Untitled

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2023-05-11

load data

```
data=read.csv("ds_salaries.csv")
head(data)
```

```
##   work_year experience_level employment_type                job_title salary
## 1      2023               SE              FT Principal Data Scientist  80000
## 2      2023               MI              CT              ML Engineer  30000
## 3      2023               MI              CT              ML Engineer  25500
## 4      2023               SE              FT           Data Scientist 175000
## 5      2023               SE              FT           Data Scientist 120000
## 6      2023               SE              FT        Applied Scientist 222200
##   salary_currency salary_in_usd employee_residence remote_ratio
## 1             EUR         85847                 ES          100
## 2             USD         30000                 US          100
## 3             USD         25500                 US          100
## 4             USD        175000                 CA          100
## 5             USD        120000                 CA          100
## 6             USD        222200                 US            0
##   company_location company_size
## 1               ES            L
## 2               US            S
## 3               US            S
## 4               CA            M
## 5               CA            M
## 6               US            L
```

dimension and structure

```
dim(data)
```

```
## [1] 3755   11
```

```
str(data)
```

```
## ’data.frame':    3755 obs. of  11 variables:
##  $ work_year         : int  2023 2023 2023 2023 2023 2023 2023 2023 2023 2023 ...
##  $ experience_level  : chr  "SE" "MI" "MI" "SE" ...
##  $ employment_type   : chr  "FT" "CT" "CT" "FT" ...
##  $ job_title         : chr  "Principal Data Scientist" "ML Engineer" "ML Engineer" "Data Scientist"
##  $ salary            : int  80000 30000 25500 175000 120000 222200 136000 219000 141000 147100 ...
##  $ salary_currency   : chr  "EUR" "USD" "USD" "USD" ...
##  $ salary_in_usd     : int  85847 30000 25500 175000 120000 222200 136000 219000 141000 147100 ...
##  $ employee_residence: chr  "ES" "US" "US" "CA" ...
##  $ remote_ratio      : int  100 100 100 100 100 0 0 0 0 0 ...
##  $ company_location  : chr  "ES" "US" "US" "CA" ...
##  $ company_size      : chr  "L" "S" "S" "M" ...
```

missing data

```
sum(is.na(data))
```

```
## [1] 0
```

convert data type

```
data$experience_level=factor(data$experience_level)
data$employment_type=factor(data$employment_type)
data$job_title=factor(data$job_title)
data$salary_currency = factor(data$salary_currency)
data$employee_residence=factor(data$employee_residence)
data$company_location=factor(data$company_location)
data$company_size=factor(data$company_size)
```

exploratory analysis

check for outliers using interquartile range

```
Q1 <- quantile(data$salary, 0.25)
Q3 <- quantile(data$salary, 0.75)
IQR <- Q3 - Q1
lower_bound <- Q1 - 1.5 * IQR
upper_bound <- Q3 + 1.5 * IQR
outliers <- data$salary < lower_bound | data$salary > upper_bound
outliers
```

```
##    [1] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##   [13] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##   [25] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE
##   [37] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE
##   [49] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
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##  [169] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##  [181] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##  [193] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##  [205] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##  [217] FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##  [229]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
##  [241] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
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##  [325] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
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## [3733] FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [3745] FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE
```
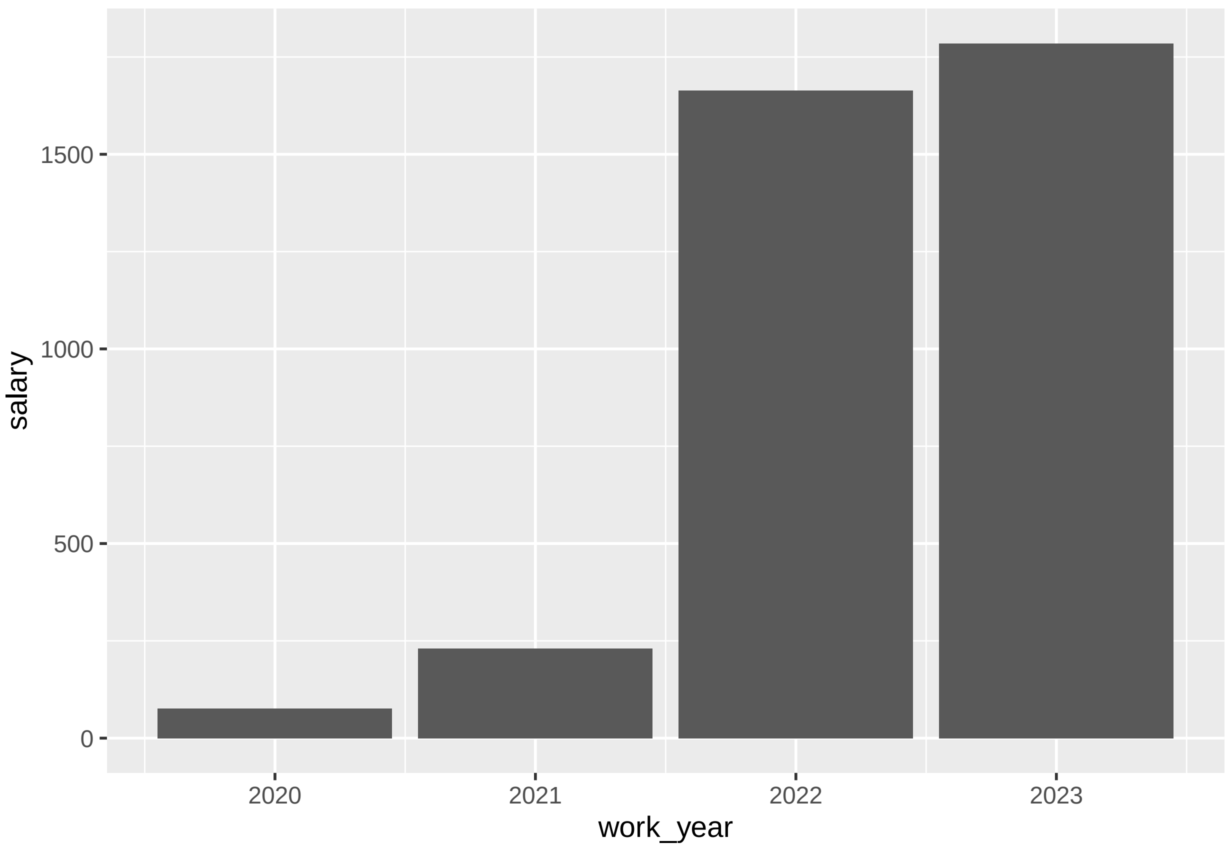

barplot

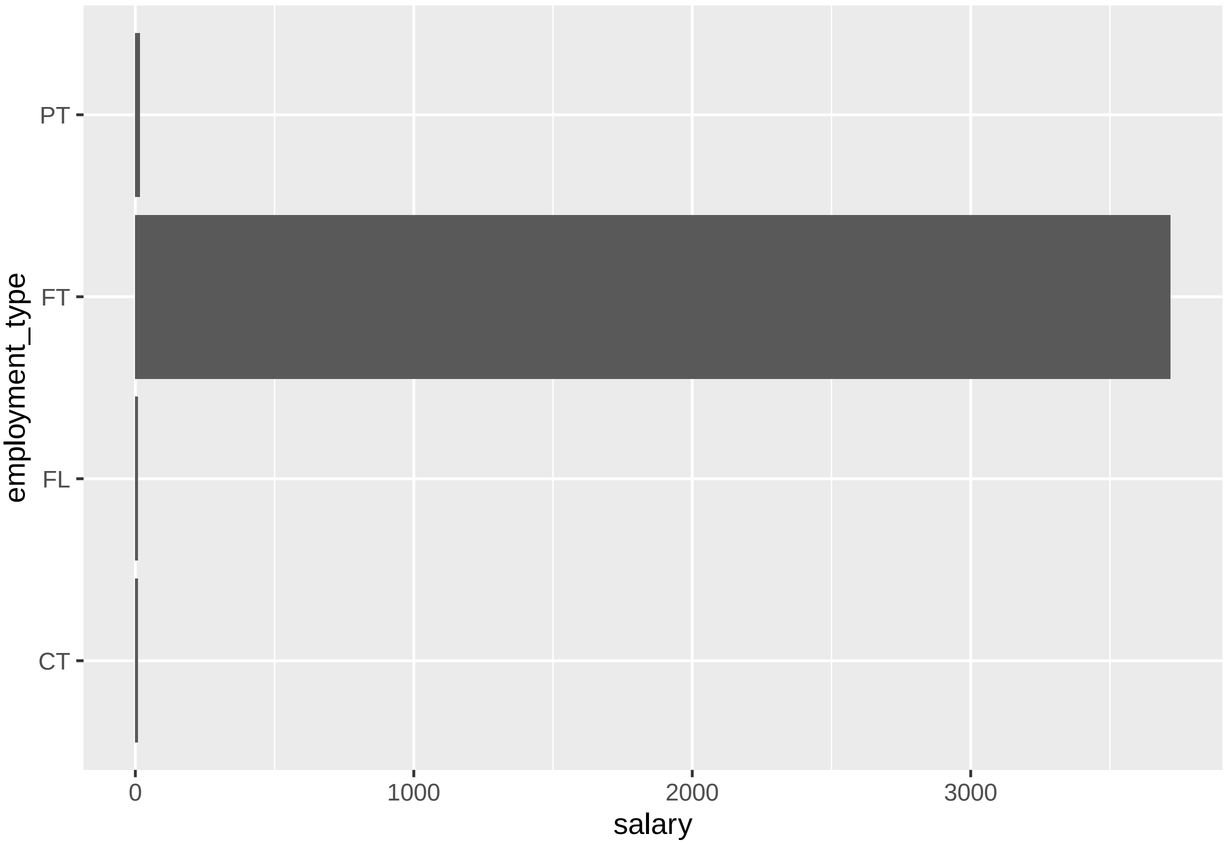
```
x= data%>%
  group_by(work_year) %>%
  summarise(salary=n())
ggplot(x, aes(x=work_year,y=salary))+geom_bar(stat = "identity")
```



```
x= data%>%
  group_by(employment_type) %>%
  summarise(salary=n())
x
```

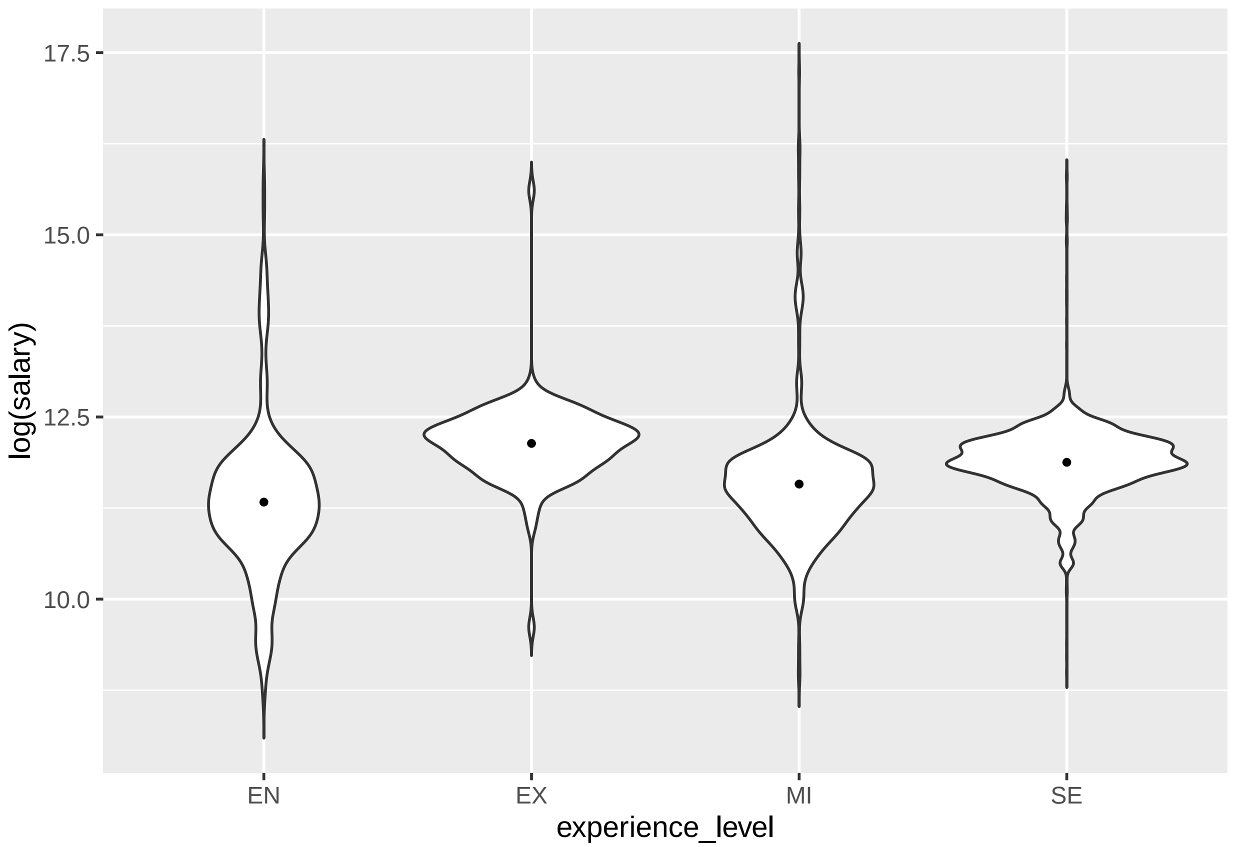
```
## # A tibble: 4 x 2
##   employment_type salary
##   <fct>            <int>
## 1 CT                  10
## 2 FL                  10
## 3 FT                3718
## 4 PT                  17
```

```
ggplot(x, aes(x=employment_type ,y=salary))+geom_bar(stat = "identity")+coord_flip()
```



```
ggplot(data,aes(x=experience_level, y=log(salary)))+geom_violin(trim = FALSE)+stat_summary(fun.y = mean
```

```
## Warning: The ‘fun.y‘ argument of ‘stat_summary()‘ is deprecated as of ggplot2 3.3.0.
## i Please use the ‘fun‘ argument instead.
## This warning is displayed once every 8 hours.
## Call ‘lifecycle::last_lifecycle_warnings()‘ to see where this warning was
## generated.
```



regression analysis

```
model = lm(log(salary)~experience_level, data = data)
summary(model)
```

```
##
## Call:
## lm(formula = log(salary) ~ experience_level, data = data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.8907 -0.2751  0.0066  0.2814  5.6511
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)         11.33138    0.03525  321.50  < 2e-16 ***
## experience_levelEX  0.80586    0.06877   11.72  < 2e-16 ***
## experience_levelMI  0.24748    0.04167    5.94 3.12e-09 ***
## experience_levelSE  0.54647    0.03742   14.60  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6305 on 3751 degrees of freedom
## Multiple R-squared:  0.08331,    Adjusted R-squared:  0.08258
## F-statistic: 113.6 on 3 and 3751 DF,  p-value: < 2.2e-16
```