Assignment for mid term CS575

Dr. Jimson Mathew & Dr. Mayank Agarwal

February 28, 2021

Create a Python code from scratch of these function

Here e_i represents the evaluated value (actual value) and s_i represents the simulated value (predicted value), $\sigma(x)$ is the standard deviation, $\bar{x}$ is the mean of x. Use the "dataset_metrics" file and compute these metrics. You need to write a python function for each of the metric.

1. bias

$$Bias = \frac{1}{N}\sum_{i=1}^{N}(e_i - s_i)$$

2. pbias

$$PBias = 100 * \frac{\sum_{i=1}^{N}(e_i - s_i)}{\sum_{i=1}^{N}(e_i)}$$

3. Nash-Sutcliffe (NSE)

$$NSE = 1 - \frac{\sum_{i=1}^{N}(e_i - s_i)^2}{\sum_{i=1}^{N}(e_i - \bar{e})^2}$$

4. log Nash-Sutcliffe

$$logNSE = 1 - \frac{\sum_{i=1}^{N}(log(e_i) - log(s_i))^2}{\sum_{i=1}^{N}(log(e_i) - log(\bar{e})^2}$$

5. correlationcoefficient

$$CC = \frac{\sum_{i=1}^{n}(e_i - \bar{e})(s_i - \bar{s})}{\sqrt{\sum_{i=1}^{n}(e_i - \bar{e})^2}\sqrt{\sum_{i=1}^{n}(s_i - \bar{s})^2}}$$

6. rsquared

$$r^2 = \left(\frac{\sum_{i=1}^{n}(e_i - \bar{e})(s_i - \bar{s})}{\sqrt{\sum_{i=1}^{n}(e_i - \bar{e})^2}\sqrt{\sum_{i=1}^{n}(s_i - \bar{s})^2}}\right)^2$$

7. mse

$$MSE = \frac{1}{N}\sum_{i=1}^{N}(e_i - s_i)^2$$

8. rmse

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(e_i - s_i)^2}$$

9. mae

$$MAE = \frac{1}{N}\sum_{i=1}^{N}(|e_i - s_i|)$$

10. rrmse

$$RRMSE = \frac{\sqrt{\frac{1}{N}\sum_{i=1}^{N}(e_i - s_i)^2}}{\bar{e}}$$

11. agreementindex

$$d = 1 - \frac{\sum_{i=1}^{N}(e_i - s_i)^2}{\sum_{i=1}^{N}(|s_i - \bar{e}| + |e_i - \bar{e}|)^2}$$

12. covariance

$$Covariance = \frac{1}{N}\sum_{i=1}^{N}((e_i - \bar{e}) * (s_i - \bar{s}))$$

13. Kling-Gupta Efficiency (kge)

$$kge = 1 - \sqrt{(CC - 1)^2 + \left(\frac{\bar{e}}{\bar{s}}\right)^2 + \left(\frac{\sigma(e)}{\sigma(s)}\right)^2}$$

14. rsr

$$rsr = \frac{\sqrt{\frac{1}{N}\sum_{i=1}^{N}(e_i - s_i)^2}}{\sigma(e)}$$

15. volume_error

$$ve = \frac{\sum_{i=1}^{N}(s_i - e_i)}{\sum_{i=1}^{N} e_i}$$