Code for writeup

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```
library(rplos)
library(ggplot2)
list("ANOVA", "bayes", "bayesian","linear regression","linear mixed models", "mixed models","generalized

#pairwise comparisons ANOVA

ANOVA_Bayesian<- plot_throughtime(terms=c("ANOVA","bayesian"),limit=10000) + geom_line(size=1,color="bla

ANOVA_Bayesian

ANOVA_LR<- plot_throughtime(terms=c("ANOVA","linear regression"),limit=10000) + geom_line(size=1,color=

ANOVA_LR

ANOVA_MM<- plot_throughtime(terms=c("ANOVA","mixed effect model"),limit=10000) + geom_line(size=1,color=

ANOVA_MM

ANOVA_GEE<- plot_throughtime(terms=c("ANOVA","generalized estimating equation"),limit=10000) + geom_line
ANOVA_GEE

ANOVA_ML<-  plot_throughtime(terms=c("ANOVA","machine learning"),limit=10000) + geom_line(size=1,color=

ANOVA_ML

ANOVA_SVM<-  plot_throughtime(terms=c("ANOVA","support vector machine"),limit=10000) + geom_line(size=1

ANOVA_SVM

ANOVA_DL<-  plot_throughtime(terms=c("ANOVA","deep learning"),limit=10000) + geom_line(size=1,color="bla

ANOVA_DL

ANOVA_Btstp<-  plot_throughtime(terms=c("ANOVA","bootstrap"),limit=10000) + geom_line(size=1,color="blac

ANOVA_Btstp

ANOVA_NN<-  plot_throughtime(terms=c("ANOVA","artificial neural network"),limit=10000) + geom_line(size=

ANOVA_NN



#pairwise comparisons bayesian

Bayesian_LR<- plot_throughtime(terms=c("linear regression","bayesian"),limit=10000) + geom_line(size=1,
```

```
Bayesian_LR

Bayesian_MM<- plot_throughtime(terms=c("bayesian","mixed effect model"),limit=10000) + geom_line(size=1

Bayesian_MM

Bayesian_GEE<- plot_throughtime(terms=c("bayesian","generalized estimating equation"),limit=10000) + ge
Bayesian_GEE

Bayesian_ML<-  plot_throughtime(terms=c("bayesian","machine learning"),limit=10000) + geom_line(size=1,

Bayesian_ML

Bayesian_SVM<-  plot_throughtime(terms=c("bayesian","support vector machine"),limit=10000) + geom_line(

Bayesian_SVM

Bayesian_DL<-  plot_throughtime(terms=c("bayesian","deep learning"),limit=10000) + geom_line(size=1,col

Bayesian_DL

Bayesian_Btstp<-  plot_throughtime(terms=c("bayesian","bootstrap"),limit=10000) + geom_line(size=1,colo

Bayesian_Btstp

Bayesian_NN<-  plot_throughtime(terms=c("bayesian","artificial neural network"),limit=10000) + geom_lin

Bayesian_NN


#pairwise comparisons linear regression


LR_MM<- plot_throughtime(terms=c("linear regression","mixed effect model"),limit=10000) + geom_line(siz

LR_MM

LR_GEE<- plot_throughtime(terms=c("linear regression","generalized estimating equation"),limit=10000) +
LR_GEE

LR_ML<-  plot_throughtime(terms=c("linear regression","machine learning"),limit=10000) + geom_line(size

LR_ML

LR_SVM<-  plot_throughtime(terms=c("linear regression","support vector machine"),limit=10000) + geom_li

LR_SVM

LR_DL<-  plot_throughtime(terms=c("linear regression","deep learning"),limit=10000) + geom_line(size=1,

LR_DL

LR_Btstp<-  plot_throughtime(terms=c("linear regression","bootstrap"),limit=10000) + geom_line(size=1,c
```

```
LR_Btstp

LR_NN<-  plot_throughtime(terms=c("linear regression","artificial neural network"),limit=10000) + geom_l

LR_NN



#pairwise comparisons mixed models



MM_GEE<- plot_throughtime(terms=c("mixed effect model","generalized estimating equation"),limit=10000) +
MM_GEE

MM_ML<-  plot_throughtime(terms=c("mixed effect model","machine learning"),limit=10000) + geom_line(size
MM_ML

MM_SVM<-  plot_throughtime(terms=c("mixed effect model","support vector machine"),limit=10000) + geom_li

MM_SVM

MM_DL<-  plot_throughtime(terms=c("mixed effect model","deep learning"),limit=10000) + geom_line(size=1

MM_DL

MM_Btstp<-  plot_throughtime(terms=c("mixed effect model","bootstrap"),limit=10000) + geom_line(size=1,

MM_Btstp

MM_NN<-  plot_throughtime(terms=c("mixed effect model","artificial neural network"),limit=10000) + geom_

MM_NN



#pairwise comparisons gee

GEE_ML<-  plot_throughtime(terms=c("generalized estimating equation","machine learning"),limit=10000) +
GEE_ML

GEE_SVM<-  plot_throughtime(terms=c("generalized estimating equation","support vector machine"),limit=1

GEE_SVM

GEE_DL<-  plot_throughtime(terms=c("generalized estimating equation","deep learning"),limit=10000) + ge

GEE_DL

GEE_Btstp<-  plot_throughtime(terms=c("generalized estimating equation","bootstrap"),limit=10000) + geo

GEE_Btstp
```

```
GEE_NN<-  plot_throughtime(terms=c("generalized estimating equation","artificial neural network"),limit=

GEE_NN



#pairwise comparisons machine learning

ML_SVM<-  plot_throughtime(terms=c("machine learning","support vector machine"),limit=10000) + geom_lin

ML_SVM

ML_DL<-  plot_throughtime(terms=c("machine learning","deep learning"),limit=10000) + geom_line(size=1,c

ML_DL

ML_Btstp<-  plot_throughtime(terms=c("machine learning","bootstrap"),limit=10000) + geom_line(size=1,co

ML_Btstp

ML_NN<-  plot_throughtime(terms=c("machine learning","artificial neural network"),limit=10000) + geom_l

ML_NN


#pairwise comparisons support vector machine

SVM_DL<-  plot_throughtime(terms=c("support vector machine","deep learning"),limit=10000) + geom_line(s

SVM_DL

SVM_Btstp<-  plot_throughtime(terms=c("support vector machine","bootstrap"),limit=10000) + geom_line(si

SVM_Btstp

SVM_NN<-  plot_throughtime(terms=c("support vector machine","artificial neural network"),limit=10000) +

SVM_NN


#pairwise comparisons deep learning


DL_Btstp<-  plot_throughtime(terms=c("deep learning","bootstrap"),limit=10000) + geom_line(size=1,color=

DL_Btstp

DL_NN<-  plot_throughtime(terms=c("deep learning","artificial neural network"),limit=10000) + geom_line
```

```
DL_NN


#pairwise comparisons bootstrap


Btstp_NN<-  plot_throughtime(terms=c("bootstrap","artificial neural network"),limit=10000) + geom_line(s

Btstp_NN
```

```
library(rplos)
ANOVA<- plot_throughtime(terms=c("ANOVA"),limit=10000)


upward_ANOVA<-ANOVA$data[1:117,]
downward_ANOVA<-ANOVA$data[118:151,]

ANOVA_model_up<- glm(upward_ANOVA$value~upward_ANOVA$dateplot,family="quasipoisson")
summary(ANOVA_model_up)
```

```
##
## Call:
## glm(formula = upward_ANOVA$value ~ upward_ANOVA$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -7.637  -1.560  -0.730   1.067   5.017
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)           -1.395e+01  6.375e-01  -21.88   <2e-16 ***
## upward_ANOVA$dateplot  1.183e-03  4.074e-05   29.02   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 5.600331)
##
##     Null deviance: 7437.73  on 116  degrees of freedom
## Residual deviance:  686.84  on 115  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
ANOVA_model_down<- glm(downward_ANOVA$value~downward_ANOVA$dateplot,family="quasipoisson")

summary(ANOVA_model_down)
```

```
##
## Call:
## glm(formula = downward_ANOVA$value ~ downward_ANOVA$dateplot,
##     family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -9.9292  -0.8247   0.2653   1.2141   4.3981
```

```
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)              13.4499405  2.4727352   5.439 5.53e-06 ***
## downward_ANOVA$dateplot -0.0005212  0.0001464  -3.561  0.00118 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 6.598347)
##
##     Null deviance: 339.51  on 33  degrees of freedom
## Residual deviance: 255.24  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
Bayesian<- plot_throughtime(terms=c("bayesian"),limit=10000)


upward_Bayesian<-Bayesian$data[1:121,]
downward_Bayesian<-Bayesian$data[122:155,]

Bayesian_model_up<- glm(upward_Bayesian$value~upward_Bayesian$dateplot,family="quasipoisson")
summary(Bayesian_model_up)
```

```
##
## Call:
## glm(formula = upward_Bayesian$value ~ upward_Bayesian$dateplot,
##     family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -6.6667  -1.3913  -0.3377   1.0475   5.9950
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                -1.058e+01  4.722e-01  -22.40   <2e-16 ***
## upward_Bayesian$dateplot  9.633e-04  3.043e-05   31.65   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 3.84003)
##
##     Null deviance: 5510.94  on 120  degrees of freedom
## Residual deviance:  476.63  on 119  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
Bayesian_model_down<- glm(downward_Bayesian$value~downward_Bayesian$dateplot,family="quasipoisson")

summary(Bayesian_model_down)
```

```
##
## Call:
```

```
## glm(formula = downward_Bayesian$value ~ downward_Bayesian$dateplot,
##     family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -9.7337  -0.7562   0.1102   1.5299   3.3755
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 11.7543419  2.4011264   4.895 2.69e-05 ***
## downward_Bayesian$dateplot -0.0004168  0.0001421  -2.934  0.00614 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 6.684634)
##
##     Null deviance: 317.39  on 33  degrees of freedom
## Residual deviance: 259.56  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
LR<- plot_throughtime(terms=c("linear regression"),limit=10000)


upward_LR<-LR$data[1:121,]
downward_LR<-LR$data[122:155,]

LR_model_up<- glm(upward_LR$value~upward_LR$dateplot,family="quasipoisson")
summary(LR_model_up)
```

```
##
## Call:
## glm(formula = upward_LR$value ~ upward_LR$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -6.3591  -1.2395  -0.3679   0.8710   4.5625
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)        -1.447e+01  5.130e-01  -28.21   <2e-16 ***
## upward_LR$dateplot  1.208e-03  3.276e-05   36.88   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 3.212971)
##
##     Null deviance: 6906.55  on 120  degrees of freedom
## Residual deviance:  399.35  on 119  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```r
LR_model_down<- glm(downward_LR$value~downward_LR$dateplot,family="quasipoisson")

summary(LR_model_down)
```

```
##
## Call:
## glm(formula = downward_LR$value ~ downward_LR$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -11.3001   -0.8424    0.1947    1.6246    4.7656
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)           11.8009768  2.6305706   4.486 8.79e-05 ***
## downward_LR$dateplot -0.0004125  0.0001556  -2.651   0.0124 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 9.04858)
##
##     Null deviance: 417.67  on 33  degrees of freedom
## Residual deviance: 353.81  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```r
MM<- plot_throughtime(terms=c("mixed effect model"),limit=10000)


upward_MM<-MM$data[1:120,]
downward_MM<-MM$data[121:154,]

MM_model_up<- glm(upward_MM$value~upward_MM$dateplot,family="quasipoisson")
summary(MM_model_up)
```

```
##
## Call:
## glm(formula = upward_MM$value ~ upward_MM$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -7.5130  -1.2834  -0.4962   0.7482   5.0016
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)        -1.347e+01  5.197e-01  -25.93   <2e-16 ***
## upward_MM$dateplot  1.147e-03  3.326e-05   34.49   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 3.665926)
##
##     Null deviance: 6641.68  on 119  degrees of freedom
```

```
## Residual deviance:  447.72  on 118  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
MM_model_down<- glm(downward_MM$value~downward_MM$dateplot,family="quasipoisson")

summary(MM_model_down)
```

```
##
## Call:
## glm(formula = downward_MM$value ~ downward_MM$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -10.1977   -1.0954    0.0424    1.4548    4.7064
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)           10.8712691  2.4119340   4.507 8.27e-05 ***
## downward_MM$dateplot -0.0003610  0.0001426  -2.531   0.0165 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 7.175138)
##
##     Null deviance: 318.24  on 33  degrees of freedom
## Residual deviance: 272.12  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
GEE<- plot_throughtime(terms=c("generalized estimating equation"),limit=10000)


upward_GEE<-GEE$data[1:120,]
downward_GEE<-GEE$data[121:163,]

GEE_model_up<- glm(upward_GEE$value~upward_GEE$dateplot,family="quasipoisson")
summary(GEE_model_up)
```

```
##
## Call:
## glm(formula = upward_GEE$value ~ upward_GEE$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.2019  -0.9882  -0.0947   0.6244   3.3200
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)         -1.167e+01  3.273e-01  -35.66   <2e-16 ***
## upward_GEE$dateplot  1.043e-03  2.140e-05   48.71   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## (Dispersion parameter for quasipoisson family taken to be 1.498625)
##
##     Null deviance: 5005.38  on 119  degrees of freedom
## Residual deviance:  188.36  on 118  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
GEE_model_down<- glm(downward_GEE$value~downward_GEE$dateplot,family="quasipoisson")

summary(GEE_model_down)
```

```
##
## Call:
## glm(formula = downward_GEE$value ~ downward_GEE$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -8.0220  -1.1174   0.3569   1.3068   6.3250
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)           12.6967872  1.6754129   7.578 2.55e-09 ***
## downward_GEE$dateplot -0.0004782  0.0001001  -4.777 2.29e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 6.497059)
##
##     Null deviance: 444.14  on 42  degrees of freedom
## Residual deviance: 294.42  on 41  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
Btstp<- plot_throughtime(terms=c("bootstrap"),limit=10000)


upward_Btstp<-Btstp$data[1:127,]
downward_Btstp<-Btstp$data[128:161,]

Btstp_model_up<- glm(upward_Btstp$value~upward_Btstp$dateplot,family="quasipoisson")
summary(Btstp_model_up)
```

```
##
## Call:
## glm(formula = upward_Btstp$value ~ upward_Btstp$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -7.3459  -1.4573  -0.4940   0.8755   4.3636
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept)           -1.115e+01  4.562e-01  -24.45   <2e-16 ***
## upward_Btstp$dateplot  1.003e-03  2.938e-05   34.13   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 3.753851)
##
##     Null deviance: 6454.40  on 126  degrees of freedom
## Residual deviance:  492.65  on 125  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
Btstp_model_down<- glm(downward_Btstp$value~downward_Btstp$dateplot,family="quasipoisson")

summary(Btstp_model_down)
```

```
##
## Call:
## glm(formula = downward_Btstp$value ~ downward_Btstp$dateplot,
##     family = "quasipoisson")
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -10.5528   -0.5759    0.5276    1.0067    4.7823
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)              12.6047194  2.6347165   4.784 3.72e-05 ***
## downward_Btstp$dateplot -0.0004709  0.0001559  -3.021  0.00493 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 7.534935)
##
##     Null deviance: 359.13  on 33  degrees of freedom
## Residual deviance: 289.97  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
ML<- plot_throughtime(terms=c("machine learning"),limit=10000)


upward_ML<-ML$data[1:127,]
downward_ML<-ML$data[128:161,]

ML_model_up<- glm(upward_ML$value~upward_ML$dateplot,family="quasipoisson")
summary(ML_model_up)
```

```
##
## Call:
## glm(formula = upward_ML$value ~ upward_ML$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
```

```
##     Min       1Q   Median       3Q      Max
## -4.9248  -1.2937  -0.0637   0.8437   4.5873
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)        -1.165e+01  4.288e-01  -27.18   <2e-16 ***
## upward_ML$dateplot  1.011e-03  2.760e-05   36.62   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 2.247468)
##
##     Null deviance: 4470.32  on 126  degrees of freedom
## Residual deviance:  299.49  on 125  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
ML_model_down<- glm(downward_ML$value~downward_ML$dateplot,family="quasipoisson")

summary(ML_model_down)
```

```
##
## Call:
## glm(formula = downward_ML$value ~ downward_ML$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -8.7636  -0.3534   0.3860   1.0948   3.4856
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)           4.515e+00  2.297e+00   1.966   0.0581 .
## downward_ML$dateplot 5.017e-06  1.356e-04   0.037   0.9707
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 5.550421)
##
##     Null deviance: 218.14  on 33  degrees of freedom
## Residual deviance: 218.13  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
SVM<- plot_throughtime(terms=c("support vector machine"),limit=10000)


upward_SVM<-SVM$data[1:120,]
downward_SVM<-SVM$data[121:163,]

SVM_model_up<- glm(upward_SVM$value~upward_SVM$dateplot,family="quasipoisson")
summary(SVM_model_up)
```

```
##
```

```
## Call:
## glm(formula = upward_SVM$value ~ upward_SVM$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4991  -1.3211  -0.2060   0.9297   2.6884
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)         -1.278e+01  4.014e-01  -31.84   <2e-16 ***
## upward_SVM$dateplot  1.108e-03  2.619e-05   42.30   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 1.87818)
##
##     Null deviance: 4941.57  on 119  degrees of freedom
## Residual deviance:  242.58  on 118  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
SVM_model_down<- glm(downward_SVM$value~downward_SVM$dateplot,family="quasipoisson")

summary(SVM_model_down)
```

```
##
## Call:
## glm(formula = downward_SVM$value ~ downward_SVM$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -8.4287  -1.1033   0.1362   1.3730   3.0352
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)            7.697e+00  1.502e+00   5.123 7.54e-06 ***
## downward_SVM$dateplot -1.827e-04  8.954e-05  -2.041   0.0477 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 5.027146)
##
##     Null deviance: 260.69  on 42  degrees of freedom
## Residual deviance: 239.71  on 41  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```
DL<- plot_throughtime(terms=c("deep learning"),limit=10000)


upward_DL<-DL$data[1:126,]
downward_DL<-DL$data[127:160,]
```

```r
DL_model_up<- glm(upward_DL$value~upward_DL$dateplot,family="quasipoisson")
summary(DL_model_up)
```

```
##
## Call:
## glm(formula = upward_DL$value ~ upward_DL$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.2455  -0.9935  -0.2244   0.8168   2.6551
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)        -1.236e+01  4.992e-01  -24.77   <2e-16 ***
## upward_DL$dateplot  1.030e-03  3.210e-05   32.08   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 1.954069)
##
##     Null deviance: 3062.52  on 125  degrees of freedom
## Residual deviance:  257.87  on 124  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```r
DL_model_down<- glm(downward_DL$value~downward_DL$dateplot,family="quasipoisson")

summary(DL_model_down)
```

```
##
## Call:
## glm(formula = downward_DL$value ~ downward_DL$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -7.9839  -1.2025   0.3492   1.3782   3.1560
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)           4.049e+00  2.584e+00   1.567    0.127
## downward_DL$dateplot 4.332e-06  1.525e-04   0.028    0.978
##
## (Dispersion parameter for quasipoisson family taken to be 4.360154)
##
##     Null deviance: 167.5  on 33  degrees of freedom
## Residual deviance: 167.5  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```r
NN<- plot_throughtime(terms=c("artificial neural network"),limit=10000)


upward_NN<-NN$data[1:125,]
```

```r
downward_NN<-NN$data[126:159,]

NN_model_up<- glm(upward_NN$value~upward_NN$dateplot,family="quasipoisson")
summary(NN_model_up)
```

```
##
## Call:
## glm(formula = upward_NN$value ~ upward_NN$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -4.5205  -1.2434  -0.2426   0.7960   3.7146
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)        -1.045e+01  5.514e-01  -18.95   <2e-16 ***
## upward_NN$dateplot  9.077e-04  3.565e-05   25.46   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 2.765811)
##
##     Null deviance: 2686.00  on 124  degrees of freedom
## Residual deviance:  348.85  on 123  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

```r
NN_model_down<- glm(downward_NN$value~downward_NN$dateplot,family="quasipoisson")

summary(NN_model_down)
```

```
##
## Call:
## glm(formula = downward_NN$value ~ downward_NN$dateplot, family = "quasipoisson")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -6.4334  -0.8114   0.3590   0.8406   3.9604
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)           5.7952552  2.4566218   2.359   0.0246 *
## downward_NN$dateplot -0.0001066  0.0001451  -0.735   0.4680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasipoisson family taken to be 3.45447)
##
##     Null deviance: 129.14  on 33  degrees of freedom
## Residual deviance: 127.28  on 32  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```