



Mathematics & Global Sustainability

Environment Statistics

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Abstract

For my senior project, I plan to investigate topics in **Environmental Statistics**, which by definition is the development and application of statistical methodologies, including time series analysis, spatial modeling, Bayesian methods, wavelet analysis, extreme value modeling and non-parametric (particularly regression and additive) modeling, to environmental science. In this preliminary stage, I plan to focus on the application of **Bayesian interference** in Environmental Statistics.

Brief Introduction

Bayesian inference is a method of statistical inference in which Bayes Theorem is used to update the probability for a hypothesis as more information and variance becomes available. In other words, it provides a principled way of combining new information with prior assumptions through Bayes Theorem, which is stated below:

$$P(H|E) = \frac{P(E|H) * P(H)}{P(E)}$$

, where H is any *hypothesis* whose probability may be affected by the *evidence* (denoted as E) or new data that were not used in computing P(H), the probability of H before E is observed. $P(H|E)$ is the posterior probability, the probability of H given E, whereas $P(E|H)$ is the probability of observing E given H is true. P(E) is the marginal likelihood for it does not determine the relative probabilities of different hypotheses.

References

- Basic Set of Environment Statistics, *United Nations Statistics Division Webpage*.
<http://unstats.un.org/unsd/environment/default.htm>
- Environmental Statistics, *Wikipedia*.
https://en.wikipedia.org/wiki/Environmental_statistics