TD-AKI.R

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library(MASS)

library(lmtest)

library(tidyverse)

# data --------------------------------------------------------------------  
dat <- readxl::read\_xlsx('D:/\_Datasets/TDIIPaper\_fix.xlsx')  
head(dat)

## # A tibble: 6 x 9  
## prov k4 p\_fasyankes ttd rbidan kih p4k td2 jki  
## <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 Aceh 76.7 80.6 71.1 316. 69.1 0 49.9 173  
## 2 Sumatera Utara 79.8 81.9 67 137. 74.3 96.4 0 187  
## 3 Sumatera Barat 72.8 76.3 75.6 126. 79.0 0 33 125  
## 4 Riau 45.8 49.2 77.3 98.1 87.4 0 28.5 129  
## 5 Jambi 89.2 83.3 90.1 175. 98.6 98.1 53.2 62  
## 6 Sumatera Selatan 90.9 88.8 83.4 146. 100 100 72.1 128

formula1 <- jki ~ k4 + ttd + td2 + p\_fasyankes + rbidan + kih + p4k  
# multikolinearitas -------------------------------------------------------  
car::vif(glm(formula1, data = dat, family = 'poisson'))

## k4 ttd td2 p\_fasyankes rbidan kih   
## 8.476804 6.009736 1.799179 6.504738 1.513682 1.726389   
## p4k   
## 1.903494

# Poisson model -----------------------------------------------------------  
pm <- glm(formula1, data = dat, family = 'poisson')  
summary(pm)

##   
## Call:  
## glm(formula = formula1, family = "poisson", data = dat)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -15.7797 -5.4360 -0.5391 2.7820 16.8028   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 4.1976032 0.1053052 39.861 < 2e-16 \*\*\*  
## k4 0.0147494 0.0024104 6.119 9.41e-10 \*\*\*  
## ttd 0.0101931 0.0022179 4.596 4.31e-06 \*\*\*  
## td2 0.0194293 0.0009511 20.428 < 2e-16 \*\*\*  
## p\_fasyankes -0.0064141 0.0020454 -3.136 0.00171 \*\*   
## rbidan -0.0039262 0.0003750 -10.469 < 2e-16 \*\*\*  
## kih -0.0168977 0.0007752 -21.799 < 2e-16 \*\*\*  
## p4k -0.0004937 0.0004435 -1.113 0.26555   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for poisson family taken to be 1)  
##   
## Null deviance: 4159.5 on 33 degrees of freedom  
## Residual deviance: 1697.4 on 26 degrees of freedom  
## AIC: 1929.2  
##   
## Number of Fisher Scoring iterations: 5

# equidispersion test -----------------------------------------------------  
deviance(pm) / df.residual(pm)

## [1] 65.28278

# Negtaive Binomial Model -------------------------------------------------  
nbm <- glm.nb(formula1, data = dat)  
summary(nbm)

##   
## Call:  
## glm.nb(formula = formula1, data = dat, init.theta = 2.600915928,   
## link = log)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -1.9967 -0.7149 -0.1613 0.3660 2.0245   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 4.0537085 0.6496198 6.240 4.37e-10 \*\*\*  
## k4 0.0110352 0.0154056 0.716 0.473799   
## ttd 0.0163058 0.0130895 1.246 0.212867   
## td2 0.0087506 0.0057693 1.517 0.129331   
## p\_fasyankes -0.0003992 0.0130756 -0.031 0.975646   
## rbidan -0.0020635 0.0022109 -0.933 0.350650   
## kih -0.0196925 0.0056250 -3.501 0.000464 \*\*\*  
## p4k -0.0007083 0.0028933 -0.245 0.806597   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for Negative Binomial(2.6009) family taken to be 1)  
##   
## Null deviance: 69.885 on 33 degrees of freedom  
## Residual deviance: 35.958 on 26 degrees of freedom  
## AIC: 393.99  
##   
## Number of Fisher Scoring iterations: 1  
##   
##   
## Theta: 2.601   
## Std. Err.: 0.612   
##   
## 2 x log-likelihood: -375.989

# parameter dispersi  
deviance(nbm) / df.residual(nbm)

## [1] 1.383012

# Uji Simultan ------------------------------------------------------  
nbm\_intercept <- glm.nb(jki ~ 1, data = dat)  
lrtest(nbm\_intercept, nbm)

## Likelihood ratio test  
##   
## Model 1: jki ~ 1  
## Model 2: jki ~ k4 + ttd + td2 + p\_fasyankes + rbidan + kih + p4k  
## #Df LogLik Df Chisq Pr(>Chisq)   
## 1 2 -200.17   
## 2 9 -187.99 7 24.359 0.000985 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# nilai koef  
(exp(coef(nbm))[-1] - 1) \* 100

## k4 ttd td2 p\_fasyankes rbidan kih   
## 1.10963470 1.64394671 0.87889893 -0.03990975 -0.20613300 -1.94998618   
## p4k   
## -0.07080831

# Goodnes of fit ----------------------------------------------------------  
lrtest(pm, nbm)

## Likelihood ratio test  
##   
## Model 1: jki ~ k4 + ttd + td2 + p\_fasyankes + rbidan + kih + p4k  
## Model 2: jki ~ k4 + ttd + td2 + p\_fasyankes + rbidan + kih + p4k  
## #Df LogLik Df Chisq Pr(>Chisq)   
## 1 8 -956.61   
## 2 9 -187.99 1 1537.2 < 2.2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1