Data Regression by Gaussian Process

Data Science for Transdisciplinary Research (II)

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Data Information

Title: Daily average temperature of Virgin Islands national park's coral reef area

source: https://portal.edirepository.org/nis/mapbrowse?packageid=edi.296.4

	Owner	Site	Temperature	Date
0	NPS Data	Yawzi - NPS	25.8	1989-01-10
1	NPS Data	Yawzi - NPS	25.7	1989-01-11
2	NPS Data	Yawzi - NPS	25.6	1989-01-12
3	NPS Data	Yawzi - NPS	25.5	1989-01-13
4	NPS Data	Yawzi - NPS	25.5	1989-01-14
...	...	...	...	...
11290	PJE Data	Yawzi 9 m	29.4	2020-07-28
11291	PJE Data	Yawzi 9 m	29.2	2020-07-29
11292	PJE Data	Yawzi 9 m	29.1	2020-07-30
11293	PJE Data	Yawzi 9 m	29.3	2020-07-31
11294	PJE Data	Yawzi 9 m	29.2	2020-08-01

11295 rows × 4 columns

Geographic Coordinates

N: 18.317, S: 18.307, E: -64.72, W: -64.73

N: 18.31506678, S: 18.31506678, E: -64.72551007, W: -64.72551007

Why we selected this data

- Water temperature has influence on coral reef population, and the average temperature is believed to fluctuate due to seasonal change/climate change.
- We want to know the relationship of the temperature and time in months.

→ What we are going to do:

- Resample the data from daily data to monthly data using average temperature of days in month
- Implement regression of monthly average temperature from Jan 2010 to August 2020 using Gaussian Process Regressor

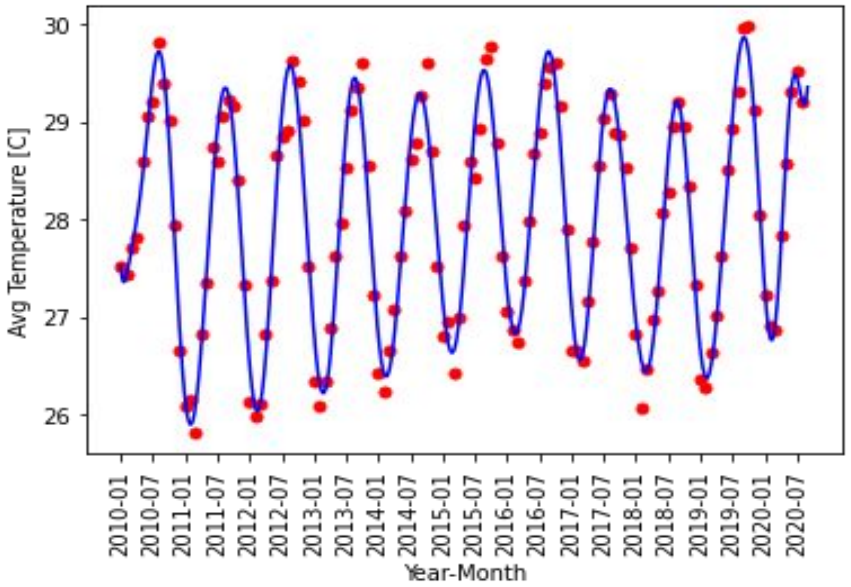
Analysis result

Kernel:

Exp-Sine-Squared kernel or the Periodic kernel was used

The parameters used are [length_scale=.05, periodicity=1e3])

→ It can be confirmed that the relation is periodic and its period is 12 months.



Analysis result

Regarding confidence interval:

The interval region is so small that it is not shown on the plot since the standard deviation of average temperature is relatively small (10^{-4}~10^{-6}) compared to the predicted value (25~30)

```
In [16]: y_pred, sigma = gpr.predict(x, return_std=True)

In [17]: print(sigma)

[9.96717275e-06 9.07426885e-06 8.73036386e-06 ... 9.57174741e-05
 1.08785976e-04 1.23106500e-04]
```