

# Supplementary Information

## AI Based Cough Analysis for Pulmonary Tuberculosis Triage and Diagnosis: A Technical Review

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### Supplementary Note 1: Performance Metric Formulae

The following formulas define the standard classification metrics used to evaluate tuberculosis testing models based on cough sound analysis. To calculate these metrics, the following terms from the confusion matrix are used: **True Positives (TP)** are TB-positive cases correctly identified by the model, while **True Negatives (TN)** are TB-negative cases correctly identified. **False Positives (FP)** refer to TB-negative cases incorrectly classified as TB-positive, and **False Negatives (FN)** are TB-positive cases incorrectly classified as TB-negative.

- **Accuracy**

$$\text{Accuracy} = \frac{TP + TN}{TP + TN + FP + FN}$$

- **Sensitivity, or True Positive Rate**

$$\text{Sensitivity} = \frac{TP}{TP + FN}$$

- **Specificity, or True Negative Rate**

$$\text{Specificity} = \frac{TN}{TN + FP}$$

- **Precision**

$$\text{Precision} = \frac{TP}{TP + FP}$$

- **F1 Score**

$$\text{F1 Score} = 2 \cdot \frac{\text{Precision} \cdot \text{Sensitivity}}{\text{Precision} + \text{Sensitivity}} = \frac{2TP}{2TP + FP + FN}$$

- **Area Under the Receiver Operating Characteristic Curve, or AUC-ROC**

The AUC-ROC is computed by plotting the true positive rate, or sensitivity, against the false positive rate across decision thresholds. The false positive rate is defined as:

$$\text{FPR} = \frac{FP}{FP + TN}$$

AUC-ROC does not have a single closed-form expression in this context and is typically computed numerically.