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Data Analysis: Statistical Modeling and Computation in Applications

Help

sandipan_dey ⌄

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6. General cross validation

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Exercises due Nov 10, 2021 17:29 IST   Completed

Cross validation and information criterion

1/1 point (graded)

Think about the model selection procedure based on cross validation (CV) and information criterion (IC) (e.g., AIC), select all correct statements:

- [x] IC is more preferable if the speed of algorithm training is a priority

- [x] IC is more preferable if the sample size is small

- [x] CV is more preferable if model selection results are different with different ICs

- [ ] CV is more preferable if it selects the model we want

✔

Solution:

Generally speaking, CV is more preferable as it has fewer assumptions compared to the model selections relied on IC. However, if the sample size is very small, further splitting it to training and test sets may lead to large uncertainty in the predictions. Thus, IC could be more preferable in such conditions. Calculating IC is usually much quicker and simpler than CV as well, so IC could be preferred as well if speed is a top priority.

However, in theory, IC and CV are somewhat equivalent to the other. Minimizing AIC is asymptotically equivalent to leave-one-out cross-validation (LOOCV) (see Stone 1977). Similarly, BIC is asymptotically equivalent to leave-v-out cross-validation when $v/n \rightarrow 1$ (see Shao 1997).

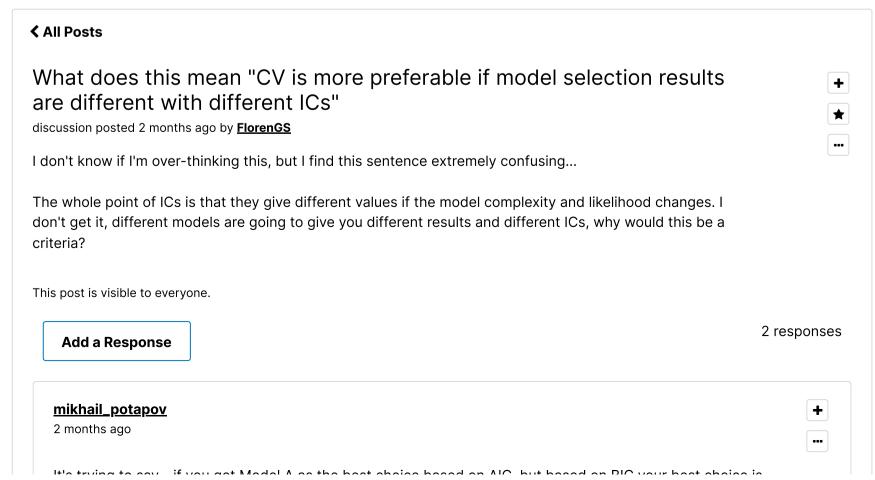| Submit	You have used 1 of 3 attempts

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ℹ Answers are displayed within the problem

Discussion

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Topic: Module 4: Time Series:Introduction to Time Series Analysis 3 / 6. General cross validation

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What does this mean "CV is more preferable if model selection results are different with different ICs"

discussion posted 2 months ago by **FlorenGS**

+

★

...

I don't know if I'm over-thinking this, but I find this sentence extremely confusing...

The whole point of ICs is that they give different values if the model complexity and likelihood changes. I don't get it, different models are going to give you different results and different ICs, why would this be a criteria?

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mikhail_potapov   +
2 months ago   ...

It's trying to say...if you got Model A as the best choice based on AIC, but based on BIC your best choice is

It's trying to say - if you get Model A as the best choice based on AIC, but based on BIC your best choice is Model B, would CV be a more preferable criteria?

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kozaronek   +

2 months ago   ...

Read up on this discussion if you're confused. It helped me make sense of the finer points.
https://discourse.datamethods.org/t/information-criteria-vs-cross-validation/2375/2

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