

Syllabus

Course Overview

In this course, you evaluate forecast model outcomes to solve organizational problems, examine the impact of time and data latency on forecasting, and practice identifying patterns in the output of forecast models. You will also learn to communicate with stakeholders regarding the application and results of forecasting techniques.

Donald Rumsfeld once said,

There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know. (Rumsfeld, 2002)

When we forecast anything, whether we are forecasting monthly sales, account balances, arrivals at an emergency room, activity durations, real estate prices, or even hydrological extremes, what Rumsfeld stated rings very true. We will never be able to predict anything with 100 percent accuracy, because we simply do not know what we do not know. Our best chance at creating the most accurate forecasts and predictions possible is to see what others have done for similar business problems, see what data we have available to work with, identify the overlaps and differences between these, and create the best predictive, or forecasting, model or method that we can with what we have. This course provides the tools for forecasting by walking you through the available methods available, particularly for time series forecasting, and will also provide some basic introductions to more advanced methods, like decision trees and machine learning methods.

Reference

Rumsfeld, D. (2002, February 12). United States Department of Defense news briefing – Secretary Rumsfeld and Gen. Myers. Retrieved from <http://archive.defense.gov/transcripts/transcript.aspx?transcriptid=2636>

Course Competencies

(Read Only)

To successfully complete this course, you will be expected to:

- 1 Evaluate forecast model outcomes to solve organizational problems.
- 2 Articulate the impact of time and data latency on forecasting.
- 3 Identify patterns in the output of forecast models.
- 4 Apply forecasting techniques to reduce uncertainty for the stakeholder.
- 5 Present results to stakeholders in a succinct and relevant manner.

Course Prerequisites

Prerequisite(s): ANLT5050.

Syllabus >> Course Materials

Required

The materials listed below are required to complete the learning activities in this course.

Library

The following required readings are provided in the Capella University Library or linked directly in this course. To find specific readings by journal or book title, use [Journal and Book Locator](#). Refer to the [Journal and Book Locator library guide](#) to learn how to use this tool.

- Boyle, J., Jessup, M., Crilly, J., Green, D., Lind, J., Wallis, M., . . . Fitzgerald, G. (2012). [Predicting emergency department admissions](#). *Emergency Medicine Journal*, 29(5), 358–365.
- Brocklebank, J. C., & Dickey, D. A. (2003). [SAS for forecasting time series \(2nd ed.\)](#). Cary, NC: SAS Publishing.

- Chan, C., Huang, H., & You, H. (2012). [Intelligence modeling for coping strategies to reduce emergency department overcrowding in hospitals](#). *Journal of Intelligent Manufacturing*, 23(6), 2307–2318. doi:10.1007/s10845-011-0574-
- Jessup, M., Crilly, J., Boyle, J., Wallis, M., Lind, J., Green, D., & Fitzgerald, G. (2015, April 27). [Users' experiences of an emergency department patient admission predictive tool: A qualitative evaluation](#). *Health Informatics Journal*, pp. 1–15. doi:10.1177/1460458215577993
- Jessup, M., Wallis, M., Boyle, J., Crilly, J., Lind, J., Green, D., . . . Fitzgerald, G. (2010). [Implementing an emergency department patient admission predictive tool](#). *Journal of Health Organization and Management*, 24(3), 306–318.
- Kadri, F., Harrou, F., Chaabane, S., & Tahon, C. (2014). [Time series modelling and forecasting of emergency department overcrowding](#). *Journal of Medical Systems*, 38(9), 1–21. doi:http://dx.doi.org/10.1007/s10916-014-0107-0
- Kam, H. J., Sung, J. O., & Park, R. W. (2010). [Prediction of daily patient numbers for a regional emergency medical center using time series analysis](#). *Healthcare Informatics Research*, 16(3), 158–165.
- Reis, B. Y., & Mandl, K. D. (2003). [Time series modeling for syndromic surveillance](#). *BMC Medical Informatics & Decision Making*, 3(1), 2–11.
- Soyiri, I. N., & Reidpath, D. D. (2012). [Evolving forecasting classifications and applications in health forecasting](#). *International Journal of General Medicine*, 5, 381–389.
- Soyiri, I. N., & Reidpath, D. D. (2013). [An overview of health forecasting](#). *Environmental Health and Preventive Medicine*, 18(1), 1–9.
- Tongkhaw, P., & Kantanantha, N. (2013). [Bayesian models for time series with covariates, trend, seasonality, autoregression and outliers](#). *Journal of Computer Science*, 9(3), 291–298.
- Wang, J. (2012). [On quantifying and forecasting emergency department overcrowding at Sunnybrook Hospital using statistical analyses and artificial neural networks](#) (Master's thesis). Available from ProQuest Dissertations & Theses database. (UMI No. 1327515711).
- Wargon, M., Guidet, B., Hoang, T. D., & Hejblum, G. (2009). [A systematic review of models for forecasting the number of emergency department visits](#). *Emergency Medicine Journal*, 26(6), 395–399. doi:10.1136/emj.2008.062380

External Resource

Please note that URLs change frequently. While the URLs were current when this course was designed, some may no longer be valid. If you cannot access a specific link, contact your instructor for an alternative URL. Permissions for the following links have been either granted or deemed appropriate for educational use at the time of course publication.

- Hoot, N. R., LeBlanc, L. J., Jones, I., Levin, S. R., Zhou, C., Gadd, C. S., & Aronsky, D. (2009). [Forecasting emergency department crowding: A prospective, real-time evaluation](#). Retrieved from <http://jamia.oxfordjournals.org/content/16/3/338>
- Schubert, S., & Lee, T. (2011). [Time series data mining with SAS Enterprise Miner](#). Retrieved from <https://support.sas.com/resources/papers/proceedings11/160-2011.pdf>
- Wargon, M., Casalino, E., & Guidet, B. (2010). [From model to forecasting: A multicenter study in emergency departments](#). Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/j.1553-2712.2010.00847.x/abstract>

Suggested

The following materials are recommended to provide you with a better understanding of the topics in this course. These materials are not required to complete the course, but they are aligned to course activities and assessments and are highly recommended for your use.

Optional

The following optional materials are offered to provide you with a better understanding of the topics in this course. These materials are not required to complete the course.

Library

The following optional readings may be available in the Capella University Library. To find specific readings by journal or book title, use [Journal and Book Locator](#). Refer to the [Journal and Book Locator library guide](#) to learn how to use this tool. If the full text is not available, you may be able to request a copy through the [Interlibrary Loan](#) service.

- Arroyo, J., Espínola, R., & Maté, C. (2011). Different approaches to forecast interval time series: A comparison in finance. *Computational Economics*, 37(2), 169–191. doi:10.1007/s10614-010-9230-2
- Dailey, W. (2014). [Big data: Data analytics \[Video\]](#). Skillsoft Ireland Limited.
- Khoury, J. (2015). [Data visualization essentials: Choosing the type of visualization for the data \[Video\]](#). Skillsoft Ireland Limited.
- Liu, X., Ni, Z., Yuan, D., Jiang, Y., Wu, Z., Chen, J., & Yang, Y. (2011). A novel statistical time-series pattern based interval forecasting strategy for activity durations in workflow systems. *Journal of Systems & Software*, 84(3), 354–376. doi:10.1016/j.jss.2010.11.927
- Munusamy, M., Muthuveerappan, C., Baba, M., & Asmoni, M. (2015). An overview of the forecasting methods used in real estate housing price modelling. *Jurnal Teknologi*, 73(5) doi:10.11113/jt.v73.4337
- Scott, S. (2017). [Data science essentials: Effective communication and visualization \[Video\]](#). Skillsoft Ireland Limited.

- Xing, Y., Roundy, J. K., Wood, E. F., & Sheffield, J. (2015). Seasonal forecasting of global hydrologic extremes. *Bulletin of the American Meteorological Society*, 96(11), 1895–1912. doi:10.1175/BAMS-D-14-00003.2

External Resource

Please note that URLs change frequently. While the URLs were current when this course was designed, some may no longer be valid. If you cannot access a specific link, contact your instructor for an alternative URL. Permissions for the following links have been either granted or deemed appropriate for educational use at the time of course publication.

- Ord, K., Fildes, R., & Kourentzes, N. (2017). *Principles of business forecasting* (2nd ed.). New York, NY: Wessex Press.
- [Python](http://www.python.org). (n.d.). Retrieved from <http://www.python.org>
- Python.org. (n.d.). [Beginner's Guide to Python](https://wiki.python.org/moin/BeginnersGuide). Retrieved from <https://wiki.python.org/moin/BeginnersGuide>
- Python.org. (n.d.). [Downloading Python](https://wiki.python.org/moin/BeginnersGuide/Download). Retrieved from <https://wiki.python.org/moin/BeginnersGuide/Download>
- [R](https://www.r-project.org/). (n.d.). Retrieved from <https://www.r-project.org/>

Unit 1 >> Introduction to Forecasting

Introduction

This week you will:

- Become acquainted with various applications of forecasting data models and concepts.
- Become acquainted with the Vila Health virtual internship for applied forecasting.
- Conduct data profiling.

In this unit, you will learn basic concepts about forecasting methods, and how forecasting methods can be applied to solve business problems. The articles in the first study of this unit focus on the application of predictive modeling in the health care industry. This industry focus will help prepare you for your virtual internship at Vila Health. Working with your group during the group study for this unit will also help prepare you for your internship. In your first group study during unit one you will set up communication channels, discuss the articles for this unit, Vila Health data provided your virtual internship. The data profiling methods you learn in Unit 1 will be applied later in this course for your Vila Health data analysis project. In your first assignment, you will complete data profiling, which is a first step in data analysis. In this assignment, you will complete the required steps for data profiling on a simple data set, and create a data profiling tutorial to save in your analytics "toolbox" for future reference for data profiling other data sets.

Learning Activities

u01s1 - Studies

Readings

From the Capella library, read:

- Boyle, J., Jessup, M., Crilly, J., Green, D., Lind, J., Wallis, M., . . . Fitzgerald, G. (2012). [Predicting emergency department admissions](#). *Emergency Medicine Journal*, 29(5), 358–365.
- Soyiri, I. N., & Reidpath, D. D. (2012). [Evolving forecasting classifications and applications in health forecasting](#). *International Journal of General Medicine*, 5, 381–389.
- Soyiri, I. N., & Reidpath, D. D. (2013). [An overview of health forecasting](#). *Environmental Health and Preventive Medicine*, 18(1), 1–9.
- Wargon, M., Guidet, B., Hoang, T. D., & Hejblum, G. (2009). [A systematic review of models for forecasting the number of emergency department visits](#). *Emergency Medicine Journal*, 26(6), 395–399. doi:10.1136/emj.2008.062380

u01s2 - Software Preparation and Technology Access

In this course, you will be using software and technology that is needed to complete designated activities and assignments. There is no additional cost for this software and technology. Some software packages will be made available to you at no additional cost through Capella's subscription with Microsoft, while other software packages are available for free download through open-source licensing.

Capella University requires learners to meet certain minimum [computer requirements](#). Please note that some software required for a course may exceed these minimum requirements. Check the requirements for the software you may need to download and install to make sure it will work on your device. Most software will require a Windows PC. If you use a Mac, refer to [Installing a Virtual Environment and Windows on a Mac](#).

The software and technologies below are strongly recommended to support you in completing the course objectives. If you have access to other tools that you believe may still meet the requirements of this course, please discuss your selected alternatives with your instructor.

If you use assistive technology or any alternative communication methods to access course content, please contact [Disability Services](#) with any access-related questions or to request accommodations.

For this course, follow the instructions provided through the links below to download and install software or register for an account, as required.

SAS Statistical Software

[SAS OnDemand for Academics \(SODA\)](#)

- Download the SAS data files for use in the assignments: [ANLT5060 Data Files \[ZIP\]](#).
- Open the file and take some time to explore this data set to see how it was constructed.

Open Source Statistical Software

R and Python are two open source software that can be applied as an alternative to SAS to complete the assignments in this course.

- [Python](#): Go to the [Download](#) section of the [Python Beginners Guide](#) to download the latest version of Python.
- [R](#). Follow the instructions on the page to download the latest version of R.

Selecting a Statistical Software

On the one hand, R and Python are open source software that are free and commonly used. On the other hand, there are several reasons why an analyst would choose SAS over R or Python. SAS has better reference documentation. R and Python are getting better, but official documentation is not well written and is somewhat opaque. SAS is supported by a massive infrastructure of books. SAS has single-source support. If it is broken, you know who to call. If R or Python are broken, there is nobody to call. R and Python packages vary in quality, some are written by experts, and some are not. Whereas, SAS is only written by experts. SAS is very much the standard for many industries, especially the pharmaceutical industry, where SAS is required by the FDA. The name SAS carries a lot of inertia and is used predominantly in institutions and academia.

u01s3 - Programming Instructions

Using R

Access the [Using R](#) page on Campus for resources on:

- How to get started with R.
- How to read a file in R.
- How to get started with Descriptive Statistics in R.
- Graphical Methods in R.

Using Python

Access the [Using Python](#) page on Campus for resources on:

- How to get started with Python.
- How to read a file in Python.
- How to get started with Descriptive Statistics in Python.
- Graphical Methods in Python.

Using SAS

Access the [Using SAS](#) page on Campus for resources on:

- How to get started with SAS.

- How to read a file in SAS.
- How to get started with Descriptive Statistics in SAS.
- Graphical Methods in SAS.

u01s4 - Analytics Internship: Applied Forecasting

An integral part of this course and Capella University's data analytics program is your virtual internship. Your internship is with Vila Health, a fictional health care system that operates hospitals and other health care facilities throughout the upper midwestern United States. This internship is designed to allow you to apply the data analytics skills and knowledge you are acquiring in a realistic setting. In addition to the technical requirements of the assignment, the internship also provides a context for you to develop the collaborative, interpersonal skills that employers are looking for in new data analysts.

In this first activity, you will be introduced to the Vila Health organization, your mentor, and the case study that you focus on throughout this course. You will use the information about the case study as the context for your group discussion "Group Study Tasks" in the coming weeks. The Vila Health media interactions can help you understand a business problem and the steps you may take to solve it. The virtual internship also lets you practice the role of a data analyst and suggests how you can articulate a business solution derived from data mining in a manner that others can understand. During this virtual internship you will participate in several study groups tasks and a midpoint review assignment that will help you prepare for your Final Report assignment in Unit 10.

Click Analytics Internship: Applied Forecasting to view the Vila Health Scenario.

To get started on this project for your Data Analytics internship with Vila Health, import the provided data into SAS Enterprise Guide (or R or Python if you choose) and complete an initial examination and descriptive analysis of the data. The intention of this initial evaluation and descriptive analysis of the data include:

- Identifying the variables available in the existing data.
- Identifying any missing data or missing values.
- Identifying any data quality issues or potential data quality issues.
- Describing the possible values of qualitative (categorical) variables (and frequencies of those values) via frequency tables or graphical methods.
- Describing the quantitative (numeric) variables via numeric or graphical summary methods.
- Comparing the data available to those identified as needed for forecasting based on the research completed for Unit 1 Discussion 2.

Course Resources

Analytics Internship: Applied Forecasting

u01s5 - Group Work and Personal Effectiveness

Study Group Tasks

For each week in the course, you will find suggested study group tasks describing topics to discuss with your group within a social media setting. These topics will help guide your group toward its midpoint and final solutions; therefore, you must not skip any of these study group tasks if you plan to succeed on your Vila Health assignments.

Review the most recent Analytics Internship challenge and any of the materials you created or acquired during project-related or challenge activities prior to your study group work. Downloaded notes from your Vila Health notebook can provide useful reminders and questions for your group discussion. Be sure to consider the Belbin team role you are filling for your group and consider the information in the scenario from the perspective of that role or roles.

You will encounter study group tasks each week throughout the course, and in every course that you encounter as you journey through your program.

The questions provided are meant to provide you and your group members with some guidance for your group work. These questions should not be overlooked, as they are critical to you completing the work in the course.

Study Group Interactions

Capella recommends that you use a social media channel to collaborate and connect with your group members. Work with your teammates to identify a platform you are all comfortable using (for example, Basecamp, Yammer, Google Hangouts, or Facebook) and check to make sure that this platform is also reasonably private and secure. For example, if you decide to use Facebook, create a secret group and work within it. A secret group is invisible to the outside world, and only members can find the group and see posts. This social media group will allow you to stay connected to your team and allow you to discuss the study group topics assigned.

LinkedIn

For networking with current and past learners, we recommend that you use LinkedIn, which is a great way to stay connected to past, current, and future learners in this degree program. This will help you with networking as you move through the program and beyond.

Course Resources

[Group Collaboration Skills](#)

[Analytics Internship: Applied Forecasting | Transcript](#)

u01a1 - Data Profiling Using Statistical Software

Overview

One of the most important steps in forecasting, or any analytics project in general, is identifying the data that is available for the analyst to work with. Many times, a clearly defined and documented data dictionary is not readily available for all of the data that may be available, so the next best option is to profile and describe the available data.

In this assignment, you will profile a simple data set to identify the variables in the data set and the type and format of those variables, and identify the contents of those variables. The code you create and steps you take for data profiling in this assignment will be useful as you proceed with the study tasks and future assignments in this course and program, and in your career in data analysis.

Follow the assignment instructions below to complete a data profiling and basic descriptive analysis on the provided simple data set, and use these steps, any screenshots, code, output, and anything else you think might be helpful to create a tutorial-type paper to describe how to profile a data set. Be sure to save your code and corresponding tutorial paper in your analytics "toolbox" for future use.

Instructions

For this assignment:

- Complete the following using the data set provided by your instructor or one you located on your own:
 - Identify the variables available in the data set, as well as the types (character versus numeric) and formats of each variable.
 - Check for missing or invalid values for all character variables, and create a frequency table to describe the possible values of the character variables. (You can also use any graphical methods of your choice to describe the possible values of the character variables, as well, but this is optional.)
 - Check for missing or potentially outlying or invalid values for all numeric variables, and describe the possible values of the numeric variables. (You can also use any graphical methods of your choice to describe the possible values of the numeric variables, as well, but this is optional.)
 - Use DO loop to compute the value of a new variable.
- Write a 4–6 page tutorial-format paper that explains how to identify the variables (and variable types and formats) available in a data set, as well as the contents (missing/non-missing and possible values, for example) of the variables in a data set. Use the activities you completed to support your explanation.
- Attach screenshots of your activity results with your assignment or as an addendum to your assignment.
- Include the code you created for this assignment as an attachment or addendum to your assignment.
- Explain how data profiling techniques may be used as part of an applied forecasting project.

Your assignment will be scored on the following criteria:

- Explain statistical software approaches to profiling data.
- Identify data available for solving an organizational problem.
- Describe how available data is used for solving an organizational problem.

- Explain how data profiling techniques are used in applied forecasting projects.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Data Profiling Using Statistical Software Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Include 4–6 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

u01d1 - Planning Your Group

Throughout the course, you will be required to work collaboratively outside of the courseroom. By now, your instructor should have assigned you into groups of 2 to 3 members. With your group, be sure to:

- Introduce yourself to your group members. Share information about your background and experience and include your experience using and working with analytic software.
- Decide on the social media channels and/or collaborative tools that you as a group plan to use throughout this course.
- Connect with your group at your agreed-upon social media location and discuss this week's topics for discussion, as outlined in the group work study.
- Review the Vila Health media piece and consider the scenario presented.

Complete your group set up by Wednesday of this week.

Course Resources

[Graduate Discussion Participation Scoring Guide](#)

[Group Collaboration Skills](#)

[Analytics Internship: Applied Forecasting | Transcript](#)

u01d2 - Comparing Data Needed and Available Data

Using this unit's readings, select one forecasting method used to solve an organizational problem the same as, or similar to, the problem for Vila Health, and answer the following questions:

1. What forecasting method is used in your selected article?
2. What organizational problem are the authors attempting to solve?
3. Compare the organizational problem in your selected reading to that facing Vila Health. Are the authors in your selected article attempting to solve the same problem?
4. What variables do the authors use in their forecasting application?
5. Out of the variables used in your selected article, which are available in the Vila Health data, and which are not?
6. What additional data might you be able to gather and join with the currently available data in order to be able to use the forecasting technique in your selected article, and where might you find that data?
7. What data quality or missing data issues did the authors run into in their analysis?
8. What other issues did the authors identify that you may also need to look out for if you use this forecasting method on the Vila Health data?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you found most helpful, and why. In addition, ask questions on portions of their initial post that may be incomplete or unclear.

Course Resources

Graduate Discussion Participation Scoring Guide

u01s6 - Optional Resources

The following resources provide further information on this unit's topics.

- Arroyo, J., Espínola, R., & Maté, C. (2011). Different approaches to forecast interval time series: A comparison in finance. *Computational Economics*, 37(2), 169–191. doi:10.1007/s10614-010-9230-2
- Liu, X., Ni, Z., Yuan, D., Jiang, Y., Wu, Z., Chen, J., & Yang, Y. (2011). A novel statistical time-series pattern based interval forecasting strategy for activity durations in workflow systems. *Journal of Systems & Software*, 84(3), 354–376. doi:10.1016/j.jss.2010.11.927
- Munusamy, M., Muthuveerappan, C., Baba, M., & Asmoni, M. (2015). An overview of the forecasting methods used in real estate housing price modelling. *Jurnal Teknologi*, 73(5). doi:10.11113/jt.v73.4337
- Xing, Y., Roundy, J. K., Wood, E. F., & Sheffield, J. (2015). Seasonal forecasting of global hydrologic extremes. *Bulletin of the American Meteorological Society*, 96(11), 1895–1912. doi:10.1175/BAMS-D-14-00003.2

Unit 2 >> Applications of Forecasting

Introduction

This week you will:

- Explore various applications of forecasting data models and concepts.
- Participate in a study group to examine potential applied forecasting applications for the Vila Health scenario.
- Examine the application of a forecasting method across industries.

Forecasting techniques are used for many applications across all industries, as you read in previous units. Examples include health care, real estate, meteorology, finance, and operations.

In this unit, you will explore the current research body of work via the Capella library and find applications in your own industry and others and share your findings with your fellow learners. In the discussions, you will present a summary of an article you found that uses forecasting methods in your selected industry. In the assignment, you will take a deeper look at applications of one particular forecasting method and its applications across various industries. You will continue to discuss methods, data, and tools during your group studies, with a particular focus on using the Vila Health data and other data your group gathered to begin creating basic linear regression models.

Learning Activities

u02s1 - Studies

Readings

From the Capella library, read Chapter 1 of the following e-book:

- Brocklebank, J. C., & Dickey, D. A. (2003). *SAS for forecasting time series (2nd ed.)*. Cary, NC: SAS Publishing.

Library Research

This week's assignment requires you to locate and evaluate multiple case studies or articles from the Capella University Library. Please look ahead and plan your time accordingly.

u02s2 - Study Group Tasks

Review the Analytics Internship: Applied Forecasting scenario. Consider the topics for discussion as you review the scenario. Search for details that are specific to these topics and that will aid you in making recommendations to Vila Health.

This week's topics for discussion:

- What forecasting models would be appropriate for the Vila Health scenario? Why?
- How would you decide which forecasting models to apply in the Vila Health scenario?
- How can your team work together to decide which forecasting models to apply in the Vila Health scenario?
- If new information is learned, how would your team select or change which forecasting model(s) to apply in the Vila Health scenario?

Course Resources

[Analytics Internship: Applied Forecasting | Transcript](#)

u02d1 - Applications of Forecasting

Use the Capella library to find one study or article that uses a forecasting method within your industry of choice, and write a summary description of your selected study or article. Be sure to include answers to the following questions in your summary:

1. What industry is your selected article or study from?
2. What was the business problem that the study or article was attempting to address?
3. What data was used in this study? (What types of variables, data sources, et cetera?)
4. What forecasting method or algorithm was used in this study or article?
5. What results did the authors find in using the specified forecasting method to attempt to address the business or organizational problem identified in the article or study?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you found interesting, and why. In crafting your responses, keep the following questions in mind:

1. Is this a forecasting method that is new to you? If so, what did you learn from your classmate's initial post?
2. Is this a new application of a forecasting method you are already familiar with? If so, how does your experience with the forecasting method and applications of it compare to that identified within your classmate's initial post?

Course Resources

[Graduate Discussion Participation Scoring Guide](#)

u02a1 - Cross-Industry Applications of Forecasting Methods

Overview

Forecasting methods and techniques are used in different ways and for varying applications in many industries. Some of the most impactful innovations in business related to statistics, in general, but forecasting, specifically, come from applying a statistical method in one industry. Finding a transferable way to apply that same method or algorithm in a different industry on a similar, or parallel, business problem or application, can be a challenge.

Instructions

For this assignment:

- Choose one forecasting method (for example, linear regression, exponential smoothing, seasonal adjustments, ARIMA, decision trees, or machine learning techniques).
- Use the Capella library to find three studies or articles that span three different industries and that use your selected forecasting method to address a business or organizational problem.
- Use your selected studies or articles to compare and contrast the use of your selected forecasting method.
- Write a 4–6 page paper that compares and contrasts the use of your selected forecasting method across the three industries, using the studies and articles you found in the Capella library to support your explanations.

Your assignment will be scored on the following criteria:

- Identify a forecasting method applied across different research contexts in different industries.
- Identify the business problem statement in each identified research context.
- Describe the identified forecasting method compared across different research contexts in different industries.
- Describe the results of the applied forecasting model in each of the research contexts.
- Compare and contrast how the identified forecasting method was applied in each context across different industries.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Cross-Industry Applications of Forecasting Methods Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Include 4–6 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

Unit 3 >> Evaluating Forecasting Models

Introduction

This week you will:

- Evaluate various forecasting models.
- Participate in a study group to discuss the application of linear models for the Vila Health scenario data set.
- Study the organizational needs and data set for the Vila Health scenario.

As a data analyst, it is important to understand and to be able to communicate how to select the best statistical or forecasting model or method, and explain to nonstatistically savvy coworkers, managers, or executives, why your recommended model is the best for addressing a specified business problem.

In this unit, you will explore the current research body of work via the Capella library to select, describe, and compare various methods and measurements that are used to compare forecasting models and methods. In the discussions, you will present a summary of one model evaluation method or metric in a format using language that a non-statistician could understand. In the assignment, you will take a deeper look at methods and measurements of evaluating forecasting models, and recommend the use of one for evaluating forecasting models that are candidates for addressing a

business problem in an industry of your choice. You will continue working on simple and multiple linear regression models with the data you have available through Vila Health, or that you have gathered during your group studies, with particular focus on the model evaluation methods and measures you will learn in this unit.

Learning Activities

u03s1 - Studies

Readings

From the Capella library, review:

- Soyiri, I. N., & Reidpath, D. D. (2012). Evolving forecasting classifications and applications in health forecasting. *International Journal of General Medicine*, 5, 381–389.

u03s2 - Study Group Tasks

The recommendations that your group agrees to this week need to be included as part of the Midpoint Review and Final Report and will contribute to your final group project grade. Therefore, it is critical that you do not skip any of these discussions. You will be able to make changes to your recommendations at any time during the course, but skipping a topic will negatively affect your grade.

Review the Analytics Internship: Applied Forecasting scenario. Consider the topics for discussion as you review the scenario. Search for details that are specific to these topics and that will aid you in making recommendations to Vila Health.

Individually, prior to your group meeting, or together as a group sharing a single screen, use the Vila Health data (and any additional data that you have gathered) to create a simple or multiple linear regression model to predict emergency department presentations.

This week's topics for discussion:

- Does this data and business problem seem like an appropriate application for linear regression? Why or why not?
- What assumptions of linear regression may or may not be met? (Hint: scatterplots and correlation matrix may be useful in answering this question.)
- What interaction terms and other calculated/combined variables might you want to consider for your linear regression model?
- What linear model-building methods has your group agreed upon using?
- How will you tell what the optimal linear regression model is for this data?
- What might not be considered, or what might be missed, by using a simple or multiple linear regression technique?

Review various simple and multiple linear regression models for predicting emergency department presentations and addressing the Vila Health business problem. Identify candidates for the optimal linear regression model that might be used to address the identified business problem, and justify your selections using standard model evaluation metrics. Identify additional considerations that may not be covered or met using simple or multiple linear regression methods.

Course Resources

[Analytics Internship: Applied Forecasting | Transcript](#)

u03d1 - Evaluating Forecasting Models

From your textbook or your research in the Capella library, select one method or metric that is currently used for model evaluation and explain it in terms that a non-statistician could easily understand. Discuss the benefits and pitfalls of this particular method.

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you agree or disagree with, and why.

u03s3 - Analytics Internship: Evaluating Forecasting Models

In this Vila Health activity, you will have the opportunity to speak with key stakeholders throughout the Vila Health organization. These interviews will help you determine how to apply the analytics methods you are conducting on the Vila Health data set to the staffing process issues identified by Vila Health leaders in the initial business problem. You will be able to learn more about the fields and variables and the data set in general by interviewing various end users and stakeholders. Click Analytics Internship: Evaluating Forecasting Models to view the Vila Health scenario.

u03a1 - Forecasting Evaluation Methods

Overview

It is of utmost importance as a data analyst to understand how to compare models and recommend the best candidates for addressing a business problem. As you have read in the course thus far, there are several ways (either methods or metrics) used to evaluate options for models. The key is to find a method or metric that is available and logical across all of the types of models or forecasting methods you are evaluating, much like the R-squared metric is used to compare simple linear regression models.

Instructions

For this assignment:

- Choose a minimum of three forecasting evaluation methods or metrics from your text, the readings, and additional research in the Capella library.
- Create a table to compare and contrast these selected evaluation methods or metrics.
- Select or create a business problem that you might use various forecasting methods and models, and recommend a method or metric for evaluating the models. Be sure to use examples and references to support your recommendation.
- Write a 4–6 page paper, (including an illustrative table) that compares and contrasts the three or more forecasting evaluation methods or metrics, describes your selected business problem, and recommends a method or metric to use to evaluate models that might be used to address this business problem.

Your assignment will be scored on the following criteria:

- Identify a prescribed number of relevant forecasting evaluation methods and metrics.
- Compare and contrast each identified forecasting evaluation method and metric.
- Describe a business problem that might be addressed using forecasting models or methods.
- Recommend a forecasting evaluation method or metric to use in evaluating forecasting models or methods to address a business problem.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Forecasting Evaluation Methods Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Include 4–6 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

u03s4 - Optional Resources

The following resources provides further information on this unit's topics.

- Ord, K., Fildes, R., & Kourentzes, N. (2017). *Principles of business forecasting* (2nd ed.). New York, NY: Wessex Press.
 - Chapter 2, "Basic Tools for Forecasting."
 - Chapter 10, "Advanced Methods for Forecasting, Section 1, Predictive Classification."
- Dailey, W. (2014). [Big data: Data analytics \[Video\]](#). Skillsoft Ireland Limited.
- Khoury, J. (2015). [Data visualization essentials: Choosing the type of visualization for the data \[Video\]](#). Skillsoft Ireland Limited.
- Scott, S. (2017). [Data science essentials: Effective communication and visualization \[Video\]](#). Skillsoft Ireland Limited.

Unit 4 >> Seasonal Adjustments

Introduction

This week you will:

- Explore methods for seasonal adjustments.
- Participate in a study group to determine if seasonal adjustments are appropriate for the Vila Health scenario data set.
- Apply methods for seasonal adjustments to a data set.

Many times, particularly with time-series data, linear regression techniques alone are not sufficient to create a forecast model that accurately predicts a response variable based on time. Sometimes seasonal adjustments are useful in improving a forecasting model that is attempting to address a particular business problem. You will discuss seasonal adjustments in the discussions in this unit.

You will also explore subjective adjustment options to address time-related predictive analytics and forecasting projects. Seasonal adjustments are a type of subjective adjustment options. We must consider subjective or judgmental factors when dealing with time-series data in order to improve the forecasting model and make resulting forecasts and predictions based on it more accurate. The assignment reinforces this terminology.

You will work with your group to evaluate these as options for improving your forecast model that you are working on to address the Vila Health business problem.

Learning Activities

u04s1 - Studies

Readings

From the Capella library, review:

- Soyiri, I. N., & Reidpath, D. D. (2012). [Evolving forecasting classifications and applications in health forecasting](#). *International Journal of General Medicine*, 5, 381–389.

u04s2 - Programming Instructions

Using R

Access the [Using R](#) page on Campus for resources on Seasonal Adjustments in R.

Using Python

Access the [Using Python](#) page on Campus for resources on Seasonal Adjustments in Python.

Using SAS

Access the [Using SAS](#) page on Campus for resources on Seasonal Adjustments in SAS.

u04s3 - Study Group Tasks

Continue working on addressing the Vila Health business problem by checking to determine whether seasonal adjustments are appropriate for this data set. Fit a minimum of three linear regression models on the Vila Health data, and begin discussing time series forecasting methods as alternatives to linear regression models for time-related data, like the Vila Health data. This week's topics for discussion:

- Does there appear to be seasonality in the data set? If so, what type of seasonality?
- Is it appropriate to include a seasonal adjustment for the Vila Health data set? Why or why not?

Course Resources

[Analytics Internship: Applied Forecasting](#) | [Transcript](#)

[Analytics Internship: Evaluating Forecasting Models](#) | [Transcript](#)

u04d1 - Seasonal Adjustments

Use the readings from this unit to provide an explanation, in nontechnical language, of seasonal adjustments. Include answers to the following questions:

- What are some examples of seasonality that might be present in time series data?
- What are seasonal adjustments?
- When might we use them?
- How do we know if we should use a seasonal adjustment or not?
- How do we know when we have applied an appropriate seasonal adjustment?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you agree or disagree with, and why.

Course Resources

[Graduate Discussion Participation Scoring Guide](#)

u04a1 - Seasonal Adjustments

Overview

As you have likely found in your analysis of the Vila Health data, linear regression models alone are not effective, many times, in predicting response variables based on time (also known as time series data). Sometimes, we must consider subjective or judgmental factors when dealing with time-series data in order to improve the forecasting model and make resulting forecasts and predictions based on it more accurate.

Use your readings from this unit to identify any seasonal patterns that exist in your data, and to evaluate different seasonal adjustments on the data provided. Be sure to save your project and code to use as a resource for completing your work with your group on the Vila Health business problem.

Instructions

For this assignment, using the daily stock trading volume from the Lowe's stock data set from Yahoo! Finance, complete the following actions:

1. Graph the daily stock trading volume and identify seasonality that might exist in the data, specifically identifying trend-cycle, seasonal effects, and irregular components.
2. Write a 4–6 page tutorial-format paper that explains how to prepare time series data, as well as to identify seasonality and apply seasonal adjustments on that data.
3. Use the activities you completed in your selected software to support your explanation.
4. Attach screenshots of your activity results with your assignment or as an addendum to your assignment.
5. Include the code created for this assignment as an attachment or addendum to your assignment.
6. Explain the method or metric that you used to identify seasonality and identify and apply the appropriate adjustments.
7. Be sure to support your recommendations with references.

Your assignment will be scored on the following criteria:

- Explain how applied forecasting software is used to prepare time series data.
- Explain how to identify seasonality in a particular set of time series data.
- Explain how to adjust time series data for seasonality.
- Explain how to evaluate the appropriateness of seasonal adjustments on time series data.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Seasonal Adjustments Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Include 4–6 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

Unit 5 >> Simple Linear Regression and Multiple Regression for Forecasting

Introduction

This week you will:

- Explore simple and linear regression methods for forecasting.
- Participate in a study group to determine which regression techniques are appropriate for the Vila Health business problem.
- Complete a mid-point review for your Vila Health virtual internship.

To this point we have reviewed technology and tools used for forecasting, created simple linear and multiple linear regression models, compared model evaluation techniques, and identified issues related to using linear regression on time-series data.

In this unit you will explore issues related to using only linear regression methods to address time-related predictive analytics and forecasting projects, and work with your group to summarize the work you have done thus far to attempt to address the Vila Health business problem. In the discussions, you will discuss potential issues related to using linear regression techniques, including assumptions required for linear regression models to accurately predict the response variable, as well as issues related to time and data latency. You will identify the best simple and multiple linear regression model that your group has created with the data you have available through Vila Health, or have gathered and added to the Vila Health data. In addition, during your group studies, you will use what you have learned from the discussion regarding issues with linear regression techniques for business problems like the Vila Health issue, and discuss how these issues might arise in the Vila Health problem, specifically. You will also work together to summarize your findings into your group Midpoint Review, to be submitted as your assignment for this unit.

Learning Activities

u05s1 - Studies

Readings

From the Internet, read:

- Wargon, M., Casalino, E., & Guidet, B. (2010). [From model to forecasting: A multicenter study in emergency departments](http://onlinelibrary.wiley.com/doi/10.1111/j.1553-2712.2010.00847.x/abstract). Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/j.1553-2712.2010.00847.x/abstract>

u05s2 - Study Group Tasks

The recommendations that your group agrees to this week need to be included as part of the Midpoint Review and Final Report and will contribute to your final group project grade. Therefore, it is critical that you do not skip any of these discussions. You will be able to make changes to your recommendations at any time during the course, but skipping a topic will negatively impact your grade.

Review the Analytics Internship: Evaluating Forecasting Models scenario. Consider the topics for discussion as you review the scenario. Search for details that are specific to these topics and that will aid you in making recommendations to Vila Health.

This week's topics for discussion:

- Out of the three models your group has created using linear regression techniques, which one does your group recommend using to address the Vila Health business problem?
- How good is your best linear model, and how did your group define "good"?
- What could your models be missing by only using simple or multiple linear regression techniques?
- What impacts might time and data latency have on the data and the models your group has created?

Review the description of Vila Health and the nature of the business problem. Identify options for selecting the optimal model for addressing the business problem, and issues with using only simple or multiple linear regression as a forecasting technique. Address potential issues that time and data latency might have on your selected model. Work with your group to develop a plan for attempting to address these issues or gaps in your current approach and model.

Course Resources

[Analytics Internship: Applied Forecasting | Transcript](#)

[Analytics Internship: Evaluating Forecasting Models | Transcript](#)

u05d1 - Simple Linear and Multiple Linear Regression

Reflect on your experience (in industry, in prior courses, and in this course) with linear regression, both simple and multiple. What issues are inherent in the assumptions we make when we use linear regression methods or models? Do most situations lend themselves to be predicted using a line? What alternatives exist? What issues might there be, specifically, in using a line for prediction with time-based data? What issues might arise due to latency in time and with the data on which we base our forecast?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you agree or disagree with, and why.

Course Resources

Graduate Discussion Participation Scoring Guide

u05a1 - Analytics Internship – Midpoint Review

Overview

For your Midpoint Review of the analytics internship, you will be summarizing what your group has done so far within the study group meetings for your Vila Health virtual internship to identify needed data, gather additional data, create and evaluate linear models, and recommend an optimal linear model. In addition, you will address issues with the current approach, including describing potential issues related to data and time latency.

Instructions

For this assignment:

- Summarize the business problem that your mentor has presented for the Vila Health forecasting project.
- Summarize what you have found in the research body of work using the readings in this course and research in the Capella library with respect to forecasting techniques and models used to address the business problem that Vila Health is currently facing, and the types of data that are required to use those techniques or create those models.
- Summarize the three or more linear models your group has created to address the Vila Health business problem. Be sure to include the variables that were used, the linear equation that was created, and any model performance methods or metrics that were used to summarize performance of each model.
- Describe the metrics or methods your group selected for evaluating and comparing the performance of these models.
- Use the metrics above to evaluate which forecasting model performed better for the Vila Health forecasting project, and explain why.
- Describe issues related to using only linear regression techniques for this forecasting application, and why those issues may cause predictions based on the current models to be not as accurate as they could be. Be sure to address issues related to time and data latency for this particular forecasting project, and whether these issues might be addressed with the linear regression approach taken thus far.
- Write a paper (of no more than 15 pages) that addresses all of the sections identified above. The paper will be a group effort, but will be individually submitted through the classroom. When submitting your group paper, be sure to include the names of your group members both on the title page of the paper, as well as in your submission comments.

Your assignment will be scored on the following criteria:

- Summarize a business problem for an applied forecasting project.
- Summarize the applied forecasting techniques currently used in the research body of work to address business problems.
- Summarize the selection of forecasting models resulting from the exploration of a forecasting project.
- Describe the selected comparison metrics for the models identified for a forecasting project.
- Evaluate which forecasting model performed best for a forecasting project, and explain why.
- Describe issues related to using linear regression techniques in forecasting applications for solving business problems.
- Encourage participation by peers, team members, and other stakeholders with diverse viewpoints.
- Reflect upon group work experience for an applied forecasting project.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Analytics Internship – Midpoint Review Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Write no more than 15 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

Course Resources

[Analytics Internship: Applied Forecasting | Transcript](#)

[Analytics Internship: Evaluating Forecasting Models | Transcript](#)

Unit 6 >> Exponential Smoothing

Introduction

This week you will:

- Explore methods for exponential smoothing.
- Participate in a study group to determine if exponential smoothing is useful the Vila Health scenario.
- Apply methods for exponential smoothing to a data set.

Many times, particularly with time-series data, linear regression techniques alone are not sufficient to create a forecast model that accurately predicts a response variable based on time. Sometimes, subjective techniques like smoothing, transformations, and seasonal adjustments are useful in improving a forecasting model that is attempting to address a particular business problem.

In this unit, you will explore subjective adjustment options to address time-related predictive analytics and forecasting projects, and work with your group to evaluate these as options for improving your forecast model that you are working on to address the Vila Health business problem. In the discussions, you will discuss exponential smoothing and other subjective modeling techniques. You will also identify possible subjective techniques that may be appropriate to use in modeling the data you have available through Vila Health, or have gathered and added to the Vila Health data. For the assignment in this unit, you will prepare time series data, apply smoothing methods, and explain the model evaluation method used by default (as well as any others available as options) and compare these to the model evaluation methods you identified in previous units.

Learning Activities

u06s1 - Studies

Readings

From the Capella library, review:

- Boyle, J., Jessup, M., Crilly, J., Green, D., Lind, J., Wallis, M., . . . Fitzgerald, G. (2012). Predicting emergency department admissions. *Emergency Medicine Journal*, 29(5), 358–365.

Use the Internet to read:

- Schubert, S., & Lee, T. (2011). Time series data mining with SAS Enterprise Miner. Retrieved from <https://support.sas.com/resources/papers/proceedings11/160-2011.pdf>

u06s2 - Programming Instructions

Using R

Access the [Using R](#) page on Campus for resources on Exponential Smoothing in R.

Using Python

Access the [Using Python](#) page on Campus for resources on Exponential Smoothing in Python.

Using SAS

Access the [Using SAS](#) page on Campus for resources on Exponential Smoothing in SAS.

u06s3 - Study Group Tasks

The recommendations that your group agrees to this week need to be included as part of the Final Report and will contribute to your final group project grade. Therefore, it is critical that you do not skip any of these discussions. You will be able to make changes to your recommendations at any time during the course, but skipping a topic will negatively affect your grade.

Review the Analytics Internship: Evaluating Forecasting Models scenario. Consider the topics for discussion as you review the scenario. Search for details that are specific to these topics and that will aid you in making recommendations to Vila Health.

This week's topics for discussion:

- What exponential smoothing techniques have been used by researchers to address the same or a similar business problem as that facing Vila Health?
- What exponential smoothing techniques do you think might be useful to address the Vila Health business problem?
- Did using any of these techniques improve the forecasting accuracy over the basic linear regression models you created previously?
- What methods can or should you use to evaluate whether using exponential smoothing or seasonal adjustments improves the forecasting accuracy over linear regression without any smoothing, transformations, or adjustments?

Review the description of Vila Health and the nature of the business problem. Identify options for using exponential smoothing to address the business problem. Identify what subjective techniques or methods might improve the accuracy of your forecast for the Vila Health business problem. Work with your group to evaluate smoothing, adjustment, and transformation options using the data available from Vila Health and any additional data you collected, and the techniques you learned by completing the steps in this unit's assignment.

Course Resources

[Analytics Internship: Applied Forecasting](#) | [Transcript](#)

[Analytics Internship: Evaluating Forecasting Models](#) | [Transcript](#)

u06d1 - Exponential Smoothing

Use the readings from this unit to provide an explanation, in nontechnical language, of exponential smoothing. Include answers to the following questions:

- What does exponential smoothing provide us?
- What do seasonal adjustments provide us?
- When might we want to use one or the other?
- Would there ever be a situation where we might want to use both?
- Are there other subjective techniques, or transformation or adjustment options that might be useful or helpful?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you agree or disagree with, and why.

Course Resources

[Graduate Discussion Participation Scoring Guide](#)

u06a1 - Exponential Smoothing

Overview

In your readings this unit you learned about several different subjective techniques, including smoothing techniques, transformations, seasonality, and adjustments related to seasonality, as well as how to apply these to a particular set of data. Use your readings from this unit and the instructions below to test different exponential smoothing techniques and select an optimal technique.

Be sure to save your project and code to use as a resource for completing your work with your group on the Vila Health business problem.

Instructions

For this assignment:

- Complete the following using the daily stock trading volume from the Lowe's stock data_set from Yahoo! Finance:
 - Apply all exponential smoothing methods on the data and select the most appropriate smoothing method.
- Write a 4–6 page tutorial format paper that explains how to use applied forecasting software to apply exponential smoothing methods on time series data.
 - Explain the method or metric used to determine whether the exponential smoothing method is appropriate or optimal for a particular time series data.
 - Compare and contrast exponential smoothing methods available for time series data and which ones are appropriate for the Lowe's stock data set.

Your assignment will be scored on the following criteria:

- Explain how applied forecasting software selects the optimal smoothing method for a particular set of time series data.
- Compare and contrast model evaluation methods used by applied forecasting software.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Exponential Smoothing and Seasonal Adjustments Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Include 4–6 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

u06s4 - Optional Resources

The following resources provides further information on this unit's topics.

- Ord, K., Fildes, R., & Kourentzes, N. (2017). *Principles of business forecasting* (2nd ed.). New York, NY: Wessex Press.
 - Chapter 3, "Forecasting Trends: Exponential Smoothing."
 - Chapter 4, "Seasonal Series: Forecasting and Decomposition."

Unit 7 >> Time Series Related Models

Introduction

This week you will:

- Explore methods for time series related models.
- Participate in a study group to determine what time series related models would be useful for the Vila Health scenario business problem.

- Apply time series modeling to a data set.

Like the subjective techniques covered in the previous unit, additional model options are available for time-related data, including those that include autoregression (AR) and moving averages (MA), as well as related methods. This category of time-series models is often referred to as autoregressive moving average (ARMA) and autoregressive integrated moving average (ARIMA) models.

In the next two units, you will learn about and apply ARMA and ARIMA models to the stock time series data you have used in previous units. ARIMA models have 3 parameters, p , d and q . The first step in determining what values each of these parameters should take when fitting an ARMA or ARIMA model to your data set is determining if your data is stationary or non-stationary. In this unit, you will take the first step in fitting an ARMA or ARIMA model by identifying the differencing parameter, d , for the ARMA/ARIMA model.

Learning Activities

u07s1 - Studies

Readings

From the Capella library, read:

- Reis, B. Y., & Mandl, K. D. (2003). Time series modeling for syndromic surveillance. *BMC Medical Informatics & Decision Making*, 3(1), 2–11.
- Kam, H. J., Sung, J. O., & Park, R. W. (2010). Prediction of daily patient numbers for a regional emergency medical center using time series analysis. *Healthcare Informatics Research*, 16(3), 158–165.
- Kadri, F., Harrou, F., Chaabane, S., & Tahon, C. (2014). Time series modelling and forecasting of emergency department overcrowding. *Journal of Medical Systems*, 38(9), 1–21. doi:<http://dx.doi.org/10.1007/s10916-014-0107-0>

u07s2 - Programming Instructions

Using R

Access the [Using R](#) page on Campus for resources on Time Series Related Models in R.

Using Python

Access the [Using Python](#) page on Campus for resources on Time Series Related Models in Python.

Using SAS

Access the [Using SAS](#) page on Campus for resources on Time Series Related Models in SAS.

u07s3 - Study Group Tasks

The recommendations that your group agrees to this week need to be included as part of the Final Report and will contribute to your final group project grade. Therefore, it is critical that you do not skip any of these discussions. You will be able to make changes to your recommendations at any time during the course, but skipping a topic will negatively affect your grade.

Review the Analytics Internship: Evaluating Forecasting Models scenario. Consider the topics for discussion as you review the scenario. Search for details that are specific to these topics and that will aid you in making recommendations to Vila Health.

This week's topics for discussion:

- What time series related model might apply to the business problem in the Vila Health scenario?
- Does using a time series model improve forecasting accuracy over the basic linear regression model? How would the answer to this question affect your work for the Vila Health scenario?

[Analytics Internship: Applied Forecasting | Transcript](#)

[Analytics Internship: Evaluating Forecasting Models | Transcript](#)

u07d1 - Time Series Related Models

Use the readings from this unit to provide an explanation, in nontechnical language, of time series related models. Include answers to the following questions:

- How do you know whether a time series data set is stationary or non-stationary?
- If you determine a time series data set is non-stationary, how do you figure out what how much differencing to apply to the data set to make it stationary?
- How does the autocorrelation function (ACF) plot influence how we decide to apply differencing, and what differencing parameter we use for a particular data set?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you agree or disagree with, and why.

[Graduate Discussion Participation Scoring Guide](#)

u07a1 - Time Series Related Models

Overview

In your readings this unit, you learned about time series related models as well as how to apply these to a particular set of data. Use your readings from this unit and the instructions below to conduct time series modeling.

Instructions

For this assignment, using the daily stock trading volume from the Lowe's stock data set from Yahoo! Finance, complete the following actions:

1. Create the autocorrelation function (ACF) plot for the Lowe's stock data set by fitting an ARIMA(0,0,0) model, and evaluate the autocorrelation to determine if differencing is required. Also make a note of the standard deviation of the fitted ARIMA(0,0,0) model. Use the following steps to assist you in making this determination:
 - Is the lag-1 autocorrelation zero or negative? If yes, then differencing may not be required for this data.
 - If the lag-1 autocorrelation is positive, fit an ARIMA model with a single order of differencing [ARIMA(0,1,0)] and evaluate the autocorrelation function (ACF) plot to determine if additional differencing is required. Make a note of the standard deviation in the output for the ARIMA(0,1,0) model.
2. Continue this process, testing for required additional differencing by incrementing the d parameter of an ARIMA with 0 for the other parameters, until there are signs of overdifferencing. (These may include a pattern of flipping from negative to positive (or positive to negative) in consecutive observations within the residual plot, a lag-1 autocorrelation of -0.5 or lower, or an increase in standard deviation from the prior model, with one level lower differencing (a differencing parameter of one less).
3. Write a 4–6 page tutorial-format paper that explains how to determine whether differencing is required for a time series data set and what the optimal differencing parameter is. Use the activities you completed in your selected software to support your explanation. Attach screenshots of your activity results with your assignment or as an addendum to your assignment.
4. Include the code created for this assignment as an attachment or addendum to your assignment.

5. Explain the method or metric that you used to determine the optimal differencing for this time series data set.
6. Be sure to support your recommendations with references.

Your assignment will be scored on the following criteria:

- Explain how to use applied forecasting software to determine whether a time series data set is non-stationary.
- Explain how to identify the optimal differencing parameter for an ARIMA model for a time series data set.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Time Series Related Models Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Include 4–6 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

u07s4 - Optional Resources

The following resources provides further information on this unit's topics.

- Ord, K., Fildes, R., & Kourentzes, N. (2017). *Principles of business forecasting* (2nd ed.). New York, NY: Wessex Press.
 - Chapter 5, "State-Space Models for Time Series."

Unit 8 >> ARIMA and ARMA

Introduction

This week you will:

- Explore ARMA, ARIMA, and related models.
- Participate in a study group to determine what ARMA, ARIMA, and related models would be useful for the Vila Health scenario business problem.
- Apply time series modeling to a data set.

In this unit, you will explore ARMA, ARIMA, and related models to address time-related predictive analytics and forecasting projects, and work with your group to evaluate these as options for improving your forecast model that you are working on to address the Vila Health business problem. In the discussion, you will discuss ARMA, ARIMA and related modeling techniques. You will continue with the SAS training modules, and will also identify possible ARMA and ARIMA models that may be appropriate to use in modeling the data you have available through Vila Health, or have gathered and added to the Vila Health data. For the assignment, you will prepare time series data, apply three ARMA or ARIMA models and explain them (including defining the model type and methods), evaluate the three models using one of the model fit evaluation techniques learned previously, and make recommendations regarding the adoption of these models for the identified business problem.

Learning Activities

u08s1 - Studies

Readings

From the Capella library, read:

- Chan, C., Huang, H., & You, H. (2012). [Intelligence modeling for coping strategies to reduce emergency department overcrowding in hospitals](#). *Journal of Intelligent Manufacturing*, 23(6), 2307–2318. doi:10.1007/s10845-011-0574-

Library Research

This week's assignment requires you to locate and evaluate a study or article from the Capella library. Please look ahead and plan your time accordingly.

u08s2 - Programming Instructions

Using R

Access the [Using R](#) page on Campus for resources on ARIMA and ARMA in R.

Using Python

Access the [Using Python](#) page on Campus for resources on ARIMA and ARMA in Python.

Using SAS

Access the [Using SAS](#) page on Campus for resources on ARIMA and ARMA in SAS.

u08s3 - Analytics Internship: Interpreting Forecasting Models

In this Vila Health activity, you will learn that the scope for the Vila Health project has been changed in ways that will affect the work and recommendations your team has been preparing. Your group will need to discuss what the changes mean and how they will affect the analytic approach. As you gather information from your mentor, consider what questions you and your team will need to address in order to make your final recommendations. Click Analytics Internship: Interpreting Forecasting Models to view the Vila Health scenario.

Course Resources

[Analytics Internship: Interpreting Forecasting Models](#)

u08s4 - Study Group Tasks

The recommendations that your group agrees to this week need to be included as part of the Final Report and will contribute to your final group project grade. Therefore, it is critical that you do not skip any of these discussions. You will be able to make changes to your recommendations at any time during the course, but skipping a topic will negatively affect your grade.

Review the Analytics Internship: Interpreting Forecasting Models scenario. Consider the topics for discussion as you review the scenario. Search for details that are specific to these topics and that will aid you in making recommendations to Vila Health.

This week's topics for discussion:

- What autoregressive, moving average, differencing, or other methods related to ARMA and ARIMA models have been used by researchers to address the same or a similar business problem as that facing Vila Health?
- What ARMA or ARIMA models do you think might be useful to address the Vila Health business problem?
- Did using any of these techniques improve the forecasting accuracy over the basic linear regression models you created previously? How about over the exponential smoothing, seasonal adjustments, or other subjective adjustment techniques you created previously?
- What methods appear to be the most effective at addressing the Vila Health business problem? Why?

- Specifically address differencing in the Vila Health data set. Does there appear to be any need for differencing? If so, what should the differencing parameter of ARIMA, d , be set to?

Review the description of Vila Health and the nature of the business problem. Identify options for using ARMA, ARIMA and related models to address the business problem. Identify what techniques or methods might improve the accuracy of your forecast for the Vila Health business problem. Work with your group to evaluate ARMA and ARIMA model options using the data available from Vila Health and any additional data you collected, and by completing the steps in the assignment for this unit.

Course Resources

[Analytics Internship: Applied Forecasting | Transcript](#)

[Analytics Internship: Evaluating Forecasting Models | Transcript](#)

[Analytics Internship: Interpreting Forecasting Models | Transcript](#)

u08d1 - ARIMA and ARMA

Use the readings from this unit to provide an explanation, in nontechnical language, of ARMA and ARIMA models. Include answers to the following questions:

- When might we want to use an ARMA or ARIMA model?
- How do ARMA and ARIMA differ from the exponential smoothing, seasonal adjustments, and other subjective adjustment methods?
- What are the differences between ARMA and ARIMA models?
- In addition to differencing (d), what are the other parameters of ARIMA models and what do they do?

Be sure to define any statistical terms you use in your definition, as your explanation is meant for the nonstatistically oriented businessperson to read and understand.

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you agree or disagree with, and why.

Course Resources

Graduate Discussion Participation Scoring Guide

u08a1 - ARIMA and ARMA

Overview

In your readings this unit, you learned about several different types of models, including autoregressive moving average (ARMA), autoregressive integrated moving average (ARIMA), state-space, and stationary models and modeling techniques, as well as how to use SAS to apply each of these to a particular set of data. Use your readings from this unit, the instructions below, and SAS Enterprise Miner to test fitting three different ARMA or ARIMA models on the data provided by your instructor.

Be sure to save your project and code to use as a resource for completing your work with your group on the Vila Health business problem.

Instructions

For this assignment, using the daily trading volume from Lowe's stock data set from Yahoo! Finance, complete the following actions:

1. Continue working on finding the optimal ARIMA(p,d,q) model starting with the differencing parameter you found as optimal in the Unit 7 assignment, and trying several p and q parameters, evaluating the autocorrelation function (ACF) and partial-autocorrelation function (PCF) graphs.

2. Note that the p parameter (which reflects the AR, or autoregressive, portion of an ARIMA) acts in an additive fashion to the differencing, but only as a portion of a difference, not the same way as adding a whole additional differencing parameter, but the q parameter (which reflects the MA, or moving average, portion of an ARIMA) acts in a subtractive, or canceling, fashion to the differencing, again only partially, not the same way that removing a whole differencing would behave.
3. Write a 4–6 page tutorial-format paper that explains how to fit ARMA and ARIMA models on time series data.
 - Use the activities you completed in your selected forecasting software to support your explanation.
 - Attach screenshots of your activity results with your assignment or as an addendum to your assignment.
 - Include the code created for this assignment as an attachment or addendum to your assignment.
 - Explain the model fit evaluation method or metric that you chose to use to compare the ARMA or ARIMA models you fit to the data.
 - Support your choice of model fit evaluation method or metric with references.
 - Evaluate the three ARMA or ARIMA models you built on the data provided, and discuss whether you recommend using them to address the business problem identified.
 - Support your evaluation and recommendation with references, and with definitions and explanations of the types of models you selected to fit.

Your assignment will be scored on the following criteria:

- Explain how applied forecasting software is used to prepare time series data.
- Fit a prescribed number of ARMA or ARIMA models on a data set.
- Explain a prescribed number of ARMA or ARIMA models that were fit on a data set.
- Define the model type and methods included in each of a prescribed number of ARMA or ARIMA models that were fit on a data set.
- Evaluate the prescribed number of ARMA or ARIMA models that were fit on a data set.
- Make a recommendation regarding using a prescribed number of ARMA or ARIMA models that were fit on a data set in order to address the identified business problem.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the ARMA and ARIMA Models Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Include 4–6 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

u08s5 - Optional Resources

The following resources provides further information on this unit's topics.

- Ord, K., Fildes, R., & Kourentzes, N. (2017). *Principles of business forecasting* (2nd ed.). New York, NY: Wessex Press.
 - Chapter 6, "Autoregressive Integrated Moving Average (ARIMA) Models."

Unit 9 >> Machine Learning Methods

Introduction

This week you will:

- Explore machine learning and neural networks.
- Participate in a study group to determine if machine learning and neural networks would be useful for the Vila Health scenario business problem.
- Test fitting a neural network on a data set for forecasting purposes.

Neural networks and other machine learning techniques are very common in "behind the scenes" type situations where no business or application-based explanation or interpretation has to be provided. Situations like this include intelligent search algorithms, like those used by Internet search engines, or intelligent marketing algorithms that determine which Web banner ad to serve an individual visiting a particular Web site. Although they are useful in many other applications, they are limited by the inability to explain them in a clear, logical way, using everyday language. This is why simpler models and methods, like linear regression, for example, which can be described using a simple equation of a line, and visualized with graph of a line, tend to be utilized more often.

In this unit, you will explore neural networks and other machine learning methods to address predictive analytics and forecasting projects, and work with your group to evaluate these as options for improving your forecast model. In the discussions, you will find and summarize an article or study from the Capella library that uses a machine learning method or model to address a business problem in an industry of your choice. You will identify possible neural networks that may be appropriate to use in modeling the data you have available through Vila Health, or have gathered and added to the Vila Health data. For the assignment, you will use a forecasting application of your choice to fit a neural network, explain it, evaluate the model using one of the model fit evaluation techniques learned previously, and make recommendations regarding the adoption of the neural network for the identified business problem.

Learning Activities

u09s1 - Studies

Readings

From the Capella library, read:

- Wang, J. (2012). *On quantifying and forecasting emergency department overcrowding at Sunnybrook Hospital using statistical analyses and artificial neural networks* (Master's thesis). Available from ProQuest Dissertations & Theses database. (UMI No. 1327515711).
- Tongkhaw, P., & Kantanantha, N. (2013). *Bayesian models for time series with covariates, trend, seasonality, autoregression and outliers*. *Journal of Computer Science*, 9(3), 291–298.

Use the Internet to read:

- Hoot, N. R., LeBlanc, L. J., Jones, I., Levin, S. R., Zhou, C., Gadd, C. S., & Aronsky, D. (2009). *Forecasting emergency department crowding: A prospective, real-time evaluation*. Retrieved from <http://jamia.oxfordjournals.org/content/16/3/338>

Library Research

This week's assignment requires you to locate and evaluate a study or article from the Capella library. Please look ahead and plan your time accordingly.

u09s2 - Programming Instructions

Using R

Access the [Using R](#) page on Campus for resources on Machine Learning, Neural Networks in R.

Using Python

Access the [Using Python](#) page on Campus for resources on Machine Learning, Neural Networks in Python.

Using SAS

Access the [Using SAS](#) page on Campus for resources on Machine Learning, Neural Networks in SAS.

u09s3 - Study Group Tasks

The recommendations that your group agrees to this week need to be included as part of the Final Report and will contribute to your final group project grade. Therefore, it is critical that you do not skip any of these discussions. You will be able to make changes to your recommendations at any time during the course, but skipping a topic will negatively affect your grade.

Review the Analytics Internship: Interpreting Forecasting Models scenario. Consider the topics for discussion as you review the scenario. Search for details that are specific to these topics and that will aid you in making recommendations to Vila Health.

This week's topics for discussion:

- Does a neural network or other machine learning method seem like an appropriate forecasting technique to use to address the Vila Health business problem?
- What additional data or information might be needed to create a neural network or other machine learning model to address the Vila Health business problem? If your group chooses to fit a neural network on the Vila Health data, how does its predictive performance (that is, model fit) compare to other models and methods you have used on this data previously?
- What do you need to take into consideration when explaining complex modeling techniques like neural networks or other machine learning techniques to stakeholders?
- How, as a group, do you plan to address any additional requirements or information presented to you by your mentor in Unit 8?

Begin to summarize and document results from all models, methods, and techniques you used on the Vila Health data and other data you gathered to supplement the data provided internally within Vila Health, evaluate the performance and fit of each, and form a recommendation on which model will be best to use to address the business problem identified at Vila Health. This summary is due as your final report in Unit 10.

Review the description of Vila Health and the nature of the business problem. Identify options for using a neural network to address the business problem. Work with your group to evaluate neural network options using the data available from Vila Health and any additional data you collected, and by completing the steps in the assignment for this unit.

Course Resources

[Analytics Internship: Applied Forecasting | Transcript](#)

[Analytics Internship: Evaluating Forecasting Models | Transcript](#)

[Analytics Internship: Interpreting Forecasting Models | Transcript](#)

u09d1 - Machine Learning Methods Applications

Use the Capella library to find one study or article that uses a machine learning method within your industry of choice, and write a summary description of your selected study or article. Be sure to include answers to the following questions in your summary:

- What industry is your selected article or study from?
- What was the business problem that the study or article was attempting to address?
- What data was used in this article or study? (What types of variables, data sources, et cetera?)
- What machine learning method was used in this study?
- How was a machine learning method used to address the business problem in this article or study?
- What results did the authors find in using the machine learning method to attempt to address the business or organizational problem identified in the article or study?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you found interesting, and why.

Course Resources

Graduate Discussion Participation Scoring Guide

u09a1 - Neural Networks

Overview

In your readings this unit, you learned about neural networks as one type of machine learning technique or model, some applications of these networks, and how to apply them to a particular set of data. Use your readings from this unit, the instructions below, and the forecasting application of your choice to test fitting a neural network on the data provided by your instructor. Be sure to save your project and your code to use as a resource for completing your work with your group on the Vila Health business problem.

Instructions

For this assignment, complete the following actions using the Lowe's stock data set from Yahoo! Finance:

1. Create a neural network to forecast daily stock trading volume.
2. Write a 4–6 page tutorial-format paper that explains how to fit a neural network on the data provided by your instructor.
 - Use the activities you completed in your selected forecasting application to support your explanation.
 - Attach screenshots of your activity results with your assignment or as an addendum to your assignment.
 - Include the code created for this assignment as an attachment or addendum to your assignment.
 - Explain the model fit evaluation method or metric that you chose to the neural network you created.
 - Support your choice of model fit evaluation method or metric with references.
 - Evaluate the neural network that you built on the data provided, and discuss whether you recommend using it to address the business problem identified.
 - Support your evaluation and recommendation with references, and with definitions and explanations of the type of model you selected to fit.

Your assignment will be scored on the following criteria:

- Explain how applied forecasting software is used to fit a neural network model.
- Fit a neural network model on a data set.
- Explain the neural network model that was fit on a data set.
- Evaluate the neural network model that was fit on a data set.
- Make a recommendation regarding using the neural network model that was fit on a data set in order to address the identified business problem.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Neural Networks Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Written communication is free of errors that detract from the overall message.
- **APA formatting:** Resources and citations are formatted according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** 4–6 typed double-spaced pages.
- **Font and font size:** Arial, 10 point.

u09s4 - Optional Resources

The following resources provides further information on this unit's topics.

- Ord, K., Fildes, R., & Kourentzes, N. (2017). *Principles of business forecasting* (2nd ed.). New York, NY: Wessex Press.
 - Chapter 12, "Putting Forecasting Methods to Work."
 - Chapter 10, "Advanced Methods for Forecasting, Section 4, Neural Network Methods."

Introduction

This week you will:

- Complete a Personal Effectiveness Assessment.
- Complete your final report for the Vila Health Analytics Internship.

In this unit, you will summarize the work you have done with your group during this course to address the Vila Health business problem. You will identify the best model your group created with the data you had available through Vila Health, or have gathered and added to the Vila Health data. You will summarize your findings into your final project, to be submitted as your Unit 10 assignment.

You will also complete a Personal Effectiveness Assessment for how well you and your group members worked together.

Learning Activities

u10s1 - Studies

Readings

From the Capella library, read:

- Jessup, M., Wallis, M., Boyle, J., Crilly, J., Lind, J., Green, D., . . . Fitzgerald, G. (2010). [Implementing an emergency department patient admission predictive tool](#). *Journal of Health Organization and Management*, 24(3), 306–318.
- Jessup, M., Crilly, J., Boyle, J., Wallis, M., Lind, J., Green, D., & Fitzgerald, G. (2015, April 27). [Users' experiences of an emergency department patient admission predictive tool: A qualitative evaluation](#). *Health Informatics Journal*, pp. 1–15. doi:10.1177/1460458215577993

u10s2 - Personal Effectiveness Assessment

For this activity, you will review your peers—and they you—on personal effectiveness skills, based on contributions to the group discussions. Please complete one survey for each member of your group. The assessment addresses the following characteristics:

- Interpersonal Skills.
- Integrity.
- Professionalism.
- Initiative.
- Dependability and Reliability.
- Willingness to Learn.

At certain points in your educational journey, you will meet with your department head for a 1:1 interview. The reviewer will gather your peer's assessments and your own self-reflections and use the data from these, in conjunction with the insight obtained during the 1:1 interview, to assess your skills. Your department head will provide you with feedback specifically intended to help you improve upon these skills.

During your capstone course the capstone panel of professionals will conduct a final review of your personal effectiveness skills. This final review will be assessed and your scores will be calculated as part of your final grade.

Course Resources

[Personal Effectiveness Assessment](#)

u10a1 - Analytics Internship - Final Report

Overview

For your final report of your Analytics Internship with Vila Health for this term, you will be summarizing what your group has done within the study group meetings for your Vila Health virtual internship to identify needed data, gather additional data, create and evaluate different models and modeling techniques, and recommend an optimal model based on your research and analysis as a group.

Instructions

For this assignment:

- Summarize the business problem that your mentor has presented for the Vila Health forecasting project.
- Summarize what you have found in the research body of work using the readings in this course and research in the Capella library with respect to forecasting techniques and models used to address the business problem that Vila Health is currently facing, and the types of data that are required to use those techniques or create those models.
- Summarize the three or more linear models your group has created to address the Vila Health business problem. Be sure to include the variables that were used, the linear equation that was created, and any model performance methods or metrics that were used to summarize performance of each model.
- Describe the metrics or methods your group selected for evaluating and comparing the performance of the models you used.
- Use the metrics above to evaluate which forecasting model performed best for the Vila Health forecasting project, and explain why.
- Describe issues related to using only linear regression techniques for this forecasting application, and why those issues may cause predictions based on the current models to be less accurate than they could be. Be sure to address issues related to time and data latency for this particular forecasting project, and whether these issues might be addressed with the linear regression approach taken thus far.
- Evaluate the use of specialized time series methods, including subjective methods like exponential smoothing, transformations, and seasonal adjustments, as well as ARMA and ARIMA modeling techniques for addressing the business problem presented at Vila Health.
- Describe issues related to each of the forecasting models and methods that you learned and created within this course, as it relates to the Vila Health business problem your group is attempting to address.
- Recommend one optimal model for addressing the business problem at Vila Health, interpret this model relative to the business problem it is attempting to address, and explain how this model will be used to address the business problem at Vila Health on an ongoing basis.
- Recommend an ongoing validation process and update schedule for your selected model.
- Evaluate the performance of your selected optimal model on the additional data sets provided from the additional Vila Health institutions, and recommend whether the additional institutions should adopt this same model or method for addressing the same business issue.
- Write a paper (of no more than 25 pages) that addresses all of the sections identified above. The paper will be a result of the group work, but will be individually submitted through the classroom. When submitting your group paper, be sure to include the names of your group members both on the title page of the paper, as well as in your submission comments.

Your assignment will be scored on the following criteria:

- Evaluate forecast model outcomes to solve organizational problems.
- Articulate the impact of time and data latency on forecasting.
- Identify patterns in the output of forecast models.
- Apply forecasting techniques to reduce uncertainty for the stakeholder.
- Provide a logical argument in support of conclusions or recommendations.
- Encourage participation by peers, team members, and other stakeholders with diverse viewpoints.
- Reflect upon group work experience for an applied forecasting project.
- Use communication style and vocabulary that are appropriate for the target audience.

Refer to the Analytics Internship – Final Report Scoring Guide for more details.

Additional Requirements

Please adhere to the following:

- **Written communication:** Use written communication that is free of errors that detract from the overall message.
- **APA formatting:** Format resources and citations according to APA current edition style and formatting.
- **Number of resources:** Include a list of any articles or readings you reference or use to complete your assignment.
- **Length of paper:** Write no more than 25 typed double-spaced pages.
- **Font and font size:** Use Arial, 10 point.

Course Resources

[Analytics Internship: Applied Forecasting | Transcript](#)

[Analytics Internship: Evaluating Forecasting Models | Transcript](#)

u10d1 - Course Reflection

Reflect on the past 10 weeks of this course. Elaborate on what you have found most informative and how you can apply what you have learned in future endeavors. Discuss the challenges and opportunities you encountered. What was the most challenging aspect of the course?

Response Guidelines

Respond to at least two other learners and share with them the portions of their initial post that you agree or disagree with, and why.

Course Resources

Graduate Discussion Participation Scoring Guide

u10s3 - Optional Resources

The following resources provides further information on this unit's topics.

- Ord, K., Fildes, R., & Kourentzes, N. (2017). *Principles of business forecasting* (2nd ed.). New York, NY: Wessex Press.
 - Chapter 13, "Forecasting in Practice."