…I found that the region has a significant impact on the salary of engineers. Is the significance of the region unique to engineers or are there similar correlations in other occupational groups?

Statistics Sweden use NUTS (Nomenclature des Unités Territoriales Statistiques), which is the EU's hierarchical regional division, to specify the regions.

The F-value from the Anova table is used as the single value to discriminate how much the region and salary correlates. For exploratory analysis, the Anova value seems good enough.

First, define libraries and functions.

```
library (tidyverse)
```

```
## -- Attaching packages ------------------------------------ tidyverse 1.3.0
--
```

```
## v ggplot2 3.2.1     v purrr   0.3.3
## v tibble  2.1.3     v dplyr   0.8.3
## v tidyr   1.0.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.4.0
```

```
## -- Conflicts --------------------------------------- tidyverse_conflicts()
--
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library (broom)
library (car)
```

```
## Loading required package: carData
```

```
##
## Attaching package: 'car'
```

```
## The following object is masked from 'package:dplyr':
##
##     recode
```

```
## The following object is masked from 'package:purrr':
##
##     some
```

```
library (swemaps) # devtools::install_github('reinholdsson/swemaps')
library(sjPlot)
```

```
## Registered S3 methods overwritten by 'lme4':
##   method                          from
##   cooks.distance.influence.merMod car
##   influence.merMod                car
##   dfbeta.influence.merMod         car
##   dfbetas.influence.merMod        car
```

```
## Install package "strengejacke" from GitHub (`devtools::install_github("
strengejacke/strengejacke")`) to load all sj-packages at once!
```

```
readfile <- function (file1){
  read_csv (file1, col_types = cols(), locale = readr::locale (encoding =
"latin1"), na = c("..", "NA")) %>%
    gather (starts_with("19"), starts_with("20"), key = "year", value = salary)
%>%
```

```
    drop_na() %>%
    mutate (year_n = parse_number (year))
}
nuts <- read.csv("nuts.csv") %>%
  mutate(NUTS2_sh = substr(NUTS2, 1, 4))
nuts %>%
  distinct (NUTS2_en) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Nomenclature des Unités Territoriales Statistiques (NUTS)')
```

Table 1: Nomenclature des Unités Territoriales Statistiques (NUTS)

NUTS2_en
SE11 Stockholm
SE12 East-Central Sweden
SE21 Småland and islands
SE22 South Sweden
SE23 West Sweden
SE31 North-Central Sweden
SE32 Central Norrland
SE33 Upper Norrland

```
map_ln_n <- map_ln %>%
  mutate(lnkod_n = as.numeric(lnkod))
```

The data table is downloaded from Statistics Sweden. It is saved as a comma-delimited file without heading, 000000CG.csv, http://www.statistikdatabasen.scb.se/pxweb/en/ssd/.

The table: Average basic salary, monthly salary and women´s salary as a percentage of men´s salary by region, sector, occupational group (SSYK 2012) and sex. Year 2014 – 2018 Monthly salary All sectors

In the plot and tables, you can also find information on how the increase in salaries per year for each occupational group is affected when the interactions are taken into account.

```
tb <- readfile ("000000CG.csv") %>%
  left_join(nuts %>% distinct (NUTS2_en, NUTS2_sh), by = c("region" =
"NUTS2_en"))
```

```
## Warning: Column `region`/`NUTS2_en` joining character vector and factor,
## coercing into character vector
```

```
tb_map <- readfile ("000000CG.csv") %>%
  left_join(nuts, by = c("region" = "NUTS2_en")) %>%
  right_join(map_ln_n, by = c("Länskod" = "lnkod_n"))
```

```
## Warning: Column `region`/`NUTS2_en` joining character vector and factor,
## coercing into character vector
```

```
summary_table = vector()
anova_table = vector()
for (i in unique(tb$`occuptional  (SSYK 2012)`)){
  temp <- filter(tb, `occuptional  (SSYK 2012)` == i)
  if (dim(temp)[1] > 75){
    model <- lm(log(salary) ~ region + sex + year_n, data = temp)
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "none"))
```

```
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "none"))

    model <- lm(log(salary) ~ region * sex + year_n, data = temp)
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "region and sex"))
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "region and sex"))

    model <- lm(log(salary) ~ region * year_n + sex, data = temp)
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "region and year"))
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "region and year"))

    model <- lm(log(salary) ~ region * year_n * sex, data = temp)
    summary_table <- rbind (summary_table, mutate (tidy (summary (model)), ssyk
= i, interaction = "region, year and sex"))
    anova_table <- rbind (anova_table, mutate (tidy (Anova (model, type = 2)),
ssyk = i, interaction = "region, year and sex"))
  }
}

## Note: model has aliased coefficients
##       sums of squares computed by model comparison
## Note: model has aliased coefficients
##       sums of squares computed by model comparison

anova_table <- anova_table %>% rowwise() %>% mutate(contcol = str_count(term,
":"))

summary_table <- summary_table %>% rowwise() %>% mutate(contcol =
str_count(term, ":"))

merge(summary_table, anova_table, by = c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (term.y == "region") %>%
  filter (interaction == "none") %>%

  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  ggplot () +
    geom_point (mapping = aes(x = estimate, y = statistic.y, colour =
interaction)) +
    labs(
      x = "Increase in salaries (% / year)",
      y = "F-value for interaction"
    )
```

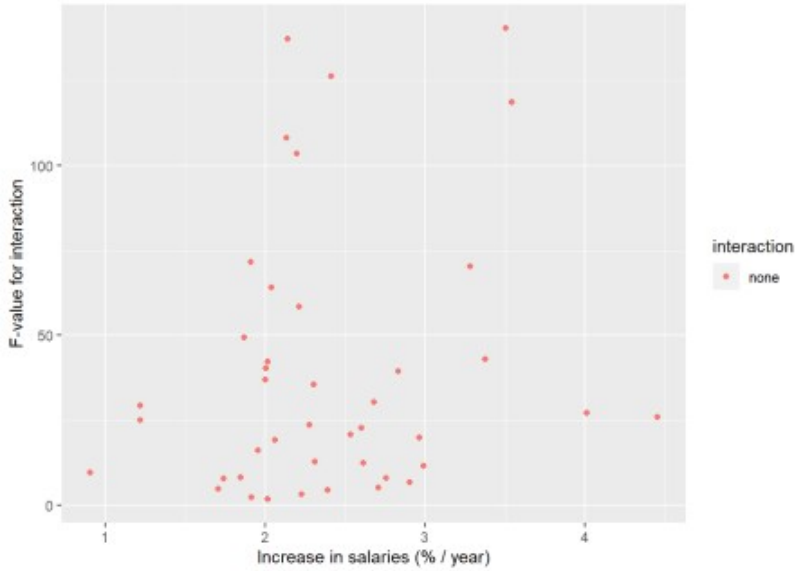

Figure 1: The significance of the region on the salary in Sweden, a comparison between different occupational groups, Year 2014 – 2018

```
merge(summary_table, anova_table, by = c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  # only look at the interactions between all three variables in the case with
interaction region, year and sex
  filter (!(contcol.y == 1 & interaction == "region, year and sex")) %>%

  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  ggplot () +
    geom_point (mapping = aes(x = estimate, y = statistic.y, colour =
interaction)) +
    labs(
      x = "Increase in salaries (% / year)",
      y = "F-value for interaction"
    )
```

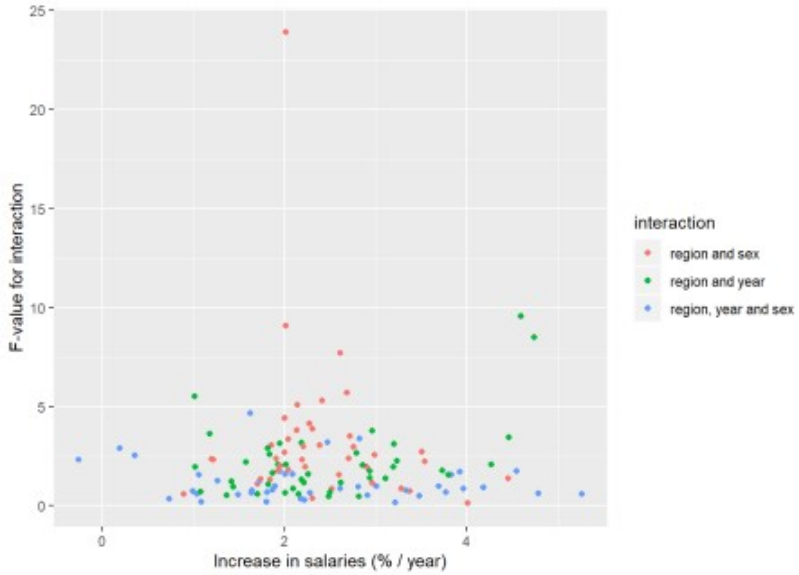

Figure 2: The significance of the interaction between region, year and sex on the salary in Sweden, a comparison between different occupational groups, Year 2014 – 2018

The tables with all occupational groups sorted by F-value in descending order.

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (term.y == "region") %>%
  filter (interaction == "none") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (region) and the yearly increase in
salaries')
```

Table 2: Correlation for F-value (region) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
234 Primary- and pre-school teachers	3.505364	140.459561	none
242 Organisation analysts, policy administrators and human resource specialists	2.141124	137.227070	none
159 Other social services managers	2.412305	126.200697	none
141 Primary and secondary schools and adult education managers	3.543591	118.692580	none
335 Tax and related government associate professionals	2.133970	108.141526	none
251 ICT architects, systems analysts and test managers	2.196568	103.500079	none
332 Insurance advisers, sales and purchasing agents	1.910500	71.550568	none
336 Police officers	3.280076	70.269911	none
241 Accountants, financial analysts and fund managers	2.040018	64.180404	none
235 Teaching professionals not elsewhere classified	2.210947	58.449386	none
351 ICT operations and user support technicians	1.868739	49.435480	none
233 Secondary education teachers	3.377886	43.017847	none
331 Financial and accounting associate professionals	2.016965	42.321607	none
214 Engineering professionals	2.002819	40.294194	none
218 Specialists within environmental and health protection	2.831305	39.372062	none
533 Health care assistants	2.001888	36.961185	none
261 Legal professionals	2.304699	35.545371	none
231 University and higher education teachers	2.682606	30.352218	none
243 Marketing and public relations professionals	1.217703	29.319658	none
222 Nursing professionals	4.012209	27.254061	none
123 Administration and planning managers	4.455192	25.902695	none
264 Authors, journalists and linguists	1.218409	24.973290	none
531 Child care workers and teachers aides	2.276723	23.659505	none
333 Business services agents	2.601340	22.810204	none
311 Physical and engineering science technicians	2.532877	20.769863	none
266 Social work and counselling professionals	2.965491	19.825931	none
411 Office assistants and other secretaries	2.060828	19.127036	none
534 Attendants, personal assistants and related workers	1.956992	16.198710	none
341 Social work and religious associate professionals	2.309857	12.736283	none
321 Medical and pharmaceutical technicians	2.613786	12.424504	none
232 Vocational education teachers	2.990624	11.524474	none
221 Medical doctors	0.902755	9.634942	none
422 Client information clerks	1.843752	8.137514	none

ssyk	Increase in salary	F-value for age	interaction
512 Cooks and cold-buffet managers	2.756431	8.061511	none
962 Newspaper distributors, janitors and other service workers	1.740067	7.765145	none
522 Shop staff	2.903890	6.830648	none
532 Personal care workers in health services	2.705999	5.078780	none
432 Stores and transport clerks	1.705670	4.865026	none
541 Other surveillance and security workers	2.389682	4.371317	none
941 Fast-food workers, food preparation assistants	2.227375	3.219358	none
833 Heavy truck and bus drivers	1.912077	2.247326	none
911 Cleaners and helpers	2.016100	1.711840	none

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (interaction == "region and sex") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (region and sex) and the yearly increase
in salaries')
```

Table 3: Correlation for F-value (region and sex) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
331 Financial and accounting associate professionals	2.0169648	23.9056822	region and sex
911 Cleaners and helpers	2.0160997	9.0815382	region and sex
321 Medical and pharmaceutical technicians	2.6137864	7.7168336	region and sex
231 University and higher education teachers	2.6826060	5.6873851	region and sex
159 Other social services managers	2.4123053	5.3090755	region and sex
242 Organisation analysts, policy administrators and human resource specialists	2.1411239	5.0798948	region and sex
533 Health care assistants	2.0018877	4.4194926	region and sex
531 Child care workers and teachers aides	2.2767234	4.1363582	region and sex
261 Legal professionals	2.3101043	3.8795657	region and sex
335 Tax and related government associate professionals	2.1339700	3.8162101	region and sex
218 Specialists within environmental and health protection	2.7191768	3.4940939	region and sex
241 Accountants, financial analysts and fund managers	2.0400185	3.3402726	region and sex

ssyk	Increase in salary	F-value for age interaction	
541 Other surveillance and security workers	2.3896824	3.0479843	region and sex
351 ICT operations and user support technicians	1.8593806	3.0366516	region and sex
235 Teaching professionals not elsewhere classified	2.2109466	2.9986405	region and sex
512 Cooks and cold-buffet managers	2.7564313	2.9661198	region and sex
234 Primary- and pre-school teachers	3.5053638	2.7061253	region and sex
214 Engineering professionals	2.0028190	2.6793275	region and sex
232 Vocational education teachers	2.9906243	2.5473580	region and sex
532 Personal care workers in health services	2.7059985	2.3861956	region and sex
332 Insurance advisers, sales and purchasing agents	1.9105004	2.3851151	region and sex
243 Marketing and public relations professionals	1.2005440	2.3538771	region and sex
264 Authors, journalists and linguists	1.2184087	2.3283437	region and sex
251 ICT architects, systems analysts and test managers	2.1965679	2.3071242	region and sex
141 Primary and secondary schools and adult education managers	3.5435906	2.2283878	region and sex
534 Attendants, personal assistants and related workers	1.9569919	2.0176966	region and sex
941 Fast-food workers, food preparation assistants	2.2273749	1.9439585	region and sex
522 Shop staff	2.9038903	1.9435000	region and sex
411 Office assistants and other secretaries	2.0399065	1.8087907	region and sex
833 Heavy truck and bus drivers	1.9298918	1.7646741	region and sex
333 Business services agents	2.6013400	1.5532994	region and sex
123 Administration and planning managers	4.4564515	1.3795888	region and sex
962 Newspaper distributors, janitors and other service workers	1.7400674	1.3302289	region and sex
422 Client information clerks	1.8437523	1.3111491	region and sex
266 Social work and counselling professionals	2.9654913	1.1228380	region and sex
432 Stores and transport clerks	1.7056704	1.0829037	region and sex
311 Physical and engineering science technicians	2.5162972	0.8523619	region and sex

ssyk	Increase in salary	F-value for age	interaction
336 Police officers	3.2800755	0.8458087	region and sex
233 Secondary education teachers	3.3778859	0.7369872	region and sex
221 Medical doctors	0.8945233	0.5918577	region and sex
341 Social work and religious associate professionals	2.3098566	0.3654042	region and sex
222 Nursing professionals	4.0122087	0.1103390	region and sex

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 0) %>%
  filter (interaction == "region and year") %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (region and year) and the yearly increase
in salaries')
```

Table 4: Correlation for F-value (region and year) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
222 Nursing professionals	4.594527	9.5756908	region and year
234 Primary- and pre-school teachers	4.741438	8.4929762	region and year
962 Newspaper distributors, janitors and other service workers	1.014436	5.5221538	region and year
218 Specialists within environmental and health protection	2.960551	3.7726084	region and year
341 Social work and religious associate professionals	1.179665	3.6377998	region and year
141 Primary and secondary schools and adult education managers	4.464391	3.4565788	region and year
231 University and higher education teachers	2.190339	3.1807419	region and year
531 Child care workers and teachers aides	1.946134	3.1384371	region and year
123 Administration and planning managers	3.202935	3.0929465	region and year
351 ICT operations and user support technicians	1.818022	2.8907900	region and year
335 Tax and related government associate professionals	2.794241	2.6351058	region and year
311 Physical and engineering science technicians	1.836449	2.5772805	region and year

ssyk	Increase in salary	F-value for age	interaction
336 Police officers	3.238027	2.2608889	region and year
221 Medical doctors	1.577680	2.1873354	region and year
266 Social work and counselling professionals	4.269070	2.0856790	region and year
534 Attendants, personal assistants and related workers	2.012733	2.0738388	region and year
333 Business services agents	1.929570	2.0713461	region and year
532 Personal care workers in health services	2.854891	2.0354065	region and year
264 Authors, journalists and linguists	1.020091	1.9403580	region and year
332 Insurance advisers, sales and purchasing agents	3.197316	1.9390313	region and year
232 Vocational education teachers	3.729880	1.7811629	region and year
512 Cooks and cold-buffet managers	2.937534	1.7459584	region and year
411 Office assistants and other secretaries	1.870052	1.6496037	region and year
235 Teaching professionals not elsewhere classified	2.263332	1.5866915	region and year
233 Secondary education teachers	3.800949	1.5667053	region and year
159 Other social services managers	2.939365	1.3862925	region and year
241 Accountants, financial analysts and fund managers	3.112492	1.3754541	region and year
251 ICT architects, systems analysts and test managers	2.189907	1.2977035	region and year
941 Fast-food workers, food preparation assistants	1.418897	1.2189448	region and year
261 Legal professionals	2.620417	1.1684118	region and year
242 Organisation analysts, policy administrators and human resource specialists	2.212719	1.1514498	region and year
833 Heavy truck and bus drivers	1.823095	1.0719499	region and year
911 Cleaners and helpers	1.438852	0.9563272	region and year
432 Stores and transport clerks	2.093243	0.8517395	region and year
331 Financial and accounting associate professionals	1.079578	0.7062153	region and year
522 Shop staff	2.500507	0.6743597	region and year
533 Health care assistants	2.008445	0.6349934	region and year

ssyk	Increase in salary	F-value for age	interaction
214 Engineering professionals	2.153132	0.5758246	region and year
243 Marketing and public relations professionals	1.702978	0.5743298	region and year
422 Client information clerks	1.363946	0.5084936	region and year
321 Medical and pharmaceutical technicians	2.820296	0.4615622	region and year
541 Other surveillance and security workers	2.488850	0.4542178	region and year

```
merge(summary_table, anova_table, c("ssyk", "interaction"), all = TRUE) %>%
  filter (term.x == "year_n") %>%
  filter (contcol.y > 1) %>%
  filter (interaction == "region, year and sex") %>%
  filter (!(contcol.y == 1 & interaction == "region, year and sex")) %>%
  mutate (estimate = (exp(estimate) - 1) * 100) %>%
  select (ssyk, estimate, statistic.y, interaction) %>%
  rename (`F-value for age` = statistic.y) %>%
  rename (`Increase in salary` = estimate) %>%
  arrange (desc (`F-value for age`)) %>%
  knitr::kable(
    booktabs = TRUE,
    caption = 'Correlation for F-value (region, year and sex) and the yearly
increase in salaries')
```

Table 5: Correlation for F-value (region, year and sex) and the yearly increase in salaries

ssyk	Increase in salary	F-value for age	interaction
531 Child care workers and teachers aides	1.6212785	4.6701912	region, year and sex
541 Other surveillance and security workers	2.8239443	3.3698474	region, year and sex
218 Specialists within environmental and health protection	2.4738659	3.2049100	region, year and sex
331 Financial and accounting associate professionals	0.1908239	2.8847688	region, year and sex
351 ICT operations and user support technicians	0.3582487	2.5229634	region, year and sex
221 Medical doctors	-0.2578495	2.3158388	region, year and sex
411 Office assistants and other secretaries	1.9518139	1.7466381	region, year and sex
141 Primary and secondary schools and adult education managers	4.5500329	1.7360681	region, year and sex
512 Cooks and cold-buffet managers	3.9252389	1.7021536	region, year and sex
251 ICT architects, systems analysts and test managers	2.0097672	1.5905499	region, year and sex
242 Organisation analysts, policy administrators and human resource specialists	2.0886458	1.5752902	region, year and sex

ssyk	Increase in salary	F-value for age	interaction
941 Fast-food workers, food preparation assistants	1.0629882	1.5615772	region, year and sex
232 Vocational education teachers	3.8326506	1.5493239	region, year and sex
235 Teaching professionals not elsewhere classified	1.2656111	1.2406770	region, year and sex
911 Cleaners and helpers	1.7251553	1.2122343	region, year and sex
332 Insurance advisers, sales and purchasing agents	3.6964107	0.9875563	region, year and sex
833 Heavy truck and bus drivers	1.8960959	0.9786211	region, year and sex
532 Personal care workers in health services	3.0120859	0.9603131	region, year and sex
335 Tax and related government associate professionals	2.8095715	0.9471462	region, year and sex
266 Social work and counselling professionals	4.1855410	0.9152029	region, year and sex
123 Administration and planning managers	3.9661945	0.8530921	region, year and sex
159 Other social services managers	2.6152072	0.8505913	region, year and sex
533 Health care assistants	1.8690208	0.7855258	region, year and sex
231 University and higher education teachers	1.6422359	0.7732961	region, year and sex
241 Accountants, financial analysts and fund managers	3.3332928	0.7520525	region, year and sex
333 Business services agents	0.9959201	0.7345545	region, year and sex
233 Secondary education teachers	3.7756980	0.6833044	region, year and sex
534 Attendants, personal assistants and related workers	1.8119543	0.6586806	region, year and sex
243 Marketing and public relations professionals	1.6359856	0.6487796	region, year and sex
214 Engineering professionals	2.2789556	0.6307550	region, year and sex
234 Primary- and pre-school teachers	4.7865061	0.6132542	region, year and sex
264 Authors, journalists and linguists	1.0415688	0.5809769	region, year and sex
222 Nursing professionals	5.2654653	0.5702894	region, year and sex
962 Newspaper distributors, janitors and other service workers	1.4942008	0.5531934	region, year and sex
522 Shop staff	2.9107242	0.5165112	region, year and sex
321 Medical and pharmaceutical technicians	3.4804846	0.4863120	region, year and sex

ssyk	Increase in salary	F-value for age	interaction
341 Social work and religious associate professionals	0.7370630	0.3372004	region, year and sex
311 Physical and engineering science technicians	2.1802298	0.3313909	region, year and sex
261 Legal professionals	2.2233855	0.2620376	region, year and sex
432 Stores and transport clerks	1.7998663	0.1870227	region, year and sex
422 Client information clerks	1.0842242	0.1733253	region, year and sex
336 Police officers	3.2164461	0.1482551	region, year and sex

Let's check what we have found.

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "234 Primary- and pre-school teachers")

model <-lm (log(salary) ~ year_n + sex + NUTS2_sh, data = temp)

plot_model(model, type = "pred", terms = c("NUTS2_sh"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```

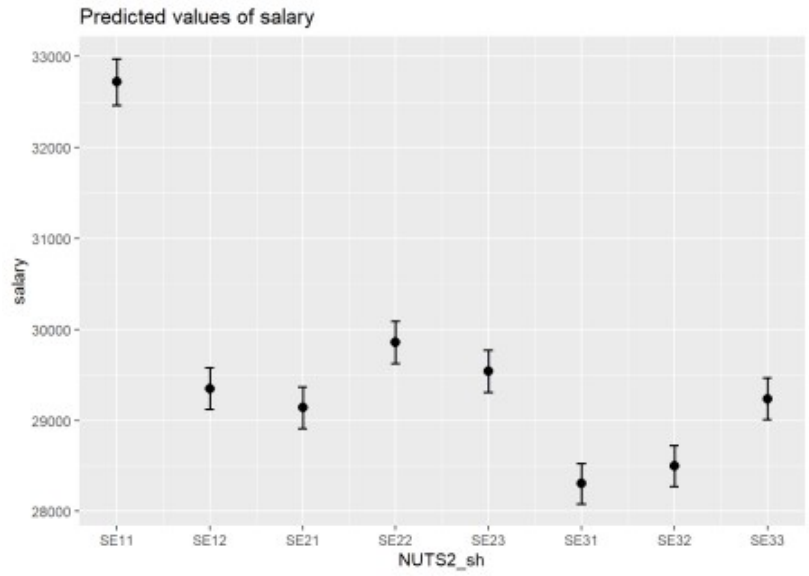

Figure 3: Highest F-value region, Primary- and pre-school teachers

```
tb_map %>%
    filter(`occuptional  (SSYK 2012)` == "234 Primary- and pre-school teachers")
%>%
  ggplot() +
    geom_polygon(mapping = aes(x = ggplot_long, y = ggplot_lat, group = lnkod,
fill = salary)) +
      facet_grid(. ~ year) +
    coord_equal()
```

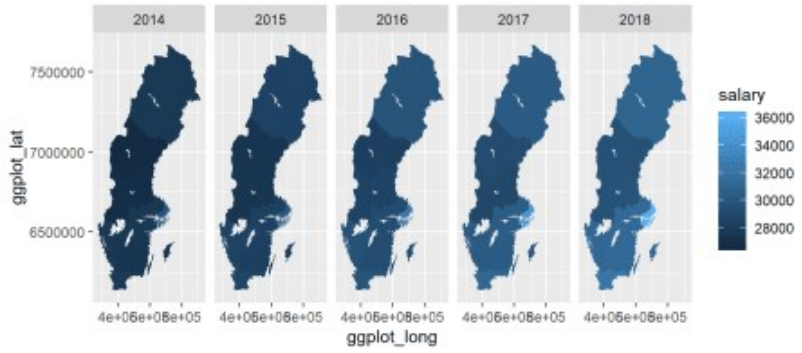

Figure 4: Highest F-value region, Primary- and pre-school teachers

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "911 Cleaners and helpers")

model <-lm (log(salary) ~ year_n + sex + NUTS2_sh, data = temp)

plot_model(model, type = "pred", terms = c("NUTS2_sh"))
```

```
## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```

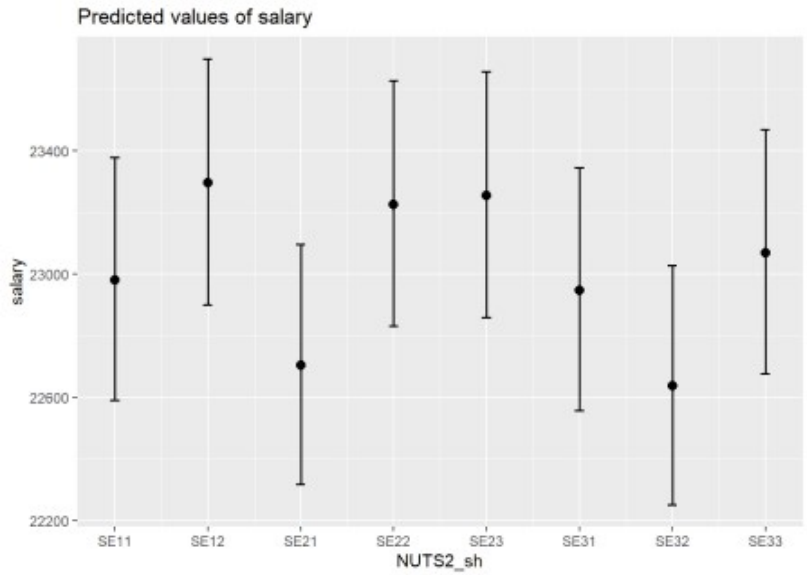

Figure 5: Lowest F-value region, Cleaners and helpers

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "331 Financial and accounting associate
professionals")

model <-lm (log(salary) ~ year_n + sex * NUTS2_sh, data = temp)

plot_model(model, type = "pred", terms = c("NUTS2_sh", "sex"))
```

```
## Model has log-transformed response. Back-transforming predictions to original
```

response scale. Standard errors are still on the log-scale.

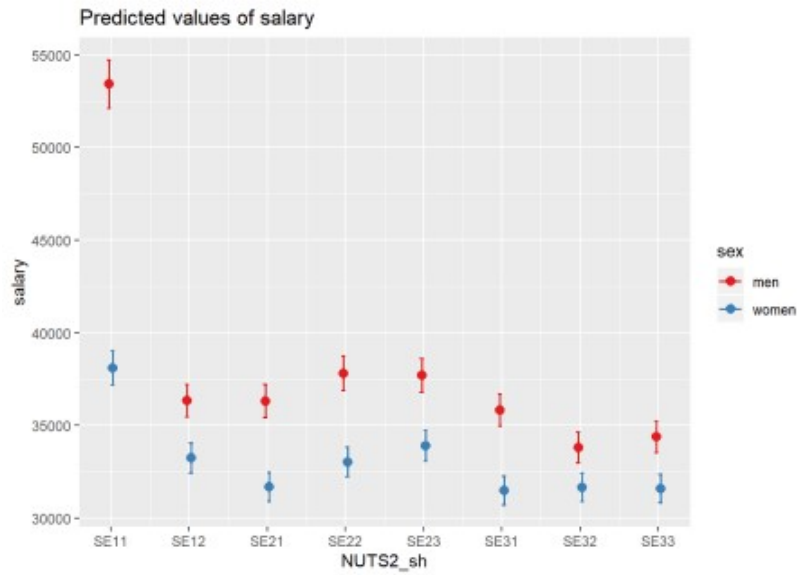

Figure 6: Highest F-value interaction gender and region, Financial and accounting associate professionals

```
tb_map %>%
    filter(`occuptional  (SSYK 2012)` == "331 Financial and accounting associate
professionals") %>%
  filter (sex == "men") %>%
  ggplot() +
    geom_polygon(mapping = aes(x = ggplot_long, y = ggplot_lat, group = lnkod,
fill = salary)) +
      facet_grid(. ~ year) +
    coord_equal()
```

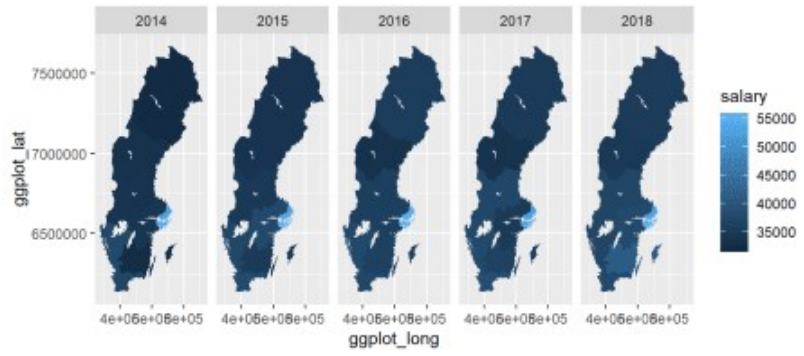

Figure 7: Highest F-value interaction gender and region, Financial and accounting associate professionals

```
tb_map %>%
    filter(`occuptional  (SSYK 2012)` == "331 Financial and accounting associate
professionals") %>%
  filter (sex == "women") %>%
  ggplot() +
    geom_polygon(mapping = aes(x = ggplot_long, y = ggplot_lat, group = lnkod,
```

```
fill = salary)) +
      facet_grid(. ~ year) +
    coord_equal()
```

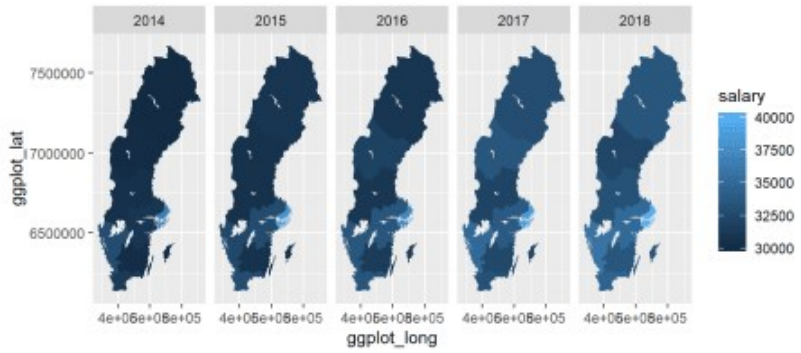

Figure 8: Highest F-value interaction gender and region, Financial and accounting associate professionals

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "222 Nursing professionals")

model <-lm (log(salary) ~ year_n + sex * NUTS2_sh, data = temp)

plot_model(model, type = "pred", terms = c("NUTS2_sh", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```

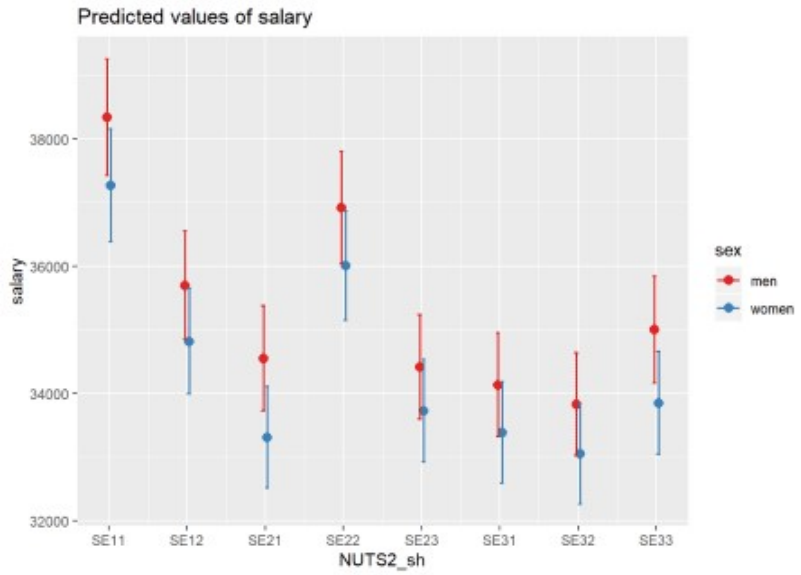

Figure 9: Lowest F-value interaction gender and region, Nursing professionals

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "222 Nursing professionals")

model <-lm (log(salary) ~ year_n * NUTS2_sh + sex , data = temp)
```

```
plot_model(model, type = "pred", terms = c("NUTS2_sh", "year_n"))
```

```
## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```

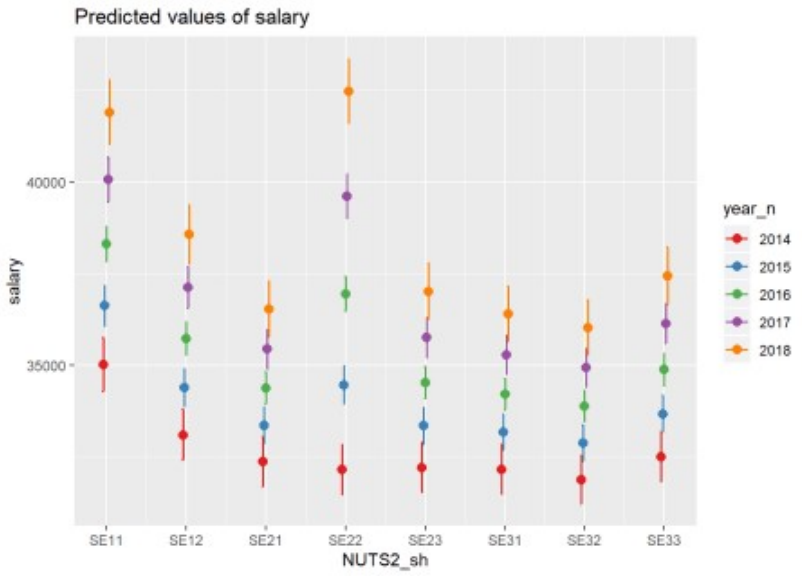

Figure 10: Highest F-value interaction year and region, Nursing professionals

```
tb_map %>%
  filter(`occuptional  (SSYK 2012)` == "222 Nursing professionals") %>%
  ggplot() +
    geom_polygon(mapping = aes(x = ggplot_long, y = ggplot_lat, group = lnkod,
fill = salary)) +
      facet_grid(. ~ year) +
    coord_equal()
```

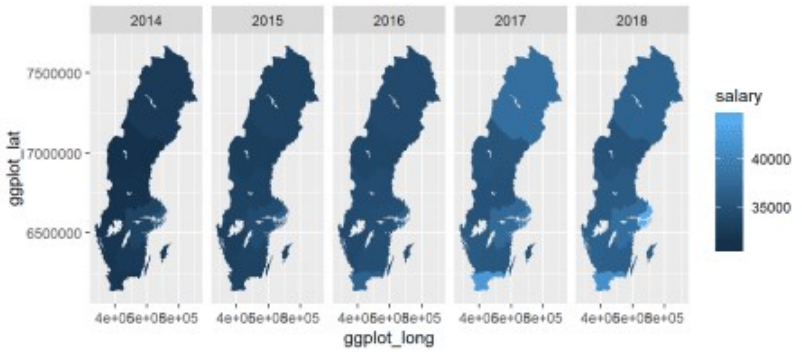

Figure 11: Highest F-value interaction year and region, Nursing professionals

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "541 Other surveillance and security
workers")
```

```
model <-lm (log(salary) ~ year_n * NUTS2_sh + sex , data = temp)

plot_model(model, type = "pred", terms = c("NUTS2_sh", "year_n"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```

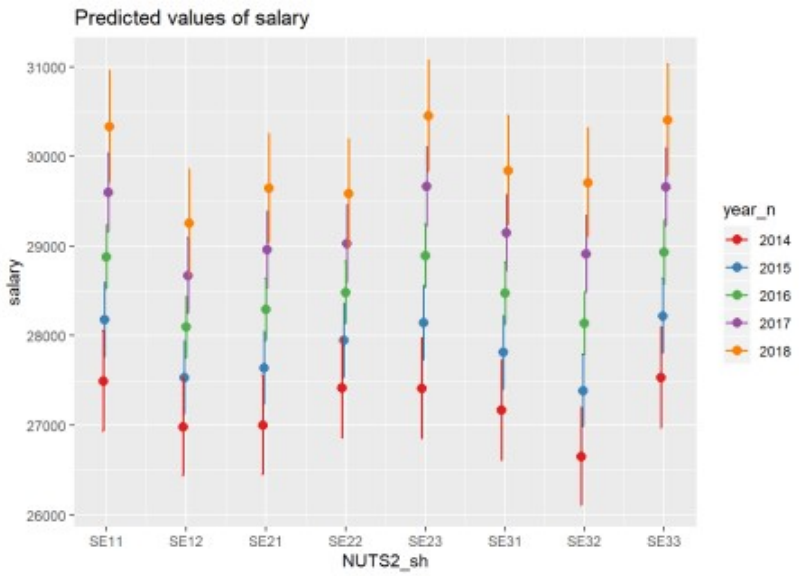

Figure 12: Lowest F-value interaction year and region, Other surveillance and security workers

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "531 Child care workers and teachers
aides")

model <-lm (log(salary) ~ year_n * NUTS2_sh * sex , data = temp)

plot_model(model, type = "pred", terms = c("NUTS2_sh", "year_n", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```

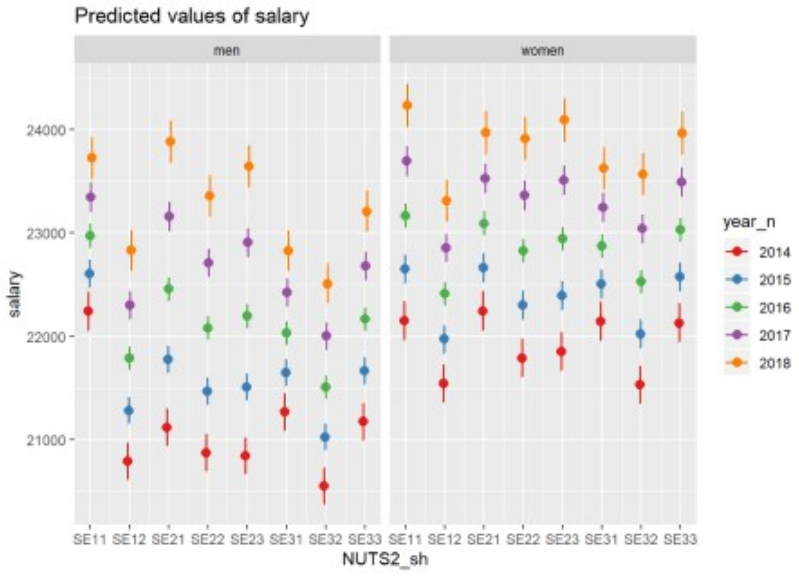

Figure 13: Highest F-value interaction region, year and gender, Child care workers and teachers aides

```
tb_map %>%
```

```
  filter(`occuptional  (SSYK 2012)` == "531 Child care workers and teachers
aides") %>%
  filter (sex == "men") %>%
  ggplot() +
    geom_polygon(mapping = aes(x = ggplot_long, y = ggplot_lat, group = lnkod,
fill = salary)) +
      facet_grid(. ~ year) +
    coord_equal()
```

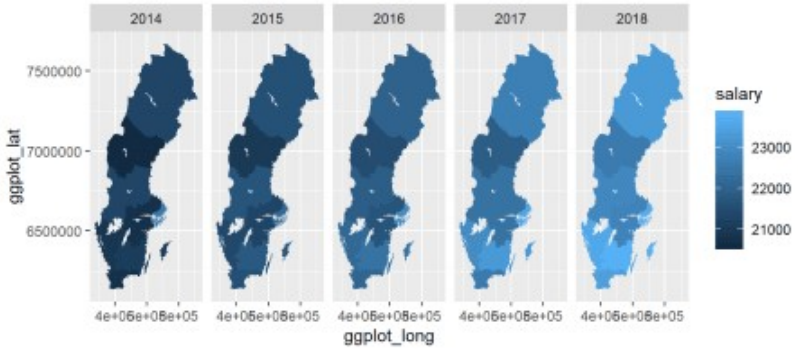

Figure 14: Highest F-value interaction region, year and gender, Child care workers and teachers aides

```
tb_map %>%
    filter(`occuptional  (SSYK 2012)` == "531 Child care workers and teachers
aides") %>%
  filter (sex == "women") %>%
  ggplot() +
    geom_polygon(mapping = aes(x = ggplot_long, y = ggplot_lat, group = lnkod,
fill = salary)) +
      facet_grid(. ~ year) +
    coord_equal()
```

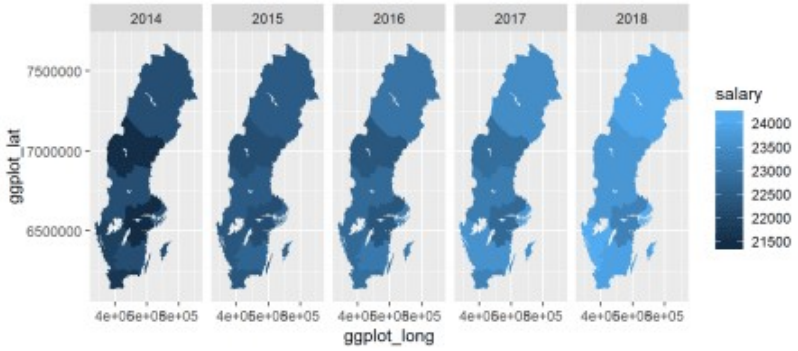

Figure 15: Highest F-value interaction region, year and gender, Child care workers and teachers aides

```
temp <- tb %>%
  filter(`occuptional  (SSYK 2012)` == "336 Police officers")

model <-lm (log(salary) ~ year_n * NUTS2_sh * sex , data = temp)

plot_model(model, type = "pred", terms = c("NUTS2_sh", "year_n", "sex"))

## Model has log-transformed response. Back-transforming predictions to original
response scale. Standard errors are still on the log-scale.
```

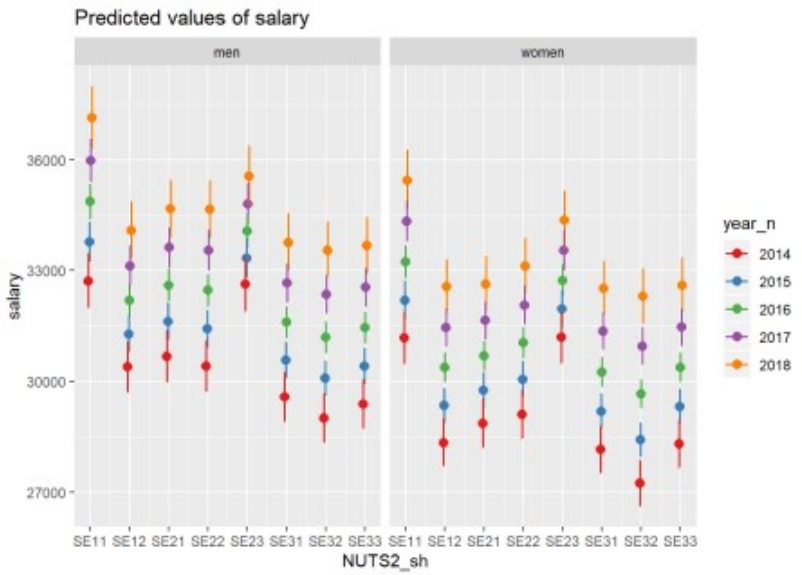

Figure 16: Lowest F-value interaction region, year and gender, Police officers