Example confusion matrix for a ternary classifier, it shows the predicted and actual temperature for 345 days. For 110 days the temperature is predicted correct, and for 235 it is predicted incorrectly.

|  |  |  |  |
| --- | --- | --- | --- |
| N = 345 | Predicted High | Predicted Medium | Predicted Low |
| Actual High | TP\_H = 50 | FP\_H = 20 | FN\_H = 10 |
| Actual Medium | FP\_M = 30 | TP\_M = 25 | FN\_M = 40 |
| Actual Low | FP\_L = 60 | FP\_L = 75 | TP\_L = 35 |

Where:

* **TP** = True Positive
* **FP** = False Positive
* **FN** = False Negative

### Metrics Calculation

1. **Accuracy**:

**Acuuracy = (TP\_H + TP\_M + TP\_L) / total samples**

**= (50 + 25 + 35) / 345 = 110 / 345 = 0.32**

1. **Precision** for each class:

Precision\_High = TP\_H / (TP\_H + FP\_H) = 50 / (50 + 20) = 0.714

Precision\_Medium = TP\_M / (TP\_M + FP\_M) = 25 / (25 + 30) = 0.455

Precision\_Low​ = TP\_L / (TP\_L + FP\_L) = 35 / (35 + 60 + 75) = 35 / 170 = 0.21

1. **Recall** for each class:

Recall\_High = TP\_H / (TP\_H + FN\_H) = 50 / 50 + 10 = 0.83

Recall\_Medium​ = TP\_M / (TP\_M + FN\_M) = 25 / 25 + 40 = 0.385

Recall\_Low = TP\_L / (TP\_L + FN\_L) = 35 / 35 + 10 + 40 = 35 / 85 = 0.412

1. **Specificity** for each class (True Negative Rate):

Specificity\_High = TN\_H / (TN\_H + FP\_H) = (25 + 35) / (25 + 35 + 20) = 60 / 80 = 0.75

Specificity\_Medium = TN\_M / (TN\_M + FP\_M) = (50 + 35) / (50 + 35 + 30) = 85 / 115 =

0.74

Specificity\_Low = TN\_L / (TN\_L + FP\_L) = (50 + 25) / (50 + 25 + 60 + 75) = 75 / 210 =

0.36

1. Error Rate:

Error Rate = ( FP\_H + FP\_M + FP\_L + FN\_H + FN\_M + FN\_L)/ total samples

= 1 - Accuracy = 1 - 0.32 = 0.68