What is the difference between Positive Predictive Value and Sensitivity?

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Positive Predictive Value (PPV) and Sensitivity are statistical measures used to evaluate the performance of a diagnostic test or screening tool. Both measures assess the accuracy of a test in correctly identifying the presence or absence of a condition. However, there are key differences between PPV and Sensitivity.

PPV is the proportion of individuals who test positive for a condition and actually have the condition. It is calculated by dividing the number of true positive results by the total number of positive results. PPV indicates the likelihood that a positive test result is a true positive, and it is influenced by the prevalence of the condition in the population being tested.

On the other hand, Sensitivity is the proportion of individuals with the condition who correctly test positive for it. It is calculated by dividing the number of true positive results by the total number of individuals with the condition. Sensitivity measures the ability of a test to correctly identify individuals with the condition, regardless of whether they show symptoms.

In summary, while both PPV and Sensitivity evaluate the accuracy of a test, PPV is influenced by the prevalence of the condition, while Sensitivity is not. Therefore, they provide different perspectives on the performance of a diagnostic test and should be used together to fully assess its effectiveness.

Positive Predictive Value vs. Sensitivity: What's the Difference?

One of the most common ways to assess the performance of a is to create a confusion matrix, which summarizes the predicted outcomes from the model vs. the actual outcomes from the dataset.

		Actual Outcome: Positive	Actual Outcome: Negative
Predicted Outcome	Positive	True Positive	False Positive
	Negative	False Negative	True Negative

Two metrics that we're often interested in within a confusion matrix are positive predictive value and sensitivity.

Positive predictive value is the probability that an observation with a positive predicted outcome actually *has* a positive outcome.

It is calculated as:

Positive predictive value = True Positives / (True Positives + False Positives)

		Actual Outcome: Positive	Actual Outcome: Negative	
Predicted Outcome	Positive	True Positive	False Positive	Positive Predicted Value = TP / (TP + FP)
	Negative	False Negative	True Negative	

Sensitivity is the probability that an observation with a positive outcome actually has a positive predicted outcome.

It is calculated as:

Sensitivity = True Positives / (True Positives + False Negatives)

		Actual Outcome: Positive	Actual Outcome: Negative
Predicted Outcome	Positive	True Positive	False Positive
	Negative	False Negative	True Negative
		Sensitivity = TP / (TP+FN)	

The following example shows how to calculate both of these metrics in practice.

Example: Calculating Positive Predictive Value & Sensitivity

Suppose a doctor uses a to predict whether or not 400 individuals have a certain disease.

The following confusion matrix summarizes the

predictions made by the model:

		Actual Outcome: Positive	Actual Outcome: Negative
Predicted Outcome	Positive	**15** (True Positive)	**10** (False Positive)
	Negative	**5** (False Negative)	**370** (True Negative)

We would calculate the positive predictive value as:

Positive predictive value = True Positives / (True Positives + False Positives)Positive predictive value = 15 / (15 + 10)Positive predictive value = 0.60

This tells us that the probability that an individual who receives a positive test result actually *has* the disease is 0.60.

We would calculate the sensitivity as:

Sensitivity = True Positives / (True Positives + False Negatives)Sensitivity = 15 / (15 + 5)Sensitivity = 0.75

This tells us that the probability that an individual who has the disease will actually receive a positive test result is 0.75.

Additional Resources

The following tutorials explain how to create a confusion matrix in different statistical software: