Oversampling to Repair Bias and Imbalance Simultaneously

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Picking Sizes

Original unmitigated sizes.

Repairing imbalance alone can make bias worse.

Repairing imbalance without making bias worse.

Repairing both imbalance and bias.

Given new class imbalance and disparate impact, solve for new intersection sizes.
ORBIS Algorithm

1. train-test split

2. relabel

3. pick sizes

4. oversample

5. inverse relabel

6. train

7. predict

8. evaluate

$X, y$

$X_{\text{train}}, y_{\text{train}}$

$X_{\text{train}}, \hat{y}_{\text{train}}$

$X_{\text{test}}, y_{\text{test}}$

$X_{\text{orbis}}, y_{\text{orbis}}$

$X_{\text{orbis}}, \hat{y}_{\text{orbis}}$

$\hat{y}_{\text{pred}}$

trainable estimator

trained estimator

scores
Summary and Conclusion

• Repair level hyperparameters: bias, imbalance
  • Can guarantee effect on data, but not on estimators
• Assumes binary class labels
  • Internally binarizes protected attributes
• Empirical study:
  • 12 datasets
  • 5 other imbalance mitigators
  • 9 other bias mitigators
  • 5 ways to blend metrics for single-objective AutoML
• Implementation:
  https://github.com/ibm/lale