



Bob Eisenberg <bob.eisenberg@gmail.com>

Estimators, the big new idea in statistics

Bob Eisenberg <beisenbe@rush.edu>

Sat, Aug 24, 2013 at 7:55 AM

Reply-To: beisenbe@rush.edu

To: 刘宇 <lytinahome@gmail.com>, "Bob Eisenberg beisenbe@rush" <Bob.Eisenberg@gmail.com>, "Bob Eisenberg beisenbe@rush" <beisenbe@rush.edu>

Dear Yu,

Good to hear what you are working on so hard!
Let me know how I can help.

There is ONE crucial idea in statistics that every scientist and mathematician (pure and applied) should know, and most do not.

The idea is ESTIMATION.

ESTIMATORS are always used in every (literally every single) scientific process to convert raw experimental data into graphs, and then into estimates of parameters of theories.

The crucial CRUCIAL idea about estimators is that they are NOT and can never be unique. One chooses the estimator by what is possible (i.e., what lab measurements are possible; what computations are possible), and what is desired as a result (minimum variance, unbiased, etc etc).

ESTIMATORS ALWAYS INVOLVE A THEORY.

There is nothing wrong with this provided estimators are discussed EXPLICITLY as part of the scientific process.

If estimators are implicit, devastating problems result because scientists and mathematicians confuse CHOICES (they have made implicitly in this case) in the estimation process with reality.

For example, molecular dynamics is a way of estimating properties of (for example) ions in solutions and channels. It makes (drastic but necessary) approximations to allow its calculations to be made. If those approximations are not discussed explicitly, workers are mystified by the places MD does not fit real data. If those approximations are discussed explicitly, one can check to see if the failure reflects the necessary approximations in MD itself, or whether there is something else going on.

Enjoy!

As ever
Bob

PS A technical note. It is important that you replace your purely Chinese email address above with an English name followed by the Chinese characters.

e.g., **Yu Liu** 刘宇 or **Yu_Liu_** 刘宇 ,

If you use ONLY Chinese characters like 刘宇, SPAM filters in Western email systems may cast you out of the email queue altogether. I have NOT had that problem. I am getting your emails fine. So this is not an immediate problem. AND I apologize for the linguistic arrogance of the (mostly) Americans who have written the SPAM filters, but in the past (NOT with you) I have lost contact with some Chinese colleagues (actually Taiwanese colleagues) this way for a time and I would not want that to happen with you

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On Sat, Aug 24, 2013 at 6:13 AM, 刘宇 <lytinahome@gmail.com> wrote:

Dear Bob

The test is GRE. I have to remember numerous words to prepare it. By the way, I will become a senior soon. And I have finished all the requires for the diploma except the graduation thesis. So I have considerable latitude in course selecting. My plan is to learn more classes about nature and society, such as biology and economy. I think the greatest flaw for math students is that we know too little about the world from our training.

Now I want to strengthen my math skills. I want to review Real Analysis, and learn some basic about Optimization. And maybe a further learning about Statistics is also needed for my application.(I intend to learn statistics in future, since it seems statistics is more applicable, and it's a powerful tool to analysis and predict related things.) It looks like I will be quite busy in the next semester. As you said, a journey of a thousand miles starts with a single step. I try to enjoy this long journey.