DS-GA 3001.009, Responsible Data Science, Spring 2019

Course Project: Nutritional Labels for Automated Decision Systems

Project proposal due at 5pm on Monday, April 29
Final submission due at 11am on Monday, May 13

Objectives

In this project, you will work in **teams of two** to develop an interpretability tool for an automated decision system (ADS) of your choice, based on the concept of a nutritional label. We suggest that you develop a nutritional label for one of the systems developed in response to a Kaggle competition of your choice, but you should feel free to use other systems that are of interest to you. **Do not focus on Northpointe's COMPAS** in this assignment, since this tool was already covered extensively during class. **Be sure to prominently cite your sources of code and data!**

Grading

This project is worth 20 points, and both project partners will receive the same grade for the project.

1. Project proposal: by **5 pm on Monday, April 29**, submit a summary of your proposed project (1 paragraph is sufficient), listing the names of both project partners and the ADS you propose to analyze in the project. Be explicit about where you'll get the data and the code implementing the ADS. You should make sure that the data is available, and that you are able to run the code on that data. Both project partners should submit identical proposals on NYU Classes.
2. Final submission: by **11am on Monday, May 13**, submit your project report, implementation, and slides. You will be graded on your execution of the project (with a jupyter notebook), and on the quality of the project report and presentation. You should submit a jupyter notebook implementing your project, an accompanying written report in PDF format (5-10 pages), and a PDF version of your slides. You will also be required to present your project in class, on May 13. Each team will be given 5 minutes for the presentation.

Detailed description and goals

Automated Decision System (ADS) are in widespread use in government and industry, and a number of efforts are currently underway to regulate them. As you know, New York City recently passed a law (Local Law 49 of 2018) that compels the development of procedures and recommendations that City agencies should follow when explaining the operation of an ADS to the public, and demonstrating that an ADS does not discriminate against individuals based on

membership in protected groups. In this project, you will help NYC and other municipalities by designing **a nutritional label** for a system of your choice. Your nutritional label will be implemented by a jupyter notebook, and it will be complemented by your project report.

Unfortunately, we do not currently have complete examples of ADS that are in use by government agencies. For this reason, we encourage you to focus on examples from [Kaggle competitions](#), where the goals, the data, and one or several implementations are available for analysis. Select a Kaggle competition that has already finished, and for which you can find and successfully execute at least one solution. A list of solutions to Kaggle competitions is available [here](#), and you may be able to find solutions in other ways. If you decide to work with a system that's not from Kaggle, you should make sure that data and at least one implementation is available to you. **Once again: Be sure to prominently cite your sources of code and data!**

Structure of your report

1. Background: general information about your chosen ADS
   a. What is the purpose of this ADS? What are its stated goals?
   b. If the ADS has multiple goals, explain any trade-offs that these goals may introduce.
2. Input and output
   a. Describe the data used by this ADS. How was this data collected or selected?
   b. For each input feature, describe its datatype, give information on missing values and on the value distribution. Show pairwise correlations between features if appropriate. Run any other reasonable profiling of the input that you find interesting and appropriate. **This part of the report is based on the computation in your jupyter notebook. Include all relevant plots into the report and describe them appropriately.**
   c. What is the output of the system (e.g., is it a class label, a score, a probability, or some other type of output), and **how do we interpret it**?
3. Implementation and validation: present your understanding of the code that implements the ADS. This code was implemented by others (as part of the Kaggle competition), not by you as part of this assignment. Your goal here is to demonstrate that you understand the implementation at a high level.
   a. Describe data cleaning and any other pre-processing
   b. Give high-level information about the implementation of the system
   c. How was the ADS validated? How do we know that it meets its stated goal(s)?
4. Outcomes: **This part of the report is based on the computation in your jupyter notebook. Include all relevant plots into the report and describe them appropriately.**
   a. Analyze the effectiveness (accuracy) of the ADS by comparing its performance across different subpopulations.

    b. Select one or several fairness or diversity measures, justify your choice of these measures for the ADS in question, and quantify the fairness or diversity of this ADS.

    c. Develop additional methods for analyzing ADS performance: think about stability, robustness, performance on difficult or otherwise important examples (in the style of LIME), or any other property that you believe is important to check for this ADS.

5. Summary
    a. Do you believe that the data was appropriate for this ADS?
    b. Do you believe the implementation is robust, accurate and fair/ diverse/ stable / … ?
    c. Would you be comfortable deploying this ADS in the public sector, or in the industry? Why so or why not?
    d. What improvements do you recommend to the data collection or analysis methodology?

What to submit

1. Submit one zip file including:
    a. project report in PDF format, 5-10 pages
    b. project presentation (slides) in PDF format
    c. your .ipynb notebook with code
    d. if it is not obvious how to run your program, you should include a README file
2. You have to **work in teams of two on this project**
3. Be sure to mention the names of both project partners and their net IDs prominently on the first page of each part of the submission: report, slides, code
4. Naming convention to follow for your files: RDS_proj_<net_id1>_<net_id2>
5. You may *discuss* this assignment with students other than your team partner, but **YOU MAY NOT SHARE WRITTEN ANSWERS OR CODE WITH ANYONE.**
6. Who to contact:
    a. Instructor: Julia Stoyanovich (stoyanovich@nyu.edu) office hours Mondays 1:30 - 3 pm or by appointment, at 60 5th Avenue, room 605.
    b. Section Leader: Udita Gupta (ung200@nyu.edu) office hours Thursdays 4 - 5 pm or by appointment, at 60 5th Avenue, room 663.