BIAS DETECTION TOOLS FOR CLINICAL DECISION MAKING

Title Page (does not count toward page limit)
A Simplistic Approach to Extending Access to Quality Healthcare Utilizing AI/Machine Learning

Include:

- Solution Name/Team Name: JzDataSolns
- Link to Video
- List of team members: Jazarai Sturdivant
- Contact information (email and phone number) for team's point of contact: jazarais@gmail.com (704) 207 - 9724
- Abstract (200 words, does not count toward page limit)

ABSTRACT

This project grabbed my attention at a phase in my life where I was looking for a way to contribute. In approaching this project, my goal was not to create "one more thing". As an educator, it is apparent that the advances in technology have had a significant impact in the ability to maintain records in consistent formats and familiar with the presence of this challenge across various fields, including healthcare. The goal of this project was to contribute to the solution to the problem of inequitable access to health care opportunities that have resulted as systemic social biases while not contributing to the problem of technological competence. This solution describes the generation of reports of patients at risk categorized into levels of intervention as a flexible means to provide support in communication of services, implementation of intervention, and feedback for healthcare facilities. With further development of the solution described and collaboration amongst community organizers this solution can assist creating a system that is not based on social constructs to create more opportunities to attempt to bridge the gap in access to resources which will avoid the perpetuation of the unequal access to care for all populations.

GitHub code (less than 1 page)

Although you submitted your code in GitHub, please Include a link here for easy reference. We suggest including the actual output and/or visualizations from your bias detection tool and anything else you need to submit to demonstrate input/output.

Methodology Overview (less than 1 page)

In researching the significant factors in prediction of pre-eclampsia, the connection to hypertension, heart disease, obesity, and diabetes was revealed to be relevant. In consideration of the extension of access to quality care, it is necessary to review the significant factors to the inequitable nature of healthcare services. An article from health analytics supports the fact that creating a connection to community resources would prove to be beneficial in moving forward in the effort to assist in slowing the perpetuation of healthcare disparities resulting from social bias. The factors considered are proven to be significant in the prediction of prevention in the development of pre-eclampsia, hypertension, heart disease, obesity, and diabetes. Populations with the highest rate of the chronic disorder was the target of the process of identification.

The populations I chose to identify were individuals who are uninsured, obese, and have not had contact with the facility recently. I chose to identify zero contact with the factility in the form of appointments in the last 14 months, 18 months, and 22 months. Race, Payer_code, weight, age, gender, “time in facility” and Mitigation_Score. With the goal of mitigation in this challenge, it was important to use a reliable source of disparity identification. This tool uses many of the same metrics that would be needed in order to create a custom tool and utilizes data from various verified and credible sources. This tool also provides a baseline of calculated measurements of disparity.

This approach was created after research into current uses of machine learning models in the prediction of hypertension and pre-eclampsia. With the support of a predictive model for hypertension utilizing the least amount data (https://doi.org/10.3389/fpubh.2021.619429), this tool is flexible in the data that it can be utilized with. There is flexibility to use this tool to store data or to collect new data or even to be integrated in the current data so that it can be used to show past patient records to show the impact of the reports and can inform next required updates in development.This tool identifies the areas susceptible to differing levels of treatment by assigning a mitigation score. One of the complexities of the healthcare processes is the process of payment for services. This is established prior to services and is typically a deterrent, as well as a disqualifier for services for people of varying backgrounds, not only for the sake of the price but also the sacrifice of privacy and freedoms.

One differing feature of my bias detection tool is the consideration of the missing values. Typically, in most analyses the missing values are replaced, changed or removed to proceed with the statistical analysis. In consideration of the fact that missing values can be an indication of the lack of access to health care, the use of these values in the reports as well as the assignment of intervention level is different from other approaches that I have seen.

In an article, by health analytics, as well as in other published reports on the inequities of healthcare, the inconsistency in records is a barrier, but by using the missing values to collect more data in populations that are currently lacking data, this is justified in intention. In practice, the inclusion of the occurrence of missing values makes the tool beneficial even if the identified level of risk is incorrect.

In consideration of this tool, I wanted to consider the uninsured, the homeless, estranged individuals, and individuals from all populations as well as facilities with access to varying resources. The ability to identify patients in a fast way is a realistic contribution to various facilities and the ability to utilize data in various formats will be ensure the sustainability of this tool and the generalizability to different facilities and services within the health care system. It was essential to utilize current or developing ideas.

Healthcare Scenario (1 page)

Where does bias occur and how do we provide a path forward for follow-up investigations?
With the addition of accountability for the patient to complete tasks to better their health while providing equal opportunity and access to quality care will close the gap between A path forward is the delivery of resources as well as the incentivization of the completion of tasks that are beneficial to the patient.

How do you account for consistent evaluation and assessments of the algorithm over time and for all patient populations?
Due to the fact that these reports will be generated with the use of the facility's record, there will be no requirement for additional resources for this tool, though the use of it could prove to be essential in the duties of the task force set out in Mrs. Obama's Let's Move legislation this solution could be utilized by healthcare service managers in a variety of fields.

How will the process of evaluation and assessment work?
Clients will be responsible for submitting documentation to their health care provider and healthcare providers.

Value Proposition (less than 1 page)

- The tool will identify missing values in Reports for patients
- The tool will flag records green with more than 1 year without health care record
- The tool will flag records yellow with more than 14 months without health care record.
- The tool will flag records orange with more than 18 months without a health care record.
- The tool will flag records red with more than 22 months without a health care record.
- The tool assigns a Mitigation score that will be used to provide community resources through the portal, identify the need for outreach, or explain the impact of the tool

- What recommendations did your tool suggest to identify the underlying root(s) of the biases detected? Who would be responsible for investigating cause and remediation options? How easily could the tool be implemented to perform this task?
    - The tool will notify the submitting party of the missing input
    - The tool will notify of differing values for personal information
    - Patient Intake/Checkout
    - The tool will notify the necessary treating parties of the resources
- How will your bias detection tool, when implemented as described here, improve healthcare over time and for all patient populations?
    - With the utilization of this tool, more effort could be put forward to fill in the missing and inconsistent data points, reach more people, provide more quality healthcare to all populations.

Operational Requirements (less than 1 page)

I do acknowledge that the tool will be distributed under the BSD 3 license which indicates that Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- The names of its contributors may not be used to endorse or promote products derived from this (https://docs.oracle.com/cloud/latest/big-data-discovery-cloud/BDDLG/cl_bsd_license.htm#BDDLG-concept_1F381CA11423445A90B7C3D6CB4DF612)

Sustainability Plan (1 page)

Describe how you envision a healthcare organization sustaining your bias detection tool. List the responsibilities and activities required across the different stakeholder groups who must be involved in implementing your tool (e.g. technologists, informaticists, doctors, practitioners, administrators, etc.). Elaborate on the ongoing level of effort to monitor and mitigate bias on a continual effort, including tool maintenance and retrospective analysis to guard against drift.

Your submission will be evaluated by the judges based on how well this section answers these questions:

What are some Challenges in implementation of Evaluations and Assessments?

Validation of submitted documentation.

Fairness of Implementation to all populations

Higher discount-more services required-more actions required by client

Ensuring that products and services are actually good for your health

Populations “not become targeted”

- Does your plan take into account or involve the multidisciplinary team and expertise needed for implementation in real-world settings?
    - Involves all healthcare service stakeholders
- Does your tool accurately calculate retrospective (measuring performance of the clinical decision model when developed) and prospective (measuring performance continuity/in real world application) metrics?
    - Yes
- Can the tool be used in the future without significant upkeep costs?
    - Yes

Generalizability Plan (1 page)

Where will reports be generated from?

- Healthcare facility
- Financial/Budgeting Documents

What will be evaluated?

Reports generated will include:

- *Impact on Price of Services*
- *Total Number of Patients Utilizing the incentives*
- *Number of patients reported to receive resources regarding*
- *Monitoring of Health Improvement Data*
- *Analysis of Services used (Move more, Eat Better, Sleep Enough) (Whole Life documents)*
- Projection of Flagged Risk Patients

How will you account for all populations?

- access to include all patients of the facility: requirement record to be a patient

Populations that are not patients receive information at local churches, recreation centers, shelter, hospitals (Hospitals will capture various populations), within the community

What are some Challenges in implementation of Evaluations and Assessments

- Validation of submitted documentation.
- Fairness of Implementation to all populations
- Higher discount-more services required-more actions required by client
- Ensuring that products and services are actually good for your health
- Populations “not become targeted”