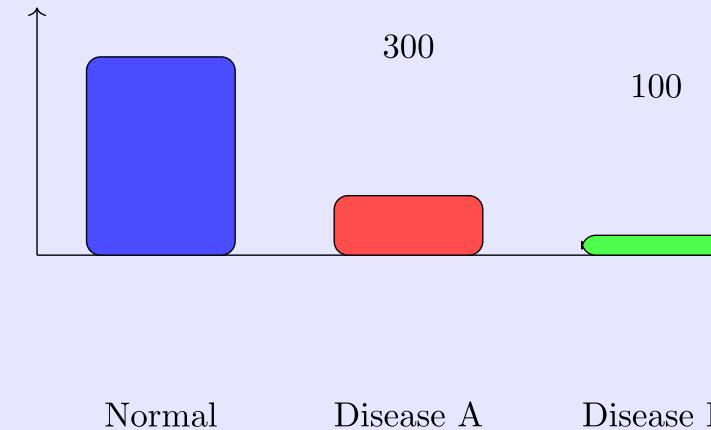


Handling Class Imbalance in Medical Imaging

Count 2000



Weighted Loss
 $\mathcal{L} = - \sum w_c y_c \log(\hat{y}_c)$
 $w_c \propto \frac{1}{frequency(c)}$

Advanced Sampling
SMOTE, ADASYN
Cluster-based

Focal Loss
 $\mathcal{L} = - \sum (1 - \hat{y}_c)^\gamma y_c \log(\hat{y}_c)$
Focus on hard examples

Comprehensive Approach
Combine multiple strategies for best results



Ensemble Methods
Multiple models
specialized per class

Class Imbalance Best Practices:

- **Stratify splits** to maintain class distribution across train/val/test
- **Report per-class metrics** in addition to overall performance
- **Use appropriate evaluation metrics** - AUC-PR for rare classes
- **Combine sampling techniques with loss function strategies**
- **Consider domain-specific augmentations** that preserve pathology
- **Use validation set with real distribution** to tune final thresholds
- **Consider hierarchical classification** for very rare classes