Best Hyperparameters:

* { 'eta': 0.3, 'max\_depth': 3, 'objective': 'multi:softprob', 'num\_class': 21}, steps = 20

Metrics:

* Accuracy: 0.7471736896197327
* Balanced accuracy: 0.6635997967392908
* Precision: 0.7371484288840131
* Recall: 0.7471736896197327
* F1:0.728472662959295

Explanation:

Extreme gradient boosting, more commonly known as XGBoost, is a supervised machine learning ensemble method. XGBoost implements gradient boosted trees, where trees are trained iteratively and learn from the mistakes of the previous trees using gradient descent to minimize loss. For our experiments, we tested out a wide range of hyperparameters and used a randomized search to tune our model. We found the optimal model used a step size of 20, a max depth of 3, and a learning rate of 0.3.