The Bias Report

Audit Date:	16 Apr 2022
Data Audited:	866 rows
Attributes Audited:	age, sex, went_icu, location
Audit Goal(s):	Equal Parity - Ensure all protected groups are have equal representation in the selected set. Proportional Parity - Ensure all protected groups are selected proportional to their percentage of the population. False Positive Rate Parity - Ensure all protected groups have the same false positive rates as the reference group). False Discovery Rate Parity - Ensure all protected groups have equally proportional false positives within the selected set (compared to the reference group). False Negative Rate Parity - Ensure all protected groups have the same false negative rates (as the reference group). False Omission Rate Parity - Ensure all protected groups have equally proportional false negatives within the non-selected set (compared to the reference group).
Reference Groups:	Custom group - The reference groups you selected for each attribute will be used to calculate relative disparities in this audit.
Fairness Threshold:	80%. If disparity for a group is within 80% and 125% of the value of the reference group on a group metric (e.g. False Positive Rate), this audit will pass.

Audit Results:

1. Summary
2. Details by Fairness Measures
3. Details by Protected Attributes
4. Bias Metrics Values
5. Base Metrics Calculated for Each Group

Audit Results: Summary

Equal Parity - Ensure all protected groups are have equal representation in the selected set.	Failed	Details
Proportional Parity - Ensure all protected groups are selected proportional to their percentage of the population.	Failed	Details
False Positive Rate Parity - Ensure all protected groups have the same false positive rates as the reference group).	Failed	Details
False Discovery Rate Parity - Ensure all protected groups have equally proportional false positives within the selected set (compared to the reference group).	Failed	Details
False Negative Rate Parity - Ensure all protected groups have the same false negative rates (as the reference group).	Failed	Details
False Omission Rate Parity - Ensure all protected groups have equally proportional false negatives within the non-selected set (compared to the reference group).	Failed	Details

Audit Results: Details by Fairness Measures

Equal Parity: Failed

What is it?

This criteria considers an attribute to have equal parity is every group is equally represented in the selected set. For example, if race (with possible values of white, black, other) has equal parity, it implies that all three races are equally represented (33% each)in the selected/intervention set.

When does it matter?

If your desired outcome is to intervene equally on people from all races, then you care about this criteria.

Which groups failed the audit:

For age (with reference group as 25.0 - 50.0)
- 0.0 - 25.0 with 0.09X Disparity
- 75.0 - 100.0 with 0.17X Disparity

For sex (with reference group as F)
- I with 0.11X Disparity
- M with 1.64X Disparity

For went_icu (with reference group as N)
- NR with 5.58X Disparity
- Y with 2.76X Disparity

For location (with reference group as Europa)
- Oceania with 0.41X Disparity
- Asia with 0.15X Disparity
- America with 0.09X Disparity
- NL with 0.18X Disparity

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Proportional Parity: Failed

What is it?

This criteria considers an attribute to have proportional parity if every group is represented proportionally to their share of the population. For example, if race with possible values of white, black, other being 50%, 30%, 20% of the population respectively) has proportional parity, it implies that all three races are represented in the same proportions (50%, 30%, 20%) in the selected set.

When does it matter?

If your desired outcome is to intervene proportionally on people from all races, then you care about this criteria.

Which groups failed the audit:

For age (with reference group as 25.0 - 50.0)
- 75.0 - 100.0 with 0.50X Disparity
- 50.0 - 75.0 with 0.63X Disparity

For sex (with reference group as F)
- I with 0.49X Disparity

For went_icu (with reference group as N)
- NR with 1.30X Disparity

For location (with reference group as Europa)
- America with 0.75X Disparity
- Oceania with 2.37X Disparity
- Asia with 0.49X Disparity

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False Positive Rate Parity: Failed

What is it?

This criteria considers an attribute to have False Positive parity if every group has the same False Positive Error Rate. For example, if race has false positive parity, it implies that all three races have the same False Positive Error Rate.

When does it matter?

If your desired outcome is to make false positive errors equally on people from all races, then you care about this criteria. This is important in cases where your intervention is punitive and has a risk of adverse outcomes for individuals. Using this criteria allows you to make sure that you are not making false positive mistakes about any single group disproportionately.

Which groups failed the audit:

For age (with reference group as 25.0 - 50.0)
- Not found with 0.40X Disparity
- 50.0 - 75.0 with 0.58X Disparity
- 0.0 - 25.0 with 0.00X Disparity

For sex (with reference group as F)
- M with 0.59X Disparity
- I with 0.00X Disparity

For went_icu (with reference group as N)
- NR with 0.53X Disparity
- Y with 0.22X Disparity

For location (with reference group as Europa)
- America with 0.00X Disparity
- Oceania with 0.00X Disparity
- Asia with 0.22X Disparity

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False Discovery Rate Parity: Failed

What is it?

This criteria considers an attribute to have False Discovery Rate parity if every group has the same False Discovery Error Rate. For example, if race has false discovery parity, it implies that all three races have the same False Discvery Error Rate.

When does it matter?

If your desired outcome is to make false positive errors equally on people from all races, then you care about this criteria. This is important in cases where your intervention is punitive and can hurt individuals and where you are selecting a very small group for interventions.

Which groups failed the audit:

For age (with reference group as 25.0 - 50.0)
- Not found with 0.57X Disparity
- 0.0 - 25.0 with 0.00X Disparity
- 75.0 - 100.0 with 2.90X Disparity
- 50.0 - 75.0 with 1.34X Disparity

For sex (with reference group as F)
- I with 0.00X Disparity
- M with 0.71X Disparity

For went_icu (with reference group as N)
- Y with 0.18X Disparity
- NR with 0.31X Disparity

For location (with reference group as Europa)
- America with 0.00X Disparity
- NL with 0.52X Disparity
- Oceania with 0.00X Disparity
- Asia with 0.59X Disparity

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False Negative Rate Parity: Failed

What is it?

This criteria considers an attribute to have False Negative parity if every group has the same False Negative Error Rate. For example, if race has false negative parity, it implies that all three races have the same False Negative Error Rate.

When does it matter?

If your desired outcome is to make false negative errors equally on people from all races, then you care about this criteria. This is important in cases where your intervention is assistive (providing helpful social services for example) and missing an individual could lead to adverse outcomes for them. Using this criteria allows you to make sure that you're not missing people from certain groups disproportionately.

Which groups failed the audit:

For age (with reference group as 25.0 - 50.0)
- 0.0 - 25.0 with 0.00X Disparity
- 50.0 - 75.0 with 0.74X Disparity
- Not found with 0.76X Disparity
- 75.0 - 100.0 with 4.92X Disparity

For sex (with reference group as F)
- I with 2.35X Disparity
- M with 0.44X Disparity

For went_icu (with reference group as N)
- NR with 10.00X Disparity
- Y with 10.00X Disparity

For location (with reference group as Europa)
- America with 2.95X Disparity
- Asia with 0.00X Disparity
- Oceania with 0.00X Disparity
- NL with 1.76X Disparity

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False Omission Rate Parity: Failed

What is it?

This criteria considers an attribute to have False Omission Rate parity if every group has the same False Omission Error Rate. For example, if race has false omission parity, it implies that all three races have the same False Omission Error Rate.

When does it matter?

If your desired outcome is to make false negative errors equally on people from all races, then you care about this criteria. This is important in cases where your intervention is assistive (providing help social services for example) and missing an individual could lead to adverse outcomes for them , and where you are selecting a very small group for interventions. Using this criteria allows you to make sure that you're not missing people from certain groups disproportionately.

Which groups failed the audit:

For age (with reference group as 25.0 - 50.0)
- 50.0 - 75.0 with 0.32X Disparity
- 75.0 - 100.0 with 1.84X Disparity
- Not found with 0.53X Disparity
- 0.0 - 25.0 with 0.00X Disparity

For sex (with reference group as F)
- M with 0.36X Disparity

For went_icu (with reference group as N)
- Y with 10.00X Disparity
- NR with 10.00X Disparity

For location (with reference group as Europa)
- NL with 2.79X Disparity
- America with 2.33X Disparity
- Oceania with 0.00X Disparity
- Asia with 0.00X Disparity

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Audit Results: Details by Protected Attributes

age

Attribute Value	Equal Parity	Proportional Parity	False Discovery Rate Parity	False Positive Rate Parity	False Omission Rate Parity	False Negative Rate Parity
0.0 - 25.0	0.0 - 25.0	0.0 - 25.0	0.0 - 25.0	0.0 - 25.0	0.0 - 25.0	0.0 - 25.0
25.0 - 50.0	Ref	Ref	Ref	Ref	Ref	Ref
50.0 - 75.0	50.0 - 75.0	50.0 - 75.0	50.0 - 75.0	50.0 - 75.0	50.0 - 75.0	50.0 - 75.0
75.0 - 100.0	75.0 - 100.0	75.0 - 100.0	75.0 - 100.0	75.0 - 100.0	75.0 - 100.0	75.0 - 100.0
Not found	Not found	Not found	Not found	Not found	Not found	Not found

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sex

Attribute Value	Equal Parity	Proportional Parity	False Discovery Rate Parity	False Positive Rate Parity	False Omission Rate Parity	False Negative Rate Parity
F	Ref	Ref	Ref	Ref	Ref	Ref
I	I	I	I	I	I	I
M	M	M	M	M	M	M

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went_icu

Attribute Value	Equal Parity	Proportional Parity	False Discovery Rate Parity	False Positive Rate Parity	False Omission Rate Parity	False Negative Rate Parity
N	Ref	Ref	Ref	Ref	Ref	Ref
NR	NR	NR	NR	NR	NR	NR
Y	Y	Y	Y	Y	Y	Y

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location

Attribute Value	Equal Parity	Proportional Parity	False Discovery Rate Parity	False Positive Rate Parity	False Omission Rate Parity	False Negative Rate Parity
America	America	America	America	America	America	America
Asia	Asia	Asia	Asia	Asia	Asia	Asia
Europa	Ref	Ref	Ref	Ref	Ref	Ref
NL	NL	NL	NL	NL	NL	NL
Oceania	Oceania	Oceania	Oceania	Oceania	Oceania	Oceania

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Audit Results: Bias Metrics Values

age

The False Negative Rate of each group divided by the same metric value of the reference group.

Attribute Value	Predicted Positive Rate Disparity	Predicted Positive Group Rate Disparity	False Discovery Rate Disparity	False Positive Rate Disparity	False Omission Rate Disparity	False Negative Rate Disparity
0.0 - 25.0	0.09	1.11	0.0	0.0	0.0	0.0
25.0 - 50.0	1.0	1.0	1.0	1.0	1.0	1.0
50.0 - 75.0	0.93	0.63	1.34	0.58	0.32	0.74
75.0 - 100.0	0.17	0.5	2.9	0.97	1.84	4.92
Not found	0.87	0.83	0.57	0.4	0.53	0.76

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Attribute Value	Predicted Positive Rate Disparity	Predicted Positive Group Rate Disparity	False Discovery Rate Disparity	False Positive Rate Disparity	False Omission Rate Disparity	False Negative Rate Disparity
F	1.0	1.0	1.0	1.0	1.0	1.0
I	0.11	0.49	0.0	0.0	0.96	2.35
M	1.64	0.91	0.71	0.59	0.36	0.44

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Attribute Value	Predicted Positive Rate Disparity	Predicted Positive Group Rate Disparity	False Discovery Rate Disparity	False Positive Rate Disparity	False Omission Rate Disparity	False Negative Rate Disparity
N	1.0	1.0	1.0	1.0	Undefined	Undefined
NR	5.58	1.3	0.31	0.53	10.0	10.0
Y	2.76	1.11	0.18	0.22	10.0	10.0

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Attribute Value	Predicted Positive Rate Disparity	Predicted Positive Group Rate Disparity	False Discovery Rate Disparity	False Positive Rate Disparity	False Omission Rate Disparity	False Negative Rate Disparity
America	0.09	0.75	0.0	0.0	2.33	2.95
Asia	0.15	0.49	0.59	0.22	0.0	0.0
Europa	1.0	1.0	1.0	1.0	1.0	1.0
NL	0.18	1.24	0.52	0.83	2.79	1.76
Oceania	0.41	2.37	0.0	0.0	0.0	0.0

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Audit Results: Group Metrics Values

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Attribute Value	Group Size Ratio	Predicted Positive Rate	Predicted Positive Group Rate	False Discovery Rate	False Positive Rate	False Omission Rate	False Negative Rate
0.0 - 25.0	0.02	0.03	0.59	0.0	0.0	0.0	0.0
25.0 - 50.0	0.25	0.33	0.53	0.03	0.04	0.06	0.05
50.0 - 75.0	0.37	0.3	0.33	0.05	0.02	0.02	0.04
75.0 - 100.0	0.09	0.06	0.26	0.1	0.04	0.11	0.25
Not found	0.27	0.28	0.44	0.02	0.02	0.03	0.04

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Attribute Value	Group Size Ratio	Predicted Positive Rate	Predicted Positive Group Rate	False Discovery Rate	False Positive Rate	False Omission Rate	False Negative Rate
F	0.33	0.36	0.45	0.05	0.04	0.06	0.08
I	0.07	0.04	0.22	0.0	0.0	0.06	0.18
M	0.6	0.6	0.41	0.03	0.02	0.02	0.03

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Attribute Value	Group Size Ratio	Predicted Positive Rate	Predicted Positive Group Rate	False Discovery Rate	False Positive Rate	False Omission Rate	False Negative Rate
N	0.13	0.11	0.34	0.11	0.05	0.0	0.0
NR	0.55	0.6	0.44	0.03	0.03	0.07	0.08
Y	0.32	0.3	0.38	0.02	0.01	0.01	0.01

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Attribute Value	Group Size Ratio	Predicted Positive Rate	Predicted Positive Group Rate	False Discovery Rate	False Positive Rate	False Omission Rate	False Negative Rate
America	0.07	0.05	0.3	0.0	0.0	0.09	0.18
Asia	0.18	0.08	0.19	0.03	0.01	0.0	0.0
Europa	0.57	0.55	0.39	0.06	0.04	0.04	0.06
NL	0.08	0.1	0.49	0.03	0.03	0.11	0.11
Oceania	0.1	0.22	0.93	0.0	0.0	0.0	0.0

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