Final (Individual) Assessment for the PIC Math Course (MATH 437 and MATH 422)

Spring 2020

Instructions: The following questions are to be completed on your own and submitted to me via email ([virgil.pierce@unco.edu](mailto:virgil.pierce@unco.edu) ) by Wednesday May 6. You may use any online resources you wish, and the intent is that you can answer or at least start an answer to each question using your team’s report. You should not consult with your teammates on your responses here; but you can, as you collaborate on your final report, ask the team to clarify things. My hope is that as you think about these questions that will drive some improvements to your team’s final work.

If you have any questions about what resources you can use, please ask. You can text me at 956-249-0566 if you need a quick answer. Your response to each prompt should be less than one page in length.

You may want to review the course performance rubric in putting together your responses: <https://drive.google.com/file/d/1kXb-qfUgbNP1gF_pHJGJYrgXm2Kej-Bc/view?usp=sharing>

You can answer these in any order you wish. If you have a google account you should be able to make a copy of this document and then edit it. If you do not have a google account, just type your answers however you wish.

1. Communication: Give a brief explanation (less than one page) of your team’s results and methods for non-experts. Try to address: what the problem was, what your team’s approach and method was, and what your conclusions are. You may also want to discuss what made your team’s approach different or similar to other work.

* I think that for this part I decided on three industries that will rise faster than average and three that are going to decline or shrink faster than normal. Once I discovered the division of industries into three categories I was able to determine the skills that are related to each industry and then be able to tell educational institutions to put more focus on certain areas or create state run programs that would benefit people in the growing industries. Due to the time constraints that I had I left a few industries in the “neutral” category and by my calculations these industries will grow with the population and are unlikely to see an unnatural decrease or increase over the next decade in Colorado. It could be different on a state to state basis. I use a lot of the industries that were already created by other organizations but I tried to create my own sort of model and approach.

1. Mathematical or Statistical Models: In less than one page, describe what mathematical, statistical, or computational concepts, techniques, or tools your team used in their project, analysis, and predictions. Note: Your response to this question is about describing the tools used by your team, not about whether those tools were the correct ones (a major part of this course is that there is no such thing as “the correct one”).

* I used countless amounts of statistical models in my jupyter notebook final report and I tested even more that I chose to leave off because they were not helpful. Overall I used the python packages SciKit-Learn, Pandas, NumPy, Matlib Plot, TensorFlow, and Seaborn. Each package has its own specific models and some are for modeling the data frame but I used SVM and SVC from Keras which is part of TensorFlow. I also use SciKit-Learn for a Neural Network, Linear Regression, and Nonlinear Regression. I also applied nonlinear models that tested better than the linear models. I also applied a feature correlation model on all the data I had to see if any columns were related to any others more so than the next. I also applied a feature importance model on one of my nonlinear models to see which features are being used to determine which features are being used to make the predictions.

1. Mathematical or Statistical Models: In a paragraph or two (less than one page) discuss the assumptions that underlay your team’s model, and the extent to which you were able to validate the results, or how you would approach validation given more time.

* I mean I didn’t have this assumption at the start but now one would have to assume that COVID-19 has zero effect on the Colorado workforce. I also use the current projections from Projection Central as a baseline to help test and verify my answers. This means that we would assume they are correct and that they are a standard which could be inaccurate. I think that with more time I would just put all my efforts towards how COVID-19 will affect the workforce. I might do more with individual careers too so that we arent assuming who industries are declining and whole industries are increase and we could be more specific with my results.

1. Teamwork: Please provide a detailed analysis (less than one page) of your contributions to the project. What were your contributions to mathematics, statistics, or computations? In what ways did you contribute to the well functioning of your team?

* Ill be completely honest here I did not handle this situation well at all. I did not communicate well with my previous team and I don’t think I contributed to what they had in mind very much if at all. We had different ideas as far as an approach and we had different expertise that lead to two approaches and the separation of the team. In terms of this question I made every mathematical model except for one model I found on github from some random person. I made all the computations and I made all the final results.

1. That is it for the questions that contribute to your grade. I have one final question that is for my assessment of the course itself and will be used to improve the math program and this course for future students. I appreciate your answers, and you should consider this a bonus question.   
     
   Please take a moment to reflect on what experiences or courses you have had here at UNC (or at other institutions if that is relevant) that have been important in your contributions and thinking for this course. Is there something you wish you had done prior to this course based on what you saw your teammates doing?

* I would say that STAT 411 was a major contributor to this course and I used a ton of knowledge from that class in this class or expanded on it and used a more complex version in this class. I think that having some coding experience would also be very helpful to model such complex problems. I wish I had more experience modeling large problems like this though. In an RTH class I took for fun I also learned how to reach out to industry professionals and get past customer service agents so that I can talk to a professional who understands my question and is willing to support me in my research.