

# How to Calculate Matthews Correlation Coefficient in R

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## RECOMMENDED CITATION

stats writer (2025). *How to Calculate Matthews Correlation Coefficient in R*.  
PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=100339>

The Matthews Correlation Coefficient (MCC) in R is a measure of the correlation between two binary variables and is calculated using the confusion matrix. It is calculated by taking the product of the true positives and true negatives, subtracting the product of the false positives and false negatives, and then dividing the result by the square root of the product of the sum of the true positives and false negatives multiplied by the sum of the true negatives and false positives. This value ranges from -1 to 1, where 1 represents a perfect prediction and -1 represents a perfect inverted prediction.

**Matthews correlation coefficient** (MCC) is a metric we can use to assess the performance of a .

It is calculated as:

$$\text{MCC} = (TP \cdot TN - FP \cdot FN) / \sqrt{(TP+FP)(TP+FN)(TN+FP)(TN+FN)}$$

where:

**TP:** Number of true positives

**TN:** Number of true negatives

**FP:** Number of false positives

**FN:** Number of false negatives

This metric is particularly useful when the two classes are imbalanced - that is, one class appears much more than the other.

The value for MCC ranges from -1 to 1 where:

**-1** indicates total disagreement between predicted classes and actual classes

**0** is synonymous with completely random guessing

**1** indicates total agreement between predicted classes and actual classes

For example, suppose a sports analyst uses a to predict whether or not 400 different college basketball players get drafted into the NBA.

The following confusion matrix summarizes the predictions made by the model:

		Predicted	
		Drafted = Yes	Drafted = No
Actual	Drafted = Yes	15 (True Positive)	5 (False Negative)
	Drafted = No	5 (False positive)	375 (True Negative)

To calculate the MCC of the model, we can use the following formula:

$$\text{MCC} = (TP \cdot TN - FP \cdot FN) / \sqrt{(TP+FP)(TP+FN)(TN+FP)(TN+FN)}$$

$$\text{MCC} = (15 \cdot 375 - 5 \cdot 5) / \sqrt{(15+5)(15+5)(375+5)(375+5)}$$

$$\text{MCC} = 0.7368$$

Matthews correlation coefficient turns out to be **0.7368**.

This value is somewhat close to one, which indicates that the model does a decent job of predicting whether or not players will get drafted.

The following example shows how to calculate MCC for this exact scenario using the `mcc()` function from the `mltools` package in R.

## Example: Calculating Matthews Correlation Coefficient in R

```
library(mltools)
```

```
#define vector of actual classes
```

```
actual <- rep(c(1, 0), times=c(20, 380))
```

```
#define vector of predicted classes
```

```
preds <- rep(c(1, 0, 1, 0), times=c(15, 5, 5, 375))
```

```
#calculate Matthews correlation coefficient
```

```
mcc(preds, actual)
```

```
0.7368421
```

Matthews correlation coefficient is **0.7368**.

This matches the value that we calculated earlier by hand.

If you'd like to calculate Matthews correlation coefficient for a confusion matrix, you can use the

**confusionM** argument as follows:

**library(mltools)**

```
#create confusion matrix
```

```
conf_matrix <- matrix(c(15, 5, 5, 375), nrow=2)
```

```
#view confusion matrix
```

```
conf_matrix
```

```
15 5
```

```
5 375
```

```
#calculate Matthews correlation coefficient for confusion matrix
```

```
mcc(confusionM = conf_matrix)
```

```
0.7368421
```

Once again, Matthews correlation coefficient is **0.7368**