

# STATS531 Week3 Participation

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I've three participation records at Piazza this week.

## 1. [Provide data set related to global temperature](#)

### Question about HW3

When you have got everything you can out of the Ann Arbor January Low temperature time series, consider it in the context of the global mean annual temperature time series on the class github site

run code snippet

What does it mean to "consider it in the context of..."?

Should we try and fit the same model against this new data set and see if it performs the same? Or do we analyze the new dataset on its own?

hw3

edit good question 3 Updated 7 days ago by Chittaranjan Velambur Rajan

**S the students' answer**, where students collectively construct a single answer

Click to start off the wiki answer

#### followup discussions for lingering questions and comments

☒ Resolved ☐ Unresolved

**Yang Ye** 7 days ago  
I have the same question. I think annual data may have seasonality, so it seems not appropriate to use the same model.

helpful 0

**Chongdan Pan** 7 days ago  
Maybe we can use some tricks to remove seasonality from the annual data?  
Or we can just sample global mean monthly temperature.

helpful 0

**Yang Ye** 8 days ago  
That makes sense. I hope that we can use SARMA model.

helpful 0

**Abigail Lee** 6 days ago  
I wonder too if there is some way to just get the mean global temperatures from just January from the data set. Then you could make some sort of subset that is similar to the Ann Arbor data, which might allow you to use the same model.

helpful 0

**Chongdan Pan** 5 days ago  
I've found a good website to get various time-series data. [Climate at a Glance](#) | National Centers for Environmental Information (NCEI) ([noaa.gov](#))  
I think it'll be very useful, since there are various options and filters so that we can get different types of data.

## 2. [Ask a question about standard errors for parameter estimates](#)

**question** @66 12 views

### Interpretation of standard errors for parameter estimates

I'm viewing previous homework3 report for reference right now. It says that "inadequately modeling dependence can result in artificially low standard errors for parameter estimates", but I'm wondering the reason behind it. From the slides I know low standard errors may be caused by the inappropriate use of Fisher Information but is it a general case? Or does a low standard error mean we're overfitting the model?

hw3

edit good question 0 Updated 1 day ago by Chongdan Pan

## 3. [Discuss the property of roots in ARMA model](#)

**S the students' answer**, where students collectively construct a single answer

Check the lemma shown in Slides 4, Page 19.

The Taylor series expansion of  $\phi(B)^{-1}$  is convergent if and only if  $(1 - B/\lambda_i)^{-1}$  has a convergent expansion for each  $i$  in  $1:p$ . This happens if  $|\lambda_i| > 1$  for each  $i \in 1:p$ .

Notice that  $(1 - \frac{B}{\lambda_i})^{-1} = \sum_{j=0}^{\infty} \frac{B^j}{\lambda_i^j}$ . If we define the norm of backshift operator like [source](#) does, we can get that  $\|\frac{B^j}{\lambda_i^j}\| = \frac{1}{\lambda_i^j}$ . And from the condition of convergence of a geometric series, we can get that the series converges if  $\frac{1}{\lambda_i} < 1$ .

More intuitively speaking, you can treat the backshift operator as a point on the unit sphere in a special space. If  $|\lambda_i| < 1$ , then  $\frac{B^j}{\lambda_i^j}$  is a point outside the unit circle. The bigger  $j$ , the farther away from the origin the point  $\frac{B^j}{\lambda_i^j}$  goes. Then the series which sums these points together would definitely not convergel

edit thank! 1 Updated 7 days ago by Zelong Jiang

#### followup discussions for lingering questions and comments

☒ Resolved ☐ Unresolved

**Chongdan Pan** 7 days ago  
I see what you mean, if we have a  $\lambda_i < -1$ , then the previous  $Y_{n-k}$  will plays a more and more significant role as  $k \rightarrow \infty$ , therefore we can't invert  $Y_n$  to get  $\epsilon_n$ .

helpful 0

**Zelong Jiang** 6 days ago  
Yeah, this is a great interpretation I didn't think of.

helpful 0

Reply to this followup discussion

☒ Resolved ☐ Unresolved

**Melody Wu** 23 hours ago  
Follow-up question: How do we interpret roots that are way bigger than 1 (versus roots that are outside of the unit circle but closer to 1)? I got large values for the roots in HW3 and I'm not sure if I'm doing something wrong.

helpful 0

**Chongdan Pan** 22 hours ago  
I think each root represent one term in the polynomial. The larger the root is, the more insignificant role the previous  $Y_{n-k}$  plays for  $Y_n$ . However, since we have many terms multiplied to each together, so one root extremely bigger than 1 can't determine anything, but one root smaller 1 will blow the whole polynomial up.

helpful 0

Reply to this followup discussion

Start a new followup discussion