

Extra Credit – Classification Performance Metrics

In this assignment, we'll take a look at what is required to analyze binary classification model performance data. While this assignment is optional, if you are new to machine learning, you should find it helpful in interpreting the results of your Project 4 assignment.

Please start by pulling down the two files below from the GitHub repo <https://github.com/acatlin/data>:

- [penguin_predictions.csv](#)
- [Performance Metrics for Classification problems in Machine Learning.pdf](#)

Here are the description for the three data columns:

- **.pred_female** - the model's degree of certainty around its prediction. Here, if the **.pred_female** is greater than 0.5, then the **.pred_class** has been set to 1; otherwise, the **.pred_class** is set to 0.
- **.pred_class** - "predicted"; the model's prediction for the class, based on the predictor variables (which are omitted here).
- **sex** - "actual"; how the data used to train the model was labeled

Your tasks:

1. Calculate and state the null error rate for the provided `classification_model_performance.csv` dataset. Create a plot showing the data distribution of the actual explanatory variable. Explain why always knowing the null error rate (or majority class percent) matters.

Below is an example (from a different dataset!); can you do better with ggplot?



2. Analyze the data to determine the true positive, false positive, true negative, and false negative values for the dataset, using `.pred_female` thresholds of 0.2, 0.5, and 0.8. Display your results in three confusion matrices, with the counts of TP, FP, TN, and FN. You may code your confusion matrix “by hand” (encouraged!), but full credit if you use “pre-packaged methods” here.
3. Create a table showing—for each of the three thresholds—the accuracy, precision, recall, and F1 scores.
4. Provide at least one example use case where (a) an 0.2 scored probability threshold would be preferable, and (b) an 0.8 scored probability threshold would be preferable.

(10 points / 1%) You may work alone in a small group on this optional assignment. Due end of day on Sunday, February 11th.