Information About Midterm 2

Week IX: Video 26

STAT 485/685, Fall 2020, SFU

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Video 26 Learning Objectives

In this video, we'll go over:

- Summary of what will be covered in Midterm 2
- What the midterm will look like
- How you can prepare for the midterm

What We've Learned: Ch. 4

Ch. 4: Models for Stationary Time Series (Videos 14-18)

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General linear processes:

- Defining a general linear process, and identifying some of its important properties
- Recognizing the relationship between general linear processes and MA & AR processes

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Moving average (MA) processes:

- Recognizing a moving average process of order q, i.e. MA(q)
- Deriving some properties of the MA(1) and MA(2) processes
- Identifying some important properties of the general MA(q) process
- Understanding the invertibility conditions for an MA process

What We've Learned: Ch. 4 (cont'd)

Autoregressive (AR) processes:

- Recognizing an autoregressive process of order p, i.e. AR(p)
- Deriving some properties of the AR(1) and AR(2) processes
- Identifying some important properties of the general AR(p) process
- Determining whether a given AR process is stationary
- Identifying what the autocorrelation function of an AR(1) or AR(2) process will look like

What We've Learned: Ch. 4 (cont'd)

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Autoregressive moving average (ARMA) processes:

- Recognizing an autoregressive moving average process of orders p and q, i.e. ARMA(p,q)
- Deriving some properties of simple ARMA processes
- Determining whether a given ARMA process is stationary

What We've Learned: Ch. 5

Ch. 5: Models for Non-Stationary Time Series (Videos 19-22)

What We've Learned: Ch. 5

Ch. 5: Models for Non-Stationary Time Series (Videos 19-22)

ARIMA processes:

- Given a process definition, recognizing it as an ARIMA(p,d,q) process
- Understanding the relationship between the stationary (differenced) process $\{W_t\}$ and the original non-stationary process $\{Y_t\}$
- Given the fact that a process is an ARIMA(p,d,q) process, deriving its difference equation form

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Transformations:

- Understanding the motivation behind the log-transformation, difference of logs transformation, and power transformation, for obtaining stationarity
- Describing the effect of each of the above transformations on the original dataset
- Choosing a value of the power transformation parameter λ

What We've Learned: Ch. 5 (cont'd)

Constant terms in ARIMA models:

- Defining an ARMA(p,q) model with a non-zero constant mean
- Identifying how a non-zero constant mean in the differenced series $\{W_t\}$ will affect an original ARIMA series $\{Y_t\}$

What We've Learned: Ch. 6

Ch. 6: Model Specification (Videos 23-25)

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Sample autocorrelation function (sample ACF):

- Understanding important properties of the ACF that allow us to differentiate between different models
- Obtaining sampling properties (e.g., variance) of the sample ACF, in order to determine whether a given value is significant
- Using a plot of the sample ACF, along with its sampling properties, to determine whether a dataset appears to come from an MA process

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Ch. 6: Model Specification (Videos 23-25)

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- Using a plot of the sample ACF, along with its sampling properties, to determine whether a dataset appears to come from an MA process

Sample partial autocorrelation function (sample PACF):

- Understanding important properties of the PACF that allow us to differentiate between different models
- Calculating the sample PACF for a given process, at any lag k
- Using a plot of the sample PACF, along with its sampling properties, to determine whether a dataset appears to come from an AR process

What We've Learned: Ch. 6 (cont'd)

Sample extended autocorrelation function (sample EACF):

- Using a table of the sample EACF to estimate the orders of an ARMA process
- Using all of the above methods (ACF, PACF, EACF) together, to choose an appropriate model for a given process

What We've Learned: Ch. 6 (cont'd)

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- Using a table of the sample EACF to estimate the orders of an ARMA process
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Final comment:

- We have not yet covered § 6.4 (Non-stationarity in model specification) and § 6.5 (Other specification methods). We will be covering these after the midterm

What Midterm 2 Will Look Like

Thursday, Nov. 12th
4:30pm - 6:20pm

Logistics:

- The structure will be very similar to Midterm 1.
- The first half of the exam will be administered on Canvas, the second half on Crowdmark.
- There won't be any proctoring (Zoom, Proctorio, etc.).
- However, we will be communicating via Zoom throughout the exam! So **please join the usual practice session at 4:30pm** on Thursday, and stay joined the whole time. (You can mute yourself and turn off your video. But keep the sound on so you can hear me.)
- Please **be available for the entire time slot 4:30pm-6:20pm**.
- The exam will be approximately 1 hour long, but we will need extra time to set up, resolve technical issues, etc.

What Midterm 2 Will Look Like (cont'd)

Structure:

- Open-notes, open book.
- Broken up into two parts, with a *time limit on each*.
- 5-minute break between parts.
- The first half will consist of a mix of multiple choice questions and short-answer questions (to be typed into Canvas).
- The second half will be *hand-written questions to be uploaded* to Crowdmark.
- There will be several different versions of the exam.

What Midterm 2 Will Look Like (cont'd)

Exam Policies:

- The exam will be synchronous, and students **must complete each part during the posted time**. There will be no alternative times for the exam.
- Students who miss an exam because of illness or for compassionate reasons must let me know within 24 hours after the exam date. Within four days the student must also submit a doctor's note or other relevant document.
- For any other issues occurring on the day-of (e.g., major unexpected, long-lasting Internet problems), you must *let me know as soon as possible* and submit required proof/documentation.
- For rules on missing the exam, please see the Canvas page "Policies Regarding Midterm Exams and Final Exam".

What Midterm 2 Will Look Like (cont'd)

Academic Integrity:

- Exams will be done individually – **no collaboration, communication or teamwork is allowed**! This includes asking for help on the Internet.
- Please see SFU's Academic Integrity website (`https://www.sfu.ca/students/academicintegrity.html`) for more information on what is meant by academic dishonesty.

How You Can Prepare

What can I do to prepare?

- Watch/re-watch lecture videos 14-27.
- Try out lecture video quizzes again!
- Read textbook chapters 4-6 (except § 6.4 & 6.5).
- Go through Assignments 3-6, and their solutions (once they're posted).
- Try out exercises and examples in the book.
- Go over exercises the TA covered in tutorials.
- Go over exercises we did in practice sessions.
- (Tutorial material and practice session screenshots can be found in "Missed Something in Week x?" in each week's module.)

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What else is happening?

- Week 10 tutorial (M Nov. 9th) will be going over some review & exercises.
- There will be a Monday instructor office hour in Week 10, as well as a bonus Tuesday office hour with the TA. More info will be posted in the announcements.

Final Comments

That's all for now!

Good luck on the midterm!

In the Next Video: Review and Exercises for Midterm 2

Thank you!

References:

[1] Cryer, J. D., & Chan, K. S. (2008). *Time series analysis: with applications in R.* Springer Science and Business Media.

[2] Chan, K. S., & Ripley, B. (2020). TSA: Time Series Analysis. R package version 1.2.1.