Summary statistics - tool function experiment

Lisa Schunk

2021-02-04 14:51:19

# Goal of the script

This script computes standard descriptive statistics for each group.  
The groups are based on:

* Raw material
* Spots (replicas)
* Task + edge angle

It computes the following statistics:

* n (sample size = length): number of measurements
* smallest value (min)
* largest value (max)
* mean
* median
* standard deviation (sd)

dir\_in <- "analysis/derived\_data/"  
dir\_out <- "analysis/summary\_stats/"

Raw data must be located in ~/analysis/derived\_data/.  
Formatted data will be saved in ~/analysis/summary\_stats/. The knit directory for this script is the project directory.

# Load packages

library(openxlsx)

Warning: package 'openxlsx' was built under R version 4.0.3

library(R.utils)  
library(tools)  
library(doBy)

Warning: package 'doBy' was built under R version 4.0.3

# Get names, path and information of the file

data\_file <- list.files(dir\_in, pattern = "\\.xlsx$", full.names = TRUE)  
md5\_in <- md5sum(data\_file)  
info\_in <- data.frame(file = basename(names(md5\_in)), checksum = md5\_in, row.names = NULL)

The checksum (MD5 hashes) of the imported file is

file checksum  
1 TFE\_use-wear.xlsx 894a29ed63d7a8b55ea6ff4b15e59623

# Load data into R object

imp\_data <- loadObject(paste0(dir\_in, "TFE\_use-wear.Rbin"))

The imported file is: “~/analysis/derived\_data/TFE\_use-wear.xlsx”

# 4. Define numeric variables

num.var <- 24:length(imp\_data)

The following variables will be used:

[24] Sq  
[25] Ssk  
[26] Sku  
[27] Sp  
[28] Sv  
[29] Sz  
[30] Sa  
[31] Smr  
[32] Smc  
[33] Sxp  
[34] Sal  
[35] Str  
[36] Std  
[37] Sdq  
[38] Sdr  
[39] Vm  
[40] Vv  
[41] Vmp  
[42] Vmc  
[43] Vvc  
[44] Vvv  
[45] Maximum.depth.of.furrows  
[46] Mean.depth.of.furrows  
[47] Mean.density.of.furrows  
[48] First.direction  
[49] Second.direction  
[50] Third.direction  
[51] Isotropy  
[52] epLsar  
[53] NewEplsar  
[54] Asfc  
[55] Smfc  
[56] HAsfc9  
[57] HAsfc81

# Compute summary statistics

## Create function to compute the statistics at once

nminmaxmeanmedsd <- function(x){  
 y <- x[!is.na(x)]  
 n\_test <- length(y)  
 min\_test <- min(y)  
 max\_test <- max(y)  
 mean\_test <- mean(y)  
 med\_test <- median(y)  
 sd\_test <- sd(y)  
 out <- c(n\_test, min\_test, max\_test, mean\_test, med\_test, sd\_test)  
 names(out) <- c("n", "min", "max", "mean", "median", "sd")  
 return(out)  
}

## Compute the summary statistics in groups

### Spots

spot <- summaryBy(.~ Sample + Location + Area,   
 data = imp\_data[c("Sample","Location","Area" ,names(imp\_data)[num.var])],   
 FUN = nminmaxmeanmedsd)  
str(spot)

'data.frame': 8 obs. of 207 variables:  
 $ Sample : chr "FLT8-10" "FLT8-2" "FLT8-5" "FLT8-9" ...  
 $ Location : chr "C1" "D1" "C1" "B1" ...  
 $ Area : chr "01" "01" "01" "01" ...  
 $ Sq.n : num 3 3 3 3 3 3 3 3  
 $ Sq.min : num 315 1718 196 153 231 ...  
 $ Sq.max : num 7217 2546 226 13075 433 ...  
 $ Sq.mean : num 3057 2263 215 4465 323 ...  
 $ Sq.median : num 1640 2525 223 167 306 ...  
 $ Sq.sd : num 3662.7 471.9 16.6 7456.4 102.1 ...  
 $ Ssk.n : num 3 3 3 3 3 3 3 3  
 $ Ssk.min : num -1.202 -1.432 -3.721 -0.315 -3.03 ...  
 $ Ssk.max : num 0.517 -0.51 -0.791 3.156 2.896 ...  
 $ Ssk.mean : num -0.437 -0.905 -2.155 1.664 -0.595 ...  
 $ Ssk.median : num -0.626 -0.772 -1.953 2.152 -1.65 ...  
 $ Ssk.sd : num 0.875 0.475 1.475 1.786 3.1 ...  
 $ Sku.n : num 3 3 3 3 3 3 3 3  
 $ Sku.min : num 4.34 6.94 4.74 4.58 18.08 ...  
 $ Sku.max : num 7.12 12.01 27.61 31.11 32.75 ...  
 $ Sku.mean : num 5.93 9.19 14.2 18.52 23.4 ...  
 $ Sku.median : num 6.34 8.62 10.24 19.86 19.36 ...  
 $ Sku.sd : num 1.43 2.58 11.94 13.31 8.13 ...  
 $ Sp.n : num 3 3 3 3 3 3 3 3  
 $ Sp.min : num 716 5842 525 1458 1712 ...  
 $ Sp.max : num 24832 8900 620 26706 3221 ...  
 $ Sp.mean : num 10384 7802 572 9910 2217 ...  
 $ Sp.median : num 5603 8665 570 1565 1717 ...  
 $ Sp.sd : num 12749.4 1702 47.6 14546.2 870 ...  
 $ Sv.n : num 3 3 3 3 3 3 3 3  
 $ Sv.min : num 1929 11581 1068 768 1264 ...  
 $ Sv.max : num 24749 14246 2162 99093 3612 ...  
 $ Sv.mean : num 11344 12928 1552 33611 2400 ...  
 $ Sv.median : num 7354 12958 1426 971 2322 ...  
 $ Sv.sd : num 11922 1332 557 56710 1176 ...  
 $ Sz.n : num 3 3 3 3 3 3 3 3  
 $ Sz.min : num 2645 17423 1688 2333 4034 ...  
 $ Sz.max : num 49581 22911 2686 125800 5329 ...  
 $ Sz.mean : num 21727 20731 2124 43521 4616 ...  
 $ Sz.median : num 12956 21858 1996 2429 4486 ...  
 $ Sz.sd : num 24667 2912 511 71256 657 ...  
 $ Sa.n : num 3 3 3 3 3 3 3 3  
 $ Sa.min : num 238.6 1117.1 138.7 85.2 157 ...  
 $ Sa.max : num 5359 1814 166 10906 266 ...  
 $ Sa.mean : num 2226 1567 148 3695 203 ...  
 $ Sa.median : num 1080.4 1769.3 139.3 93.9 184.6 ...  
 $ Sa.sd : num 2745.8 390.1 15.4 6244.7 56.6 ...  
 $ Smr.n : num 3 3 3 3 3 3 3 3  
 $ Smr.min : num 0.151 0.41 94.062 0.296 0.345 ...  
 $ Smr.max : num 84.156 0.768 97.359 1.943 0.77 ...  
 $ Smr.mean : num 28.398 0.566 96.055 1.109 0.493 ...  
 $ Smr.median : num 0.887 0.519 96.743 1.088 0.365 ...  
 $ Smr.sd : num 48.289 0.183 1.753 0.824 0.24 ...  
 $ Smc.n : num 3 3 3 3 3 3 3 3  
 $ Smc.min : num 349.5 1633.5 191.7 95.7 199 ...  
 $ Smc.max : num 8453 2737 248 18265 335 ...  
 $ Smc.mean : num 3491 2330 211 6154 252 ...  
 $ Smc.median : num 1669 2619.7 194.4 99.7 223.2 ...  
 $ Smc.sd : num 4348.2 606 31.9 10489 72.5 ...  
 $ Sxp.n : num 3 3 3 3 3 3 3 3  
 $ Sxp.min : num 770 3974 526 280 561 ...  
 $ Sxp.max : num 13827 5202 576 18794 1190 ...  
 $ Sxp.mean : num 6350 4675 544 6460 796 ...  
 $ Sxp.median : num 4454 4849 530 305 637 ...  
 $ Sxp.sd : num 6732 632 28 10682 343 ...  
 $ Sal.n : num 3 3 3 3 3 3 3 3  
 $ Sal.min : num 11.35 17.69 9.98 9.34 6.8 ...  
 $ Sal.max : num 19.27 23.58 17.34 46.79 9.97 ...  
 $ Sal.mean : num 16.32 20.46 13.43 22.24 8.58 ...  
 $ Sal.median : num 18.33 20.11 12.98 10.58 8.96 ...  
 $ Sal.sd : num 4.33 2.96 3.7 21.27 1.62 ...  
 $ Str.n : num 2 2 3 2 3 3 3 3  
 $ Str.min : num 0.26 0.154 0.222 0.689 0.139 ...  
 $ Str.max : num 0.286 0.514 0.844 0.714 0.544 ...  
 $ Str.mean : num 0.273 0.334 0.446 0.701 0.386 ...  
 $ Str.median : num 0.273 0.334 0.272 0.701 0.476 ...  
 $ Str.sd : num 0.0187 0.2547 0.3456 0.0183 0.2168 ...  
 $ Std.n : num 3 3 3 3 3 3 3 3  
 $ Std.min : num 156.3 140.5 151.7 25 79.3 ...  
 $ Std.max : num 169 148.5 151.8 176.5 99.7 ...  
 $ Std.mean : num 161.5 145.8 151.7 88.4 87 ...  
 $ Std.median : num 159.2 148.5 151.7 63.8 82 ...  
 $ Std.sd : num 6.66741 4.60984 0.00718 78.70957 11.12649 ...  
 $ Sdq.n : num 3 3 3 3 3 3 3 3  
 $ Sdq.min : num 0.1657 0.2937 0.0927 0.1005 0.1363 ...  
 $ Sdq.max : num 1.165 0.35 0.102 1.551 0.198 ...  
 $ Sdq.mean : num 0.5332 0.3264 0.0979 0.5869 0.1611 ...  
 $ Sdq.median : num 0.269 0.3357 0.0994 0.109 0.1493 ...  
 $ Sdq.sd : num 0.54942 0.02926 0.00469 0.83509 0.03229 ...  
 $ Sdr.n : num 3 3 3 3 3 3 3 3  
 $ Sdr.min : num 1.348 3.608 0.421 0.495 0.906 ...  
 $ Sdr.max : num 19.198 4.76 0.511 27.267 1.829 ...  
 $ Sdr.mean : num 7.851 4.33 0.474 9.446 1.264 ...  
 $ Sdr.median : num 3.006 4.623 0.489 0.578 1.057 ...  
 $ Sdr.sd : num 9.862 0.6294 0.0472 15.4327 0.4948 ...  
 $ Vm.n : num 3 3 3 3 3 3 3 3  
 $ Vm.min : num 0.0093 0.11486 0.00505 0.01399 0.00937 ...  
 $ Vm.max : num 0.67139 0.18403 0.00995 0.29933 0.02147 ...  
 $ Vm.mean : num 0.27203 0.16026 0.00697 0.11089 0.01434 ...  
 $ Vm.median : num 0.1354 0.1819 0.0059 0.0193 0.0122 ...  
 $ Vm.sd : num 0.35156 0.03933 0.00262 0.16322 0.00634 ...  
 [list output truncated]

### Task and edge angel

task <- summaryBy(.~ Sample + Task + Edge.angle,   
 data = imp\_data[c("Sample", "Task", "Edge.angle",   
 names(imp\_data)[num.var])], FUN = nminmaxmeanmedsd)  
str(task)

'data.frame': 8 obs. of 207 variables:  
 $ Sample : chr "FLT8-10" "FLT8-2" "FLT8-5" "FLT8-9" ...  
 $ Task : Factor w/ 2 levels "carving","cutting": 1 2 2 1 1 2 2 1  
 $ Edge.angle : Factor w/ 2 levels "35°","45°": 2 2 1 1 1 2 1 2  
 $ Sq.n : num 3 3 3 3 3 3 3 3  
 $ Sq.min : num 315 1718 196 153 231 ...  
 $ Sq.max : num 7217 2546 226 13075 433 ...  
 $ Sq.mean : num 3057 2263 215 4465 323 ...  
 $ Sq.median : num 1640 2525 223 167 306 ...  
 $ Sq.sd : num 3662.7 471.9 16.6 7456.4 102.1 ...  
 $ Ssk.n : num 3 3 3 3 3 3 3 3  
 $ Ssk.min : num -1.202 -1.432 -3.721 -0.315 -3.03 ...  
 $ Ssk.max : num 0.517 -0.51 -0.791 3.156 2.896 ...  
 $ Ssk.mean : num -0.437 -0.905 -2.155 1.664 -0.595 ...  
 $ Ssk.median : num -0.626 -0.772 -1.953 2.152 -1.65 ...  
 $ Ssk.sd : num 0.875 0.475 1.475 1.786 3.1 ...  
 $ Sku.n : num 3 3 3 3 3 3 3 3  
 $ Sku.min : num 4.34 6.94 4.74 4.58 18.08 ...  
 $ Sku.max : num 7.12 12.01 27.61 31.11 32.75 ...  
 $ Sku.mean : num 5.93 9.19 14.2 18.52 23.4 ...  
 $ Sku.median : num 6.34 8.62 10.24 19.86 19.36 ...  
 $ Sku.sd : num 1.43 2.58 11.94 13.31 8.13 ...  
 $ Sp.n : num 3 3 3 3 3 3 3 3  
 $ Sp.min : num 716 5842 525 1458 1712 ...  
 $ Sp.max : num 24832 8900 620 26706 3221 ...  
 $ Sp.mean : num 10384 7802 572 9910 2217 ...  
 $ Sp.median : num 5603 8665 570 1565 1717 ...  
 $ Sp.sd : num 12749.4 1702 47.6 14546.2 870 ...  
 $ Sv.n : num 3 3 3 3 3 3 3 3  
 $ Sv.min : num 1929 11581 1068 768 1264 ...  
 $ Sv.max : num 24749 14246 2162 99093 3612 ...  
 $ Sv.mean : num 11344 12928 1552 33611 2400 ...  
 $ Sv.median : num 7354 12958 1426 971 2322 ...  
 $ Sv.sd : num 11922 1332 557 56710 1176 ...  
 $ Sz.n : num 3 3 3 3 3 3 3 3  
 $ Sz.min : num 2645 17423 1688 2333 4034 ...  
 $ Sz.max : num 49581 22911 2686 125800 5329 ...  
 $ Sz.mean : num 21727 20731 2124 43521 4616 ...  
 $ Sz.median : num 12956 21858 1996 2429 4486 ...  
 $ Sz.sd : num 24667 2912 511 71256 657 ...  
 $ Sa.n : num 3 3 3 3 3 3 3 3  
 $ Sa.min : num 238.6 1117.1 138.7 85.2 157 ...  
 $ Sa.max : num 5359 1814 166 10906 266 ...  
 $ Sa.mean : num 2226 1567 148 3695 203 ...  
 $ Sa.median : num 1080.4 1769.3 139.3 93.9 184.6 ...  
 $ Sa.sd : num 2745.8 390.1 15.4 6244.7 56.6 ...  
 $ Smr.n : num 3 3 3 3 3 3 3 3  
 $ Smr.min : num 0.151 0.41 94.062 0.296 0.345 ...  
 $ Smr.max : num 84.156 0.768 97.359 1.943 0.77 ...  
 $ Smr.mean : num 28.398 0.566 96.055 1.109 0.493 ...  
 $ Smr.median : num 0.887 0.519 96.743 1.088 0.365 ...  
 $ Smr.sd : num 48.289 0.183 1.753 0.824 0.24 ...  
 $ Smc.n : num 3 3 3 3 3 3 3 3  
 $ Smc.min : num 349.5 1633.5 191.7 95.7 199 ...  
 $ Smc.max : num 8453 2737 248 18265 335 ...  
 $ Smc.mean : num 3491 2330 211 6154 252 ...  
 $ Smc.median : num 1669 2619.7 194.4 99.7 223.2 ...  
 $ Smc.sd : num 4348.2 606 31.9 10489 72.5 ...  
 $ Sxp.n : num 3 3 3 3 3 3 3 3  
 $ Sxp.min : num 770 3974 526 280 561 ...  
 $ Sxp.max : num 13827 5202 576 18794 1190 ...  
 $ Sxp.mean : num 6350 4675 544 6460 796 ...  
 $ Sxp.median : num 4454 4849 530 305 637 ...  
 $ Sxp.sd : num 6732 632 28 10682 343 ...  
 $ Sal.n : num 3 3 3 3 3 3 3 3  
 $ Sal.min : num 11.35 17.69 9.98 9.34 6.8 ...  
 $ Sal.max : num 19.27 23.58 17.34 46.79 9.97 ...  
 $ Sal.mean : num 16.32 20.46 13.43 22.24 8.58 ...  
 $ Sal.median : num 18.33 20.11 12.98 10.58 8.96 ...  
 $ Sal.sd : num 4.33 2.96 3.7 21.27 1.62 ...  
 $ Str.n : num 2 2 3 2 3 3 3 3  
 $ Str.min : num 0.26 0.154 0.222 0.689 0.139 ...  
 $ Str.max : num 0.286 0.514 0.844 0.714 0.544 ...  
 $ Str.mean : num 0.273 0.334 0.446 0.701 0.386 ...  
 $ Str.median : num 0.273 0.334 0.272 0.701 0.476 ...  
 $ Str.sd : num 0.0187 0.2547 0.3456 0.0183 0.2168 ...  
 $ Std.n : num 3 3 3 3 3 3 3 3  
 $ Std.min : num 156.3 140.5 151.7 25 79.3 ...  
 $ Std.max : num 169 148.5 151.8 176.5 99.7 ...  
 $ Std.mean : num 161.5 145.8 151.7 88.4 87 ...  
 $ Std.median : num 159.2 148.5 151.7 63.8 82 ...  
 $ Std.sd : num 6.66741 4.60984 0.00718 78.70957 11.12649 ...  
 $ Sdq.n : num 3 3 3 3 3 3 3 3  
 $ Sdq.min : num 0.1657 0.2937 0.0927 0.1005 0.1363 ...  
 $ Sdq.max : num 1.165 0.35 0.102 1.551 0.198 ...  
 $ Sdq.mean : num 0.5332 0.3264 0.0979 0.5869 0.1611 ...  
 $ Sdq.median : num 0.269 0.3357 0.0994 0.109 0.1493 ...  
 $ Sdq.sd : num 0.54942 0.02926 0.00469 0.83509 0.03229 ...  
 $ Sdr.n : num 3 3 3 3 3 3 3 3  
 $ Sdr.min : num 1.348 3.608 0.421 0.495 0.906 ...  
 $ Sdr.max : num 19.198 4.76 0.511 27.267 1.829 ...  
 $ Sdr.mean : num 7.851 4.33 0.474 9.446 1.264 ...  
 $ Sdr.median : num 3.006 4.623 0.489 0.578 1.057 ...  
 $ Sdr.sd : num 9.862 0.6294 0.0472 15.4327 0.4948 ...  
 $ Vm.n : num 3 3 3 3 3 3 3 3  
 $ Vm.min : num 0.0093 0.11486 0.00505 0.01399 0.00937 ...  
 $ Vm.max : num 0.67139 0.18403 0.00995 0.29933 0.02147 ...  
 $ Vm.mean : num 0.27203 0.16026 0.00697 0.11089 0.01434 ...  
 $ Vm.median : num 0.1354 0.1819 0.0059 0.0193 0.0122 ...  
 $ Vm.sd : num 0.35156 0.03933 0.00262 0.16322 0.00634 ...  
 [list output truncated]

### Raw material

raw\_material <- summaryBy(.~ Raw.material + Task + Edge.angle,   
 data=imp\_data[c("Raw.material","Task","Edge.angle",  
 names(imp\_data)[num.var])], FUN = nminmaxmeanmedsd)  
str(raw\_material)

'data.frame': 8 obs. of 207 variables:  
 $ Raw.material : Factor w/ 2 levels "flint","lydite": 1 1 1 1 2 2 2 2  
 $ Task : Factor w/ 2 levels "carving","cutting": 1 1 2 2 1 1 2 2  
 $ Edge.angle : Factor w/ 2 levels "35°","45°": 1 2 1 2 1 2 1 2  
 $ Sq.n : num 3 3 3 3 3 3 3 3  
 $ Sq.min : num 153 315 196 1718 231 ...  
 $ Sq.max : num 13075 7217 226 2546 433 ...  
 $ Sq.mean : num 4465 3057 215 2263 323 ...  
 $ Sq.median : num 167 1640 223 2525 306 ...  
 $ Sq.sd : num 7456.4 3662.7 16.6 471.9 102.1 ...  
 $ Ssk.n : num 3 3 3 3 3 3 3 3  
 $ Ssk.min : num -0.315 -1.202 -3.721 -1.432 -3.03 ...  
 $ Ssk.max : num 3.156 0.517 -0.791 -0.51 2.896 ...  
 $ Ssk.mean : num 1.664 -0.437 -2.155 -0.905 -0.595 ...  
 $ Ssk.median : num 2.152 -0.626 -1.953 -0.772 -1.65 ...  
 $ Ssk.sd : num 1.786 0.875 1.475 0.475 3.1 ...  
 $ Sku.n : num 3 3 3 3 3 3 3 3  
 $ Sku.min : num 4.58 4.34 4.74 6.94 18.08 ...  
 $ Sku.max : num 31.11 7.12 27.61 12.01 32.75 ...  
 $ Sku.mean : num 18.52 5.93 14.2 9.19 23.4 ...  
 $ Sku.median : num 19.86 6.34 10.24 8.62 19.36 ...  
 $ Sku.sd : num 13.31 1.43 11.94 2.58 8.13 ...  
 $ Sp.n : num 3 3 3 3 3 3 3 3  
 $ Sp.min : num 1458 716 525 5842 1712 ...  
 $ Sp.max : num 26706 24832 620 8900 3221 ...  
 $ Sp.mean : num 9910 10384 572 7802 2217 ...  
 $ Sp.median : num 1565 5603 570 8665 1717 ...  
 $ Sp.sd : num 14546.2 12749.4 47.6 1702 870 ...  
 $ Sv.n : num 3 3 3 3 3 3 3 3  
 $ Sv.min : num 768 1929 1068 11581 1264 ...  
 $ Sv.max : num 99093 24749 2162 14246 3612 ...  
 $ Sv.mean : num 33611 11344 1552 12928 2400 ...  
 $ Sv.median : num 971 7354 1426 12958 2322 ...  
 $ Sv.sd : num 56710 11922 557 1332 1176 ...  
 $ Sz.n : num 3 3 3 3 3 3 3 3  
 $ Sz.min : num 2333 2645 1688 17423 4034 ...  
 $ Sz.max : num 125800 49581 2686 22911 5329 ...  
 $ Sz.mean : num 43521 21727 2124 20731 4616 ...  
 $ Sz.median : num 2429 12956 1996 21858 4486 ...  
 $ Sz.sd : num 71256 24667 511 2912 657 ...  
 $ Sa.n : num 3 3 3 3 3 3 3 3  
 $ Sa.min : num 85.2 238.6 138.7 1117.1 157 ...  
 $ Sa.max : num 10906 5359 166 1814 266 ...  
 $ Sa.mean : num 3695 2226 148 1567 203 ...  
 $ Sa.median : num 93.9 1080.4 139.3 1769.3 184.6 ...  
 $ Sa.sd : num 6244.7 2745.8 15.4 390.1 56.6 ...  
 $ Smr.n : num 3 3 3 3 3 3 3 3  
 $ Smr.min : num 0.296 0.151 94.062 0.41 0.345 ...  
 $ Smr.max : num 1.943 84.156 97.359 0.768 0.77 ...  
 $ Smr.mean : num 1.109 28.398 96.055 0.566 0.493 ...  
 $ Smr.median : num 1.088 0.887 96.743 0.519 0.365 ...  
 $ Smr.sd : num 0.824 48.289 1.753 0.183 0.24 ...  
 $ Smc.n : num 3 3 3 3 3 3 3 3  
 $ Smc.min : num 95.7 349.5 191.7 1633.5 199 ...  
 $ Smc.max : num 18265 8453 248 2737 335 ...  
 $ Smc.mean : num 6154 3491 211 2330 252 ...  
 $ Smc.median : num 99.7 1669 194.4 2619.7 223.2 ...  
 $ Smc.sd : num 10489 4348.2 31.9 606 72.5 ...  
 $ Sxp.n : num 3 3 3 3 3 3 3 3  
 $ Sxp.min : num 280 770 526 3974 561 ...  
 $ Sxp.max : num 18794 13827 576 5202 1190 ...  
 $ Sxp.mean : num 6460 6350 544 4675 796 ...  
 $ Sxp.median : num 305 4454 530 4849 637 ...  
 $ Sxp.sd : num 10682 6732 28 632 343 ...  
 $ Sal.n : num 3 3 3 3 3 3 3 3  
 $ Sal.min : num 9.34 11.35 9.98 17.69 6.8 ...  
 $ Sal.max : num 46.79 19.27 17.34 23.58 9.97 ...  
 $ Sal.mean : num 22.24 16.32 13.43 20.46 8.58 ...  
 $ Sal.median : num 10.58 18.33 12.98 20.11 8.96 ...  
 $ Sal.sd : num 21.27 4.33 3.7 2.96 1.62 ...  
 $ Str.n : num 2 2 3 2 3 3 3 3  
 $ Str.min : num 0.689 0.26 0.222 0.154 0.139 ...  
 $ Str.max : num 0.714 0.286 0.844 0.514 0.544 ...  
 $ Str.mean : num 0.701 0.273 0.446 0.334 0.386 ...  
 $ Str.median : num 0.701 0.273 0.272 0.334 0.476 ...  
 $ Str.sd : num 0.0183 0.0187 0.3456 0.2547 0.2168 ...  
 $ Std.n : num 3 3 3 3 3 3 3 3  
 $ Std.min : num 25 156.3 151.7 140.5 79.3 ...  
 $ Std.max : num 176.5 169 151.8 148.5 99.7 ...  
 $ Std.mean : num 88.4 161.5 151.7 145.8 87 ...  
 $ Std.median : num 63.8 159.2 151.7 148.5 82 ...  
 $ Std.sd : num 78.70957 6.66741 0.00718 4.60984 11.12649 ...  
 $ Sdq.n : num 3 3 3 3 3 3 3 3  
 $ Sdq.min : num 0.1005 0.1657 0.0927 0.2937 0.1363 ...  
 $ Sdq.max : num 1.551 1.165 0.102 0.35 0.198 ...  
 $ Sdq.mean : num 0.5869 0.5332 0.0979 0.3264 0.1611 ...  
 $ Sdq.median : num 0.109 0.269 0.0994 0.3357 0.1493 ...  
 $ Sdq.sd : num 0.83509 0.54942 0.00469 0.02926 0.03229 ...  
 $ Sdr.n : num 3 3 3 3 3 3 3 3  
 $ Sdr.min : num 0.495 1.348 0.421 3.608 0.906 ...  
 $ Sdr.max : num 27.267 19.198 0.511 4.76 1.829 ...  
 $ Sdr.mean : num 9.446 7.851 0.474 4.33 1.264 ...  
 $ Sdr.median : num 0.578 3.006 0.489 4.623 1.057 ...  
 $ Sdr.sd : num 15.4327 9.862 0.0472 0.6294 0.4948 ...  
 $ Vm.n : num 3 3 3 3 3 3 3 3  
 $ Vm.min : num 0.01399 0.0093 0.00505 0.11486 0.00937 ...  
 $ Vm.max : num 0.29933 0.67139 0.00995 0.18403 0.02147 ...  
 $ Vm.mean : num 0.11089 0.27203 0.00697 0.16026 0.01434 ...  
 $ Vm.median : num 0.0193 0.1354 0.0059 0.1819 0.0122 ...  
 $ Vm.sd : num 0.16322 0.35156 0.00262 0.03933 0.00634 ...  
 [list output truncated]

# Save data

## Format name of output file

file\_out <- "TFE\_stats"

The file will be saved as “~/analysis/summary\_stats/.[ext]”.

## Write to XLSX

write.xlsx(list(spot = spot, task = task, raw\_material = raw\_material),   
 file = paste0(dir\_out, file\_out, ".xlsx"))

## Save R object

saveObject(list(spot = spot, task = task, raw\_material = raw\_material),   
 file = paste0(dir\_out, file\_out, ".Rbin"))

# sessionInfo() and RStudio version

sessionInfo()

R version 4.0.2 (2020-06-22)  
Platform: x86\_64-w64-mingw32/x64 (64-bit)  
Running under: Windows 10 x64 (build 19041)  
  
Matrix products: default  
  
locale:  
[1] LC\_COLLATE=German\_Germany.1252 LC\_CTYPE=German\_Germany.1252   
[3] LC\_MONETARY=German\_Germany.1252 LC\_NUMERIC=C   
[5] LC\_TIME=German\_Germany.1252   
  
attached base packages:  
[1] tools stats graphics grDevices utils datasets methods   
[8] base   
  
other attached packages:  
[1] doBy\_4.6.8 R.utils\_2.10.1 R.oo\_1.24.0 R.methodsS3\_1.8.1  
[5] openxlsx\_4.2.3   
  
loaded via a namespace (and not attached):  
 [1] zip\_2.1.1 Rcpp\_1.0.6 compiler\_4.0.2 pillar\_1.4.7   
 [5] digest\_0.6.27 lattice\_0.20-41 evaluate\_0.14 lifecycle\_0.2.0   
 [9] tibble\_3.0.6 gtable\_0.3.0 pkgconfig\_2.0.3 rlang\_0.4.10   
[13] Matrix\_1.2-18 DBI\_1.1.1 yaml\_2.2.1 xfun\_0.20   
[17] dplyr\_1.0.3 stringr\_1.4.0 knitr\_1.31 generics\_0.1.0   
[21] vctrs\_0.3.6 grid\_4.0.2 tidyselect\_1.1.0 glue\_1.4.2   
[25] R6\_2.5.0 rmarkdown\_2.6 tidyr\_1.1.2 purrr\_0.3.4   
[29] ggplot2\_3.3.3 magrittr\_2.0.1 backports\_1.2.1 scales\_1.1.1   
[33] ellipsis\_0.3.1 htmltools\_0.5.1.1 MASS\_7.3-51.6 assertthat\_0.2.1   
[37] colorspace\_2.0-0 Deriv\_4.1.2 stringi\_1.5.3 munsell\_0.5.0   
[41] broom\_0.7.4 crayon\_1.4.0

RStudio version 1.3.1073.

END OF SCRIPT