Program-Level Assessment: Annual Report

Program: MS Analytics (previously MS Applied Analytics)	Department:
Degree or Certificate Level: Master's	College/School: School for Professional Studies
Date (Month/Year): June 2021	Primary Assessment Contact: Srikanth Mudigonda

In what year was the data upon which this report is based collected?

Summer 2020, Fall 2020, Spring 2021

In what year was the program's assessment plan most recently reviewed/updated?

2021

1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment cycle?

The learning outcome assessed during this cycle is, *Graduates will be able to implement analytics systems that facilitate context-appropriate decision making.*
We assessed this last year as well. Re-doing it because of the importance of this in terms of preparing students for employment in professional areas associated with analytics.

2. Assessment Methods: Student Artifacts

Which student artifacts were used to determine if students achieved this outcome? Please identify the course(s) in which these artifacts were collected. Clarify if any such courses were offered a) online, b) at the Madrid campus, or c) at any other off-campus location.

The final projects that students submitted as part of: (a) AA 5963 - the final credit hour in their master's research project sequence; (b) AA 5300: Advanced Analytics; (c) AA 5800: Simulation and modeling.
The program is offered in an entirely online format, so each course in the program is offered in an entirely online format.

3. Assessment Methods: Evaluation Process

What process was used to evaluate the student artifacts, and by whom? Please identify the tools(s) (e.g., a rubric) used in the process and include them in/with this report.

Rubrics that were used for evaluating the final projects of the students were used in assessing the learning outcomes. In addition, data from end-of-course evaluations by the instructor of the courses, along with exit interviews of graduating students is also used.

4. Data/Results

What were the results of the assessment of the learning outcomes? Please be specific. Does achievement differ by teaching modality (e.g., online vs. face-to-face) or on-ground location (e.g., STL campus, Madrid campus, other off-campus site)?

The course AA 5800 (Summer 1, 2020) had 9 students, of whom 6 did very well on the final project, 1 did not complete the project (dropped the course), and 2 did reasonably well. Based on the final projects (rubric in file

"AA5800-project-rubric.pdf"), it was evident that there was a struggle with creating/adapting the code needed for running the analyses. While helping the students with the projects, I realized that the struggles stemmed from not developing a fluency in the specific way in which the statistical models needed to be specified. This problem, in turn, stemmed from relying heavily on the learning materials (code, in particular) provided by the author of the course's textbook – students knew how to read the code and use it, but were uncomfortable in coming up custom code to analyze their unique datasets for the project. This finding holds, to different degrees, across all but one student's work (so 7 out of 8 students who completed the final project struggled, to varying degrees, with creating the code from scratch).

The course AA 5300 (Spring 1, 2021): Advanced Analytics had 16 students of whom 3 students were not from the MS Analytics program, so their work has not been included in the assessment (as their academic preparation coming into the class is not necessarily the same as that of a typical student in the MS Analytics program taking the course). Of the remaining 13 students, 1 did poorly, 2 reasonably well, and 10 very well. Based on the experience gained during the previous time this course was taught, changes were made to the choice of learning materials (software framework used, sequence in which concepts were presented, etc.). These appear to have led to more positive outcomes. Speaking with the students, in conjunction with looking at the anonymous feedback provided via Blue, and their performance on the final project, it appeared that the current cohort are more comfortable with writing the needed code by building upon what they learned both during this course and in AA 5000: Foundations of Analytics, which is a key pre-requisite.

The quality of work submitted by students (Summer 2020: 2; Fall 2020: 3; Spring 2021: 4) in the final projects in the master's research project sequence - AA 5963 - was mostly of high quality: 5 students performed exceptionally well, 3 reasonably well, and 1 barely met the requirements. As part of the final project's presentation (details of the project + associated evaluation rubric can be found in the document "Master's Research Project Overview-MSAA.pdf"), in addition to discussing the nuances of their projects, students have an informal "exit interview" with the program director (me). Reflecting on what was presented, it was evident that the current cohort of students (with the one exception) have gained the knowledge and skills needed to implement analytics-based systems to address decision-making in specific (organizational) contexts.

5. Findings: Interpretations & Conclusions

What have you learned from these results? What does the data tell you?

Reflecting on the assessments performed in AA 5300, AA 5800, and AA 5963, it is clear that the recent changes made within AA 5000 (which is a key pre-requisite to both AA 5300 and AA 5800) were largely helpful. In addition, it was evident that the changes made to the content and its delivery in AA 5300 were also helpful. Additionally, a weakness in the choice of learning materials (specifically, code) used in AA 5800 became apparent.

Overall, most of the students who completed the program's capstone – the final credit hour of the three-part master's research project sequence – AA 5963 – were well prepared to:
a) take on the challenge of independently (with some mentoring from the program director, as needed);
b) defining an organizational problem and assigning a reasonable scope to it;
c) designing and implementing an analytics-based system for addressing it and aiding decision-making in that context

The one exceptional student who did not perform well also ended up having difficulties in earlier coursework (specifically, both AA 5300 and AA 5800), stemming from other challenges in her life.

Synthesizing these findings, here are the next steps:

1. continue with the approach used in AA 5300;
2. revisit the choice of coding-related content of AA 5800: use a combination of material from the textbook's author initially in the course, and switch to a wider variety of code libraries and associated code syntax in later part of the course, to increase student's fluency with writing the code needed for building sophisticated statistical models;
3. continue to carefully monitor student performance in courses leading up to the master's research project to ensure that students are adequately prepared to take on the challenge of independent, context-specific research and design + implementation of analytics systems based on such research.

6. Closing the Loop: Dissemination and Use of Current Assessment Findings

A. When and how did your program faculty share and discuss these results and findings from this cycle of assessment?

The program director will, through one-one meetings, share the findings of this cycle of assessment with the faculty teaching other courses in the program, specifically those courses that are related to this learning outcome and/or are pre-requisites for courses that address this learning outcome. In particular the following course's instructors will be informed and made aware of the larger context of assessment: AA 5100: Information Retrieval; AA 5200: Information Visualization and Presentation; AA 5750: Contemporary Issues in Analytics. This will help them prepare for having their courses being part of the next cycle of assessment.

B. How specifically have you decided to use findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies	• Course content • Teaching techniques • Improvements in technology • Prerequisites	• Course sequence • New courses • Deletion of courses • Changes in frequency or scheduling of course offerings
Changes to the Assessment Plan	• Student learning outcomes • Student artifacts collected • Evaluation process	• Evaluation tools (e.g., rubrics) • Data collection methods • Frequency of data collection

Please describe the actions you are taking as a result of the findings.

As mentioned earlier in sections 4 and 5, AA 5800 would be revised to improve student's fluency, and thus confidence, in creating the code needed for sophisticated statistical analyses. Additionally, instructors in courses that are auxiliary and help in addressing the LO of "*Graduates will be able to implement analytics systems that facilitate context-appropriate decision making"* will be informed of the results of the current assessment cycle. These instructors' inputs will be sought in determining the changes that are needed, if any, to their courses to improve the competence and self-efficacy of students. The goal is to develop the students' confidence in writing code that is part of different phases in the sequence of activities that are part of designing and implementing analytics systems.

If no changes are being made, please explain why.

7. Closing the Loop: Review of Previous Assessment Findings and Changes

A. What is at least one change your program has implemented in recent years as a result of assessment data?

During the previous assessment cycle, changes were made to AA 5000: Foundations of Analytics, which is a key pre-requisite to AA 5300 and AA 5800. During the current academic year, changes were made to AA 5300 to address the needs for revision that were discovered during the previous assessment cycle. The current version appears to have resulted in a better learning experience for the students. Additionally, weaknesses discovered as part of assessment associated with AA 5800 during the 2020-21 assessment cycle will be addressed in the current (i.e., summer 2021) iteration of the course, and the results will be assessed.

B. How has this change/have these changes been assessed?

As explained previously in this document, the changes made to AA 5000 and AA 5300 led to positive outcomes.

C. What were the findings of the assessment?

Please see part A above.

D. How do you plan to (continue to) use this information moving forward?

Please see part A above.

IMPORTANT: Please submit any assessment tools and/or revised/updated assessment plans along with this report.

MS Applied Analytics Master's Research Project Sequence: AA 5961, AA 5962, and AA 5963

Overview

The Master's Research Project (MRP) emphasizes a synthesis and demonstration of the competencies gained during a student's time in the MS Applied Analytics program. Students have two possible alternative approaches for completing the Master's Research Project (MRP) sequence. In the first approach, students choose to address a problem drawn from an organizational[1] or a societal context via the identification of specific research questions associated with the problem, designing and implementing a process for collecting relevant data and analyzing them using appropriate analysis methods, and reporting the results, along with appropriate recommendations, to decision-makers for whom the problem is of significance. In the second approach, students choose to address a problem drawn from an organizational or a societal context by building a prototype of an analytical system that will aid decision-makers for whom the problem is of significance.

The specific approach chosen by the student will be determined on the basis of the specific nature of the problem, its context, feasibility of implementing a project using the proposed approach within the context in which it is relevant, and other pertinent considerations.

The MRP's activities are distributed across three courses. Descriptions of each of the three courses, in terms of the expected activities and outcomes in each of them, are provided below.

AA 5961: Applied Analytics Masters Research Project – I

This is the first course in a three-part sequence of courses. At the end of this credit hour, students will have identified the purpose and scope of the problem they intend to address.

By the end of this course, the student is expected to have completed the following tasks, to receive a satisfactory grade.

1. Identify a problem and explain its significance in the larger organizational or societal context.
2. If needed and feasible, in the case of an organizational problem, meet appropriate stakeholders and obtain formal permission and support that are needed for defining the scope of the problem, and collecting the required data.
3. Relying on research of pertinent literature drawn from academic and practitioner streams, define the problem unambiguously, taking into account its scope and the feasibility of addressing it.
4. Provide an informal overview of relevant literature.
5. Derive an overarching research question to guide the project, taking into account what has been discovered via literature.

AA 5962: Applied Analytics Masters Research Project – II

This is the second course in a three-part sequence of courses. At the end of this credit hour, students will have created an applied research design that includes a proposal for addressing the organizational problem that was identified and described in AA 5961. This course may be taken only after completing AA 5961 with a satisfactory grade.

By the end of this course, the student is expected to have completed the following tasks, to receive a satisfactory grade.

1. Submit a formal literature review of the research findings pertinent to the problem by situating the problem within the larger context of extant relevant knowledge.
2. Derive two-three specific research questions from the problem's definition and overarching research question (completed in AA 5961)
3. Explain how, by addressing these research questions using appropriate methods[2], the problem can be addressed.

1 The problem could be specific to the organization where the student is employed, another organization to which the student has access, or to a generic organization in an industry with which the student has a deep level of domain knowledge.

2 These questions will also take into account whether the project will involve the creation of a prototype or whether it involves collection of appropriate and their analysis.

4. Identify ethical concerns and any barriers that are associated with the proposed design.
5. Devise an appropriate approach for addressing any relevant ethical concerns.
6. Determine and provide a detailed time-line for implementing the project.

AA 5963: Applied Analytics Masters Research Project – III

This is the third course in a three-part sequence of courses. At the end of this credit hour, students will have implemented an applied research project to address an organizational or societal problem, written a formal report of findings and recommendations, and produced a reflection of their experiences and its implications for their future. In the case of a prototype-based project, the student will have implemented the prototype to meet the specifications determined in the previous two courses in the sequence. This course may be taken only when students have completed AA 5961 and 5962 with satisfactory grades.

By the end of this course, the student is expected to have completed the following tasks, to receive a satisfactory grade.

1. Synthesize and analyse competencies learned throughout the program.
2. Create and submit a reflection document in which the student explains which competencies played an important role in the project and why they are important.
3. In the case of a data-collection-and-analysis-based project, apply appropriate analyses of the collected data and draw valid conclusions.
4. In the case of a prototype-based project, ensure that the prototype meets all specifications to a satisfactory level.
5. In a written report, provide detailed explanations, using appropriate formats, of the chosen approach for addressing the problem, and provide well-reasoned, appropriate, recommendations to decision-makers for whom the original problem that was addressed is relevant.
6. Explain any deviations from the original time-line and/or scope of the project.
7. Demonstrate competence to present orally, using appropriate visual aids, a summary of the master's research project to relevant stakeholders[3].

The MRP Process

Students will work with a faculty mentor throughout the 3-hour sequence. Students must proceed through the MRP series in sequence and cannot start subsequent hours prior to completing successfully preceding hours (e.g., a student cannot start AA 5962 prior to successfully completing AA 5961). The first credit hour, AA 5961, can be taken as soon as the student has obtained the foundational knowledge in applied analytics (this can be as early as after completing their first four courses in the program). The second credit hour, AA 5962, can be taken once the student has completed coursework in research design. The third credit hour can be taken when the student is close to finishing all the requirements of the program – typically in the final term of study before graduation.

On-site Project Mentor

To assist in (a) developing the proposal for the capstone project, and (b) executing the project, students will identify a mentor within their organizations during AA 5961. The on-site mentor should possess the following characteristics:

1. Possess at least a Master's degree, though it does not have to be in the area of analytics;
2. Hold a position within the organization that is relevant to the project (i.e., the student wants an on-site mentor who has the position, expertise, and referent power to assist with the project);
3. Be willing and eager to mentor the student throughout the entire project, including attending the oral presentation; and
4. Be willing and able to provide guidance and feedback throughout the project (although they are not expected to participate in the grading process).

Executing the MRP

Upon completion of AA 5963, students are responsible for preparing a written summary of the project that includes all of the following elements (as noted above, students will be completing pieces of this at each step of the MRP sequence):

- ***Purpose and Scope*** - overview and scope of the project, including background information necessary to understand the purpose and context of the project (AA 5961);
- ***Literature Review*** - a literature review of the topic that draws from both scholarly and practitioner streams, but must have at least 60% scholarly, peer-reviewed references and a minimum of 10 sources. The literature review

3 The group to whom the presentation will be made will be determined jointly by the student and the student's faculty and, if present, organizational mentor(s).

should conclude with a research question(s) that aligns with the purpose and guides the methodology (AA 5961 & AA 5962);

- ***Method*** - a description of the methodology to collect data and/or key activities involved in the project, including a sub-section on the key MS AA competencies they plan on utilizing and how they plan to utilize them (AA 5962);
- ***Results*** – a description of the analyses of the collected data to draw conclusions, including appropriate graphical presentation (AA 5962 and 5963);
- ***Discussion and Recommendations –*** a thoughtful discussion of key findings from the results, including attention paid to recommendations or improvements suggested based on your data (AA 5963);
- ***Reflection*** - a summary evaluation of the project that describes what was learned during the project (e.g., what worked well, what could have been done differently), which should conclude with a final reflection of how students have personally grown in pursuit of the MS AA program learning objectives (AA 5963); and
- ***References –*** all references correctly cited (AA 5961, AA 5962, AA 5963).

The MRP will be reviewed by the faculty mentor at each step. Please note that the entire document ***must be*** written in APA style, with no errors. Students can expect several rounds of revisions or modifications at each stage of the project. A passing grade must be obtained for each credit hour before proceeding onto the next one. The dataset(s) + analysis code produced and used as part of the MRP are to be submitted alongside the project report document. In addition to the written document, students whose project belongs to the second approach – a software-based analytics prototype – would be required to submit all of the source code associated with the prototype.

Presenting the Project

Once the written summary (along with dataset(s) and any associated source code) has been evaluated as acceptable, students will present a summary of their written capstone project to readers in a final live presentation. All readers must attend this final presentation, though the presentation may be delivered via distance technology, such as video-teleconferencing. At this time, the readers may ask additional questions about the project, its future implications, and students' future career plans. This final presentation will serve as the final capstone experience. There are three specific rubrics that will be used to evaluate the three final deliverables in AA 5961-5963. These are presented next.

Rubrics

In this section the rubrics to be used for scoring the final deliverables submitted by students in each of the three MRP courses are presented.

Rubric for scoring the final deliverable in AA 5961

	0 Performance Indicator Not Met	**1 Progress Toward Meeting Performance Indictor**	**2 Performance Indicator Met**	**3 Exceeds Expectation**	**Score**
Purpose and Scope	Background overview information is not presented.	Background overview and scope is partially presented or presented in a haphazard manner.	Background overview and scope of the project is complete;	Background overview and scope of the project is complete; differentiation between overview, scope and purpose is distinct.	
Literature Review	Very little literature is reviewed.	Some literature is reviewed, but does not make a coherent argument. Review is similar to an annotated bibliography.	Some literature is reviewed, but it may show little breadth or may focus too little attention on scholarly sources. Review's argument needs refinement.	Review shows breadth and makes a strong argument. LR concludes with clear research question(s).	
References	References are absent.	References are presented; however, they are not affiliated with the project.	References are complete and affiliated with the project.	References are complete, affiliated with the project, and includes both historical and contemporary citations, as well as scholarly and non-scholarly sources.	
Readability	Document contains numerous formatting issues or contains substantial readability issues that are consistent throughout.	Document may have a fair number of formatting issues with relation to APA style; readability may detract from sizable portions of the document.	Document is reasonably well-written, with mostly proper APA formatting; it may contain only minimal errors that affect readability.	Document is well-written, formatted correctly (using APA style) and contains no errors that affect readability.	

Rubric for scoring the final deliverable in AA 5962

	0 Performance Indicator Not Met	**1 Progress Toward Meeting Performance Indictor**	**2 Performance Indicator Met**	**3 Exceeds Expectation**	**Score**
Purpose and Scope	Background overview information is not presented.	Background overview and scope is partially presented or presented in a haphazard manner.	Background overview and scope of the project is complete;	Background overview and scope of the project is complete; differentiation between overview, scope and purpose is distinct.	
Literature Review	Very little literature is reviewed.	Some literature is reviewed, but it may show little breadth or may focus too little attention on scholarly sources. Primary argument needs refinement.	Review shows some breadth. Key argument(s) are clear. LR concludes with clear research question(s).	Review shows great deal of depth. Review has clear thesis and makes a compelling argument. Concludes with clear research question(s) that aligns with the purpose.	
Method	Methodology is incomplete. Does not include section on how key AA competencies will be utilized.	Methodology is inadequate to address chosen purpose. Section on how key AA competencies will be utilized is absent or not supported.	Methodology is complete and adequately addresses chosen purpose. Section on how key AA competencies will be utilized is clear and sufficiently supported.	Methodology is complete and clearly aligns with purpose and literature review. Section on how key AA competencies will be utilized is thoughtful, in-depth, and extremely well-supported.	

References	References are absent.	References are presented; however, they are not affiliated with the project.	References are complete and affiliated with the project. At least 60% of references are from scholarly sources and has at least 10 sources total.	References are complete, affiliated with the project, and includes both historical and contemporary citations. At least 60% of references are from scholarly sources and exceeds 10 sources total.	
Readability	Project contains numerous formatting issues or contains substantial readability issues that are consistent throughout.	Project may have a fair number of formatting issues with relation to APA style; readability may detract from sizable portions of the project.	Project is reasonably well-written, with mostly proper APA formatting; it may contain only minimal errors that affect readability.	Project is well-written, formatted correctly (using APA style) and contains no errors that affect readability.	

Rubric for scoring the final deliverable in AA 5963

	0 **Performance Indicator Not Met**	**1** **Progress Toward Meeting Performance Indictor**	**2** **Performance Indicator Met**	**3** **Exceeds Expectation**	**Score**
Abstract	Abstract is not included.	Abstract is incomplete or unclear.	Abstract is complete and mentions all sections (i.e., purpose and scope, methods, results, conclusions, and recommendations).	Abstract mentions all sections (i.e., purpose and scope, methods, results, conclusions, and recommendations). It is unified, coherent, and concise (not more than 250 words).	
Purpose and Scope	Background overview information is not presented.	Background overview and scope is partially presented or presented in a haphazard manner.	Background overview and scope of the project is complete;	Background overview and scope of the project is complete; differentiation between overview, scope and purpose is distinct.	
Literature Review	Very little literature is reviewed.	Some literature is reviewed, but it may show little breadth or may focus too little attention on scholarly sources. Primary argument needs refinement.	Review shows some breadth. Key argument(s) are clear. LR concludes with clear research question(s).	Review shows great deal of depth. Review has clear thesis and makes a compelling argument. Concludes with clear research question(s) that aligns with the purpose.	
Method	Methodology is incomplete.	Methodology is inadequate to address chosen purpose.	Methodology is complete and adequately addresses chosen purpose.	Methodology is complete and clearly aligns with purpose and literature review.	
Results	Description of data or evidence was not presented.	Description of data or evidence is incomplete or presented without logical order and little discussion.	Description of data or evidence is complete, appropriately ordered, and adequately discussed.	Description of data or evidence is complete, appropriately ordered, and thoroughly discussed. Graphical presentation is included (if possible).	
Discussion and Recommendation	Discussion and/or recommendations are absent.	Discussion and/or recommendations are incomplete.	Discussion and recommendations are complete.	Discussion and/or recommendations are complete. Recommendations are clearly tied to key findings. Implications are included and linked to literature review.	

Final reflection	Final reflection is absent.	Final reflection is incomplete.	Final reflection is complete.	Final reflection is complete, well-supported, and tied to the PLOs of the program.	
References	References are absent.	References are presented; however, they are not affiliated with the project.	References are complete and affiliated with the project. At least 60% of references are from scholarly sources and has at least 10 sources total.	References are complete, affiliated with the project, and includes both historical and contemporary citations. At least 60% of references are from scholarly sources and exceeds 10 sources total.	
Readability	Report contains numerous formatting issues or contains substantial readability issues that are consistent throughout.	Report may have a fair number of formatting issues with relation to APA style; readability may detract from sizable portions of the project.	Report is reasonably well-written, with mostly proper APA formatting; it may contain only minimal errors that affect readability.	Report is well-written, formatted correctly (using APA style) and contains no errors that affect readability.	
Deliverables	None provided	One or more of the following are missing: (a) all source code files; (b) all data files; (c) written report.	One of the following are missing: (a) all source code files; (b) all data files	All of the deliverables have been submitted	

Oral Presentation - Final Capstone Experience (ORLD 5963)

Objective: The master's candidate will demonstrate the ability to present orally, using a combination of appropriate visual aids, a summary of her/his research project.

Scoring Document/Performance Indicators

	Not Applicable	**0 Performance Indicator Not Met**	**1 Progress Toward Meeting Performance Indicator**	**2 Performance Indicator Met**	**3 Exceeds Expectation**	**Score**
Oral Summarizaution of Project		Oral summary is illogical and did not convey the content of the project.	Oral summary is logical; however, coverage of the project is inadequate.	Oral summary is logical; coverage of project is thorough	Oral summary is logical; coverage of project is thorough; candidate is able to expand on subject.	
Response to Queries		Candidate inappropriately responded to more than 50% of queries.	Candidate appropriately responded to more 50% but less than 70% of queries.	Candidate appropriately responded to more than 70% of queries.	Candidate appropriately responded to more than 90% of queries.	
Ability to address future implications.		Responses are not specific; responses do not build upon content of project.	Responses are either weak or do not build upon content of project.	Responses are appropriate and build upon content of project.	Responses are superior, validate reflection, and build upon content of project.	

The student may be asked to revise substantial portions of the written project or to re-present his/her project as dictated, based on her/his performance in the final presentation and/or the written report and other deliverables.

AA 5300 Rubric for data analysis project

Rubric for data analysis project

Criteria	Ratings	Pts
Introduction - overview of data 1. Overview of the dataset: a) Contextual information: i. Source of the data. (1) ii. A brief description of objectives behind the collection of the data. (1.5) iii. The entity that collected the data. (0.5) iv. Questions that audience interested in the dataset and its analyses might seek to see answered, etc. (2.5) Present the questions in a numbered list. (0.5)	This area will be used by the assessor to leave comments related to this criterion.	6 pts
Introduction - variables b) Variables present: i. Their types (categorical/continuous). (1) ii. Their roles (predictor or outcome). (1) Present this information in a table with appropriate column headers. (0.5)	This area will be used by the assessor to leave comments related to this criterion.	2 pts
Type of analyses 2. Type of analyses: a) A brief explanation of which analytical techniques are applicable for regression and why. (1) b) A brief explanation of which analytical techniques are applicable for classification and why. (1) The descriptions of the methods will be in brief in this section; detailed explanations are to be provided in the Analyses section – see the first requirement in Analyses below.	This area will be used by the assessor to leave comments related to this criterion.	2 pts
Analyses - overview 1. Overview: In a table with three columns and one row per method, describe in sufficient detail: a) Methods of analyses that are applicable. (3) b) For each method, an explanation of whether you intend, or not, to use the method (3) c) Present concisely the rationale behind using or not using the method, within the context of your dataset, and what you know about the method's strengths and weaknesses. (3) d) If you have used clustering or dimensionality reduction, explain in what way this/these technique/techniques aided the model building process. If you have not used either of these approaches, explain why these methods were not used (2 points). e) If you have used subsampling to obtain a reduced (rows) version of your dataset in order to achieve model fit in a reasonable amount of time, explain the details of the approach you have used (please feel free to use the approach that was described during the week 7 Zoom session and in the Canvas Q+A discussion thread (response posted on March 6, 12:06 AM) by the instructor to substantiate your choice	This area will be used by the assessor to leave comments related to this criterion.	13 pts

Criteria	Ratings	Pts
of subsampling strategy. If you did not use subsampling, explain why that was not needed. (2 points)		
Analyses - summary of results 2. Summary of results: Create a table for each method that you have used (that is, if you have used three modeling techniques, you will include three individual tables, one per each technique), where you present: a) Details of the validation method used (k-fold CV, preferably with repetitions, using Caret or hand-written k-fold CV code) (1) b) Model formulas of the various models you have fit using the particular method. (3) c) An explanation, using appropriate evidence, of model selection and evaluation measures used for identifying the best model, and determining the range of its applicability. (3– see point 2 in Conclusions)	This area will be used by the assessor to leave comments related to this criterion.	7 pts
Conclusions - 1 Based on a comparison of the results from the modeling techniques you have employed, and the results of the associated “best” models, explain which modeling technique performed the best. (4)	This area will be used by the assessor to leave comments related to this criterion.	4 pts
Conclusions - 2 Provide a description of the results of the best model. Explain them within the context of your dataset, taking into account the assumptions and theory associated with the modeling technique. For example, if you found that a random forest model out-performed all other models built using several modeling approaches, explain why you think that is. Then, explain what the importance statistics/variation in parameter estimates associated with the model imply to a decision-maker. (6)	This area will be used by the assessor to leave comments related to this criterion.	6 pts
Conclusions - 3 Based on your understanding of the dataset and your analysis of it, what future work do you think will provider deeper insights into how the dataset can help a decision-maker who is associated with the context within which the dataset was collected? (4)	This area will be used by the assessor to leave comments related to this criterion.	4 pts
Submission requirements 1. In addition to the project report, please provide the R source code in an individual .R file. (1) 2. Be sure to include your name and the “final data analysis project” the filename. Also, please include your name at the top of the R source file. (1) 3. Where needed, include meaningful comments in the R source code so that the reader can understand your intent. (2) 4. Be sure that the comments are consistent with the code (if you copy+paste code from previous assignments, you may, inadvertently include comments that are not applicable to your final project – be sure to check for consistency!). (1) 5. Along with the source file, please include your dataset in a form that is readily	This area will be used by the assessor to leave comments related to this criterion.	10 pts

Criteria	Ratings	Pts
readable in R. In the R source code files, when you use read.csv(…) or similar function calls for loading the data into the R environment, please embed the name of the datafile directly, that is, pass the name of the file directly into the read.csv(…) function as its first argument. Do not make the user type the name of the file at run time. Please ensure that the data file can be read from the current folder/directory, rather than from a directory that is specific to the folder/directory structure on your computer. (1) 6. When submitting your work, please include the following files into a folder, create a compressed archive of it (zip format), and upload the compressed archive (2): a) Your project report in the form of a PDF file, with appropriate filename (indicating your name and “final project” in it). (0.5) b) R source code file (0.75) c) Your datasets in a readily-readable form (0.75)		
		Total Points: 54

Name AA 5800 Applied data analysis project's rubric

Description

Rubric Detail

Criteria	Levels of Achievement Score on the criterion
Introduction 1.a.	**0 to 1 points** a) the source of the dataset and the purpose for which it was collected
Introduction 1.b	**0 to 3 points** b) description of the specific variables in the dataset, presented in a table with three columns, which are, successively: name of the variable, its measurement type, and its purpose (predictor and/or outcome)
Introduction 2.	**0 to 4 points** 2. Three research questions, which you intend to answer via analysis of the dataset
Introduction 3.	**0 to 4 points** 3. Specific hypotheses derived from your research questions, stated in a manner that they can be addressed via measures of ROPE and HDI of the appropriate model parameters.
Models 1.	**0 to 3 points** 1. A description of your model, or models, specified in the form of equations containing specific combinations of predictors and their associated parameters.
Models 2.	**0 to 4 points** 2. A diagram, representing the relationship among the outcome, predictors, various model parameters, their priors and the likelihood function. Please use a schema similar to the figures used in our textbook. You are welcome to draw the figure by hand and include an image version of it in your document.
Results 1.	**0 to 6 points** 1. Appropriate graphical and numerical output that is relevant in the context of the hypotheses stated in Introduction.
Results 2.	**0 to 6 points** 2. An interpretation of the output to determine whether there is support for the hypotheses (use ROPE and HDI in your arguments).

Criteria	Levels of Achievement Score on the criterion
Conclusions 1	**0 to 6 points** 1. Summarize your results and explain what they mean, together, in the context of the initiative that led to the collection of data that you used.
Conclusions 2	**0 to 4 points** 2. Identify and describe at least two avenues for future work that builds on your findings.
Conclusions 3	**0 to 3 points** 3. Explain any difficulties you encountered while completing your project and what approach(es) you have used for overcoming them.
Additional requirements	**1 to 5 points** 1. Please proof-read your report to reduce the occurrence of errors in spelling, grammar, and argumentation. 2. Include a footer, with page number, on each page. 3. Include a title page, with your name, the name of your dataset/project, and the course number + name. 4. Ensure that you include all of the relevant information and that your report is no longer than 10 pages (using 1” margins, 11-point serif font (like Times New Roman), and a reasonably-sized line-spacing. 5. Include appropriate comments to annotate your R source code. 6. Be sure to submit your dataset in a form that can be imported readily into R. either perform all data manipulations ahead of time, and use a “cleaned” version of your dataset in your analysis or include all of the cleaning operations’ commands in your R source file

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