The Chemical Statistician

I'm Eric Cai, and I love statistics and chemistry. I enjoy sharing my advice on career development. Watch my video tutorials and talk show, "The Central Equilibrium", on YouTube. Follow me on Twitter @chemstateric.

Machine Learning Lesson of the Day – Parametric vs. Non-Parametric Models

JANUARY 14, 2014 6 COMMENTS (HTTPS://CHEMICALSTATISTICIAN.WORDPRESS.COM/2014/01/14/MACHINE-LEARNING-LESSON-OF-THE-DAY-PARAMETRIC-VS-NON-PARAMETRIC-MODELS/#COMMENTS)

A machine learning algorithm can be classified as either parametric or non-parametric.

A **parametric** algorithm has a **fixed number of parameters**. A parametric algorithm is **computationally faster**, but makes **stronger assumptions** about the data; the algorithm may work well if the assumptions turn out to be correct, but it may perform badly if the assumptions are wrong. A common example of a parametric algorithm is **linear regression**.

In contrast, a **non-parametric** algorithm uses a **flexible number of parameters**, and the number of parameters often **grows as it learns from more data**. A non-parametric algorithm is **computationally slower**, but makes **fewer assumptions** about the data. A common example of a non-parametric algorithm is **K-nearest neighbour**.

To summarize, the **trade-offs** between parametric and non-parametric algorithms are in **computational cost** and **accuracy**.

FILED UNDER MACHINE LEARNING, MACHINE LEARNING LESSON OF THE DAY, STATISTICS TAGGED WITH COMPUTATIONAL COST, COMPUTATIONAL SPEED, K-NEAREST NEIGHBOUR, LINEAR REGRESSION, MACHINE LEARNING, NON-PARAMETRIC, PARAMETRIC

6 Responses to *Machine Learning Lesson of the Day – Parametric vs. Non-Parametric Models*

victoriaanugrah says:
June 4, 2015 at 9:54 am
Reblogged this on victoria anugrah and commented:
It clears my mind about non-parametric methods. 🙂

Reply

Eric Cai - The Chemical Statistician says:
June 4, 2015 at 10:13 am
Glad to hear that, Victoria! Thanks for reading!

Reply

Krupali says:
October 27, 2015 at 9:07 am
Pre-exam day and your easy explanation! Kudos.

Reply

Eric Cai - The Chemical Statistician says:
October 29, 2015 at 10:14 am
Glad to hear that, Krupali! Hope your exam went well!

Reply

Alpha Pi says:
April 4, 2016 at 4:03 am
I would like to point out that "linear regression" is not an algorithm, it's a widely known technique in statistics and not machine learning. We could would be talking about "machine learning" in linear regression if we were to perform parameter estimation with something like a genetic algorithm instead of the common OLS method. But since this is not specified, it's incorrect to regard linear regression as machine learning. Generally, there are no true parametric algorithms in machine learning, and that's what differentiates it to statistics. And before someone mentions Artificial Neural Networks, it should be clear that they are NOT parametric in the statistical sense because their parameters do not explain anything about the model and their model is a black box.

Reply

Eric Cai - The Chemical Statistician says:

April 15, 2016 at 4:53 pm

I don't like to engage in deep disagreements about definitions, so I won't respond in detail. I disagree with your statement, and a counter-example to your denial of parametric models in machine learning is LASSO.

Reply