34.030000	26.691667	-0.160000	0.406667	0	210
45	3/8/2019 2:30:00.000000000 PM	33.870000	27.098333	-0.543333	1.468333	0	240
46	3/8/2019 3:00:00.000000000 PM	33.326667	28.566667	0.120000	-2.921667	0	270
47	3/8/2019 3:30:00.000000000 PM	33.446667	25.645000	0.643333	-4.588333	0	300
48	3/8/2019 4:00:00.000000000 PM	34.090000	21.056667	0.020000	-0.786667	0	330
49	3/8/2019 4:30:00.000000000 PM	34.110000	20.270000	-0.320000	-0.131667	0	360
50	3/8/2019 5:00:00.000000000 PM	33.790000	20.138333	-0.428333	0.241667	0	390
51	3/8/2019 5:30:00.000000000 PM	33.361667	20.380000	-0.756667	3.495000	0	420
52	3/8/2019 6:00:00.000000000 PM	32.605000	23.875000	-0.370000	0.870000	0	450
53	3/8/2019 6:30:00.000000000 PM	32.235000	24.745000	-0.243333	-0.313333	0	480
54	3/8/2019 7:00:00.000000000 PM	31.991667	24.431667	-0.118333	-0.131667	0	510
55	3/8/2019 7:30:00.000000000 PM	31.873333	24.300000	-0.081667	0.005000	0	540
56	3/8/2019 8:00:00.000000000 PM	31.791667	24.305000	-0.098333	0.083333	0	570

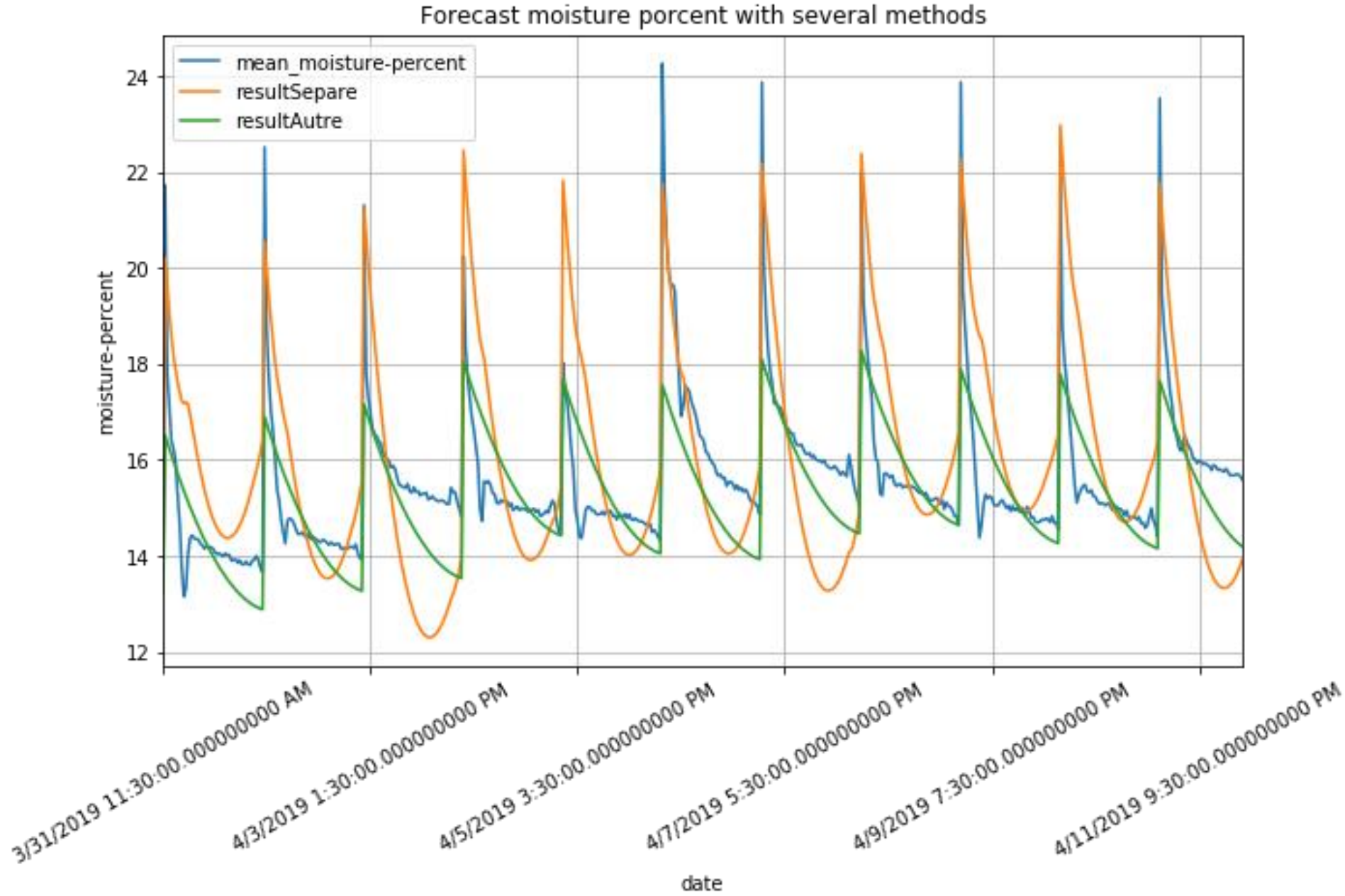



```
Sans le temps :  -2.21014576446
Avec le temps :  -0.867262586621
Avec Temps Séparé :  -0.325351399989
```

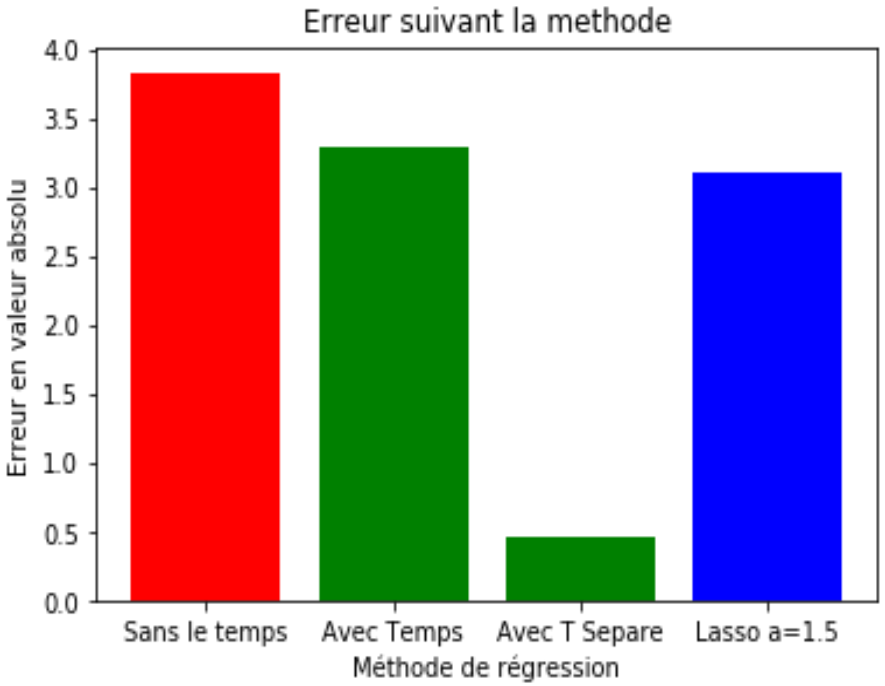

Forecast moisture porcent with several methods
mean_moisture-percent
resultSansT
resultAvecT
resultSepare
moisture-percent
24
22
20
18
16
14
12
3/31/2019 11:30:00.000000000 AM
4/3/2019 1:30:00.000000000 PM
4/5/2019 3:30:00.000000000 PM
4/7/2019 5:30:00.000000000 PM
4/9/2019 7:30:00.000000000 PM
4/11/2019 9:30:00.000000000 PM
date



Erreur avec Lasso (a = 1.5)
= 0.310217391543

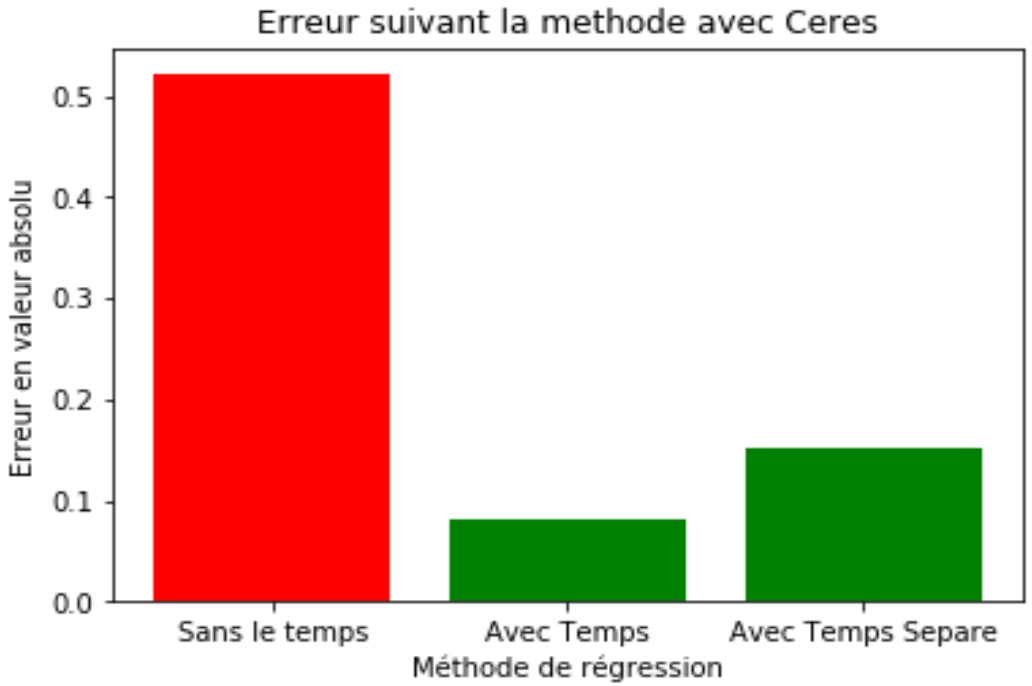

Forecast moisture porcent with several methods
mean_moisture-percent
resultSepare
resultAutre
moisture-percent
24
22
20
18
16
14
12
3/31/2019 11:30:00.000000000 AM
4/3/2019 1:30:00.000000000 PM
4/5/2019 3:30:00.000000000 PM
4/7/2019 5:30:00.000000000 PM
4/9/2019 7:30:00.000000000 PM
4/11/2019 9:30:00.000000000 PM
date

Test on dataset not included in the training data

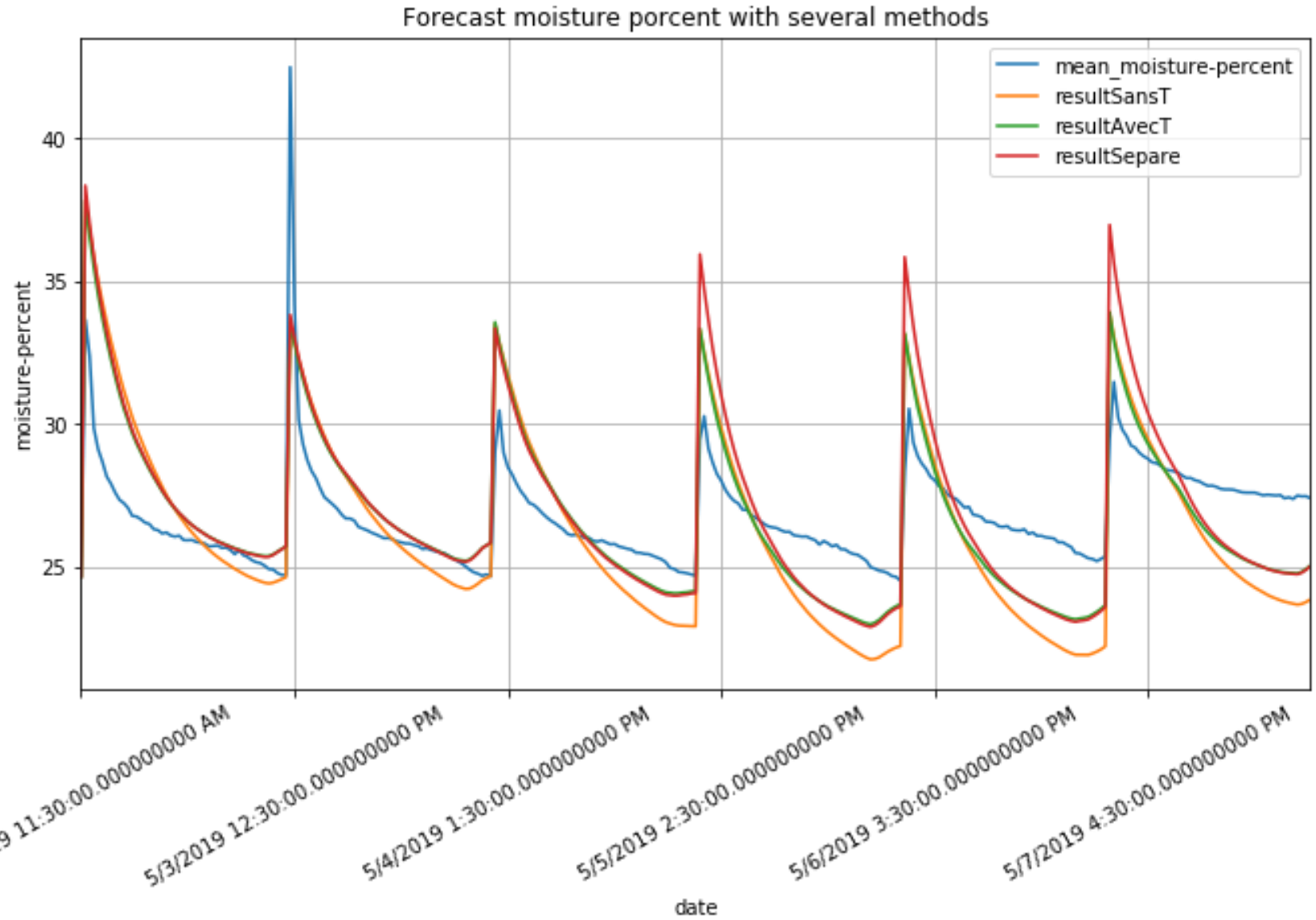



```
Sans le temps :  -3.82201707503
Avec le temps :  -3.28642586738
Avec Temps Séparé :  -0.466874285852
Avec Lasso a = 1.5 :  -3.10628303661
```

On Demeter




```
Sans le temps :  0.520951303641
Avec le temps :  0.0815202686961
Avec Temps Séparé :  -0.151172161535
```


Forecast moisture porcent with several methods
mean_moisture-percent
resultSansT
resultAvecT
resultSepare
moisture-percent
40
35
30
25
5/2/2019 11:30:00.000000000 AM
5/3/2019 12:30:00.000000000 PM
5/4/2019 1:30:00.000000000 PM
5/5/2019 2:30:00.000000000 PM
5/6/2019 3:30:00.000000000 PM
5/7/2019 4:30:00.000000000 PM
date

Watering Plan

Date	Demeter	Ceres
6-Mar	10 s/j	10 s/j
13-Mar	10 s/j	10 s/j
20-Mar	10 s/j	10 s/j
27-Mar	20 s/j	15 s/j
3-Apr	20 s/j	15 s/j
10-Apr	20 s/j	15 s/j
17-Apr	40 s/j	30 s/j
24-Apr	40 s/j	30 s/j
1-May	40 s/j	30 s/j
3-May	35s/j	20 s/j
8-May		
15-May		

Planning for the next 3 weeks

To move on with my final written report

To analyse and to chose the best algorithm

To create a watering programme

- Depending on temperature forecast
- Watering planning covering several days

Project Planning