

Steel Activity 1

Your Name Here

Learning Outcomes

- Perform exploratory data analysis on a dataset with both quantitative and categorical variables
- Identify and fit (using R) a linear model for a quantitative response based on a quantitative predictor.
- Check the conditions for a simple linear model and use transformations when they are not met.

Part 1: Squishing Steel Case Study

A commercial steel mill is involved in the process of “squishing steel”, as we will call it. A slab of steel is sent through different roll stands, with the end result being a sheet of steel that has achieved a desired gauge. The response variable of interest is Force, a quantitative measure of the roll force for each coil. The predictors including the below variables:

- avg.width: the average slab width (Q)
- temperature: temperature of slab at the roll stand (Q)
- entry.gauge: the slab gauge at the entry of the roll stand (Q)
- exit.gauge: the slab gauge at the exit of the roll stand (Q)
- roller.diameter: the diameter of the roller (Q)
- caster.id: location of the caster (North versus South)
- stand.id: one of five roll stands the steel sheet passes through (F1 - F5)

Part 1

Get to know your dataset.

TASK 1.1 Perform meaningful EDA for relating each of the predictors to the response, and make two meaningful comments on what you observe. (Please make individual plots for the response versus each predictor). The first comment should address the quantitative variables, and the second should address the categorical variables. (No transformations should be considered here)

Comment 1

Comment 2

TASK 1.2 If you were to select one quantitative variable to predict force, what would it be? Justify your answer.

Response

TASK 1.3 If you were to select one categorical variable to predict force, what would it be? Justify your answer.

Response

Part 2

The following research question will be investigated in Part 2: Is Temperature alone useful for predicting Force?

TASK 2.1 State the theoretical model that you will use to answer this research question (use correct notation)

Response

TASK 2.2 Do you have any reasons to worry about whether this test/model is valid? (you should assess the conditions)

Response

TASK 2.3 Decide whether you need to perform a transformation and explain your choice. If you choose to do so, then re-fit the model and re-assess the conditions.

Response

TASK 2.4 Use your model from 1.3 to answer the research question in context.

Response