Consecutively numbered slides:

1. Show Task for assignment and introduce group:

Hello everyone, today us, group 30, are going to show you what RMSE is and how it is used on a concrete example.

Furthermore, we are going to introduce you to a research paper that uses RMSE as well as present how and why RMSE is used in that context.

1. Show short agenda

We will start with the definition of RMSE

Go over to a simple example to explain the effect and usage

Show you the concrete formula

And finale go to the research paper in that RMSE is used.

1. What is RMSE?

Root Mean Square Error (RMSE) is the standard deviation of the residuals (prediction errors).

Residuals are a measure of how far from the regression line data points are.

RMSE is a measure of how spread out these residuals are.

In other words, it tells you how concentrated the data is around the line of best fit.

[https://www.statisticshowto.com/probability-and-statistics/regression-analysis/rmse-root-mean-square-error}

We got two examples here to give you a natural feeling for this:

The blue points are our observed data points while the red line is the hypothesis for our correlation. The RMSE now gives information in a single value on how big the spread between actual observed and forecasted data pairs is, averaged over all pairs.

The observed data points are fixed now, but we could easily change our hypothesis. On our concrete example we could check if a polynomial approach of a third degree would result in better RMSE:

We see, that the RMSE got a bit better. This may advance with the degree of our polynomial, until we hit the polynomial degree of the number of datapoints (which is 46 in this case) At that point we will reach an RMSE of 0 as there will be no deviation between observed and predicted values. At this point the meaning of RMSE is exposed. Used like this the RMSE is a quality index on how good your prediction is in comparison to observed data.

1. How is RMSE used?

As you now hopefully understood what RMSE is about we could talk about the appropriate formulas and suitable notations. A pretty easy and straight forward notation would be the following:

Short notation:

This leads to the underlying basic formula:

Classic way:

… forecasted data point i

… observed data point i

number of data pairs

One hint: It doesn’t matter if you substract forecast from observed or the other way around as the result is squared anyway.

~~Using standard deviation:~~

~~r … correlation coefficient~~

~~… standard deviation~~

This is how RMSE is used.

1. Concrete example

Our concrete example paper goes by the name:

Hybrid Artificial Intelligence Approaches for Predicting Buckling Damage of Steel Columns Under Axial Compression. We will quickly go over the two main contents of this paper:

1. Hybrid Artificial Intelligence Approaches
2. Predicting Buckling Damage of Steel Columns Under Axial Compression

We will start with the last part to start smoothly:

 

