{

library(readxl)

library(ggplot2)

library(tidyverse)

library(dplyr)

library(splines)

}

country\_all <- read\_xlsx("country\_all.xlsx", sheet = "Sheet1")#导入Excel表单

# 以 tianjin 为例绘制时序图------------------------

tianjin <- filter(country\_all,prov == "tianjin")

tianjin <- filter(tianjin, !(month<10&month>3)) # 寒假前后10月-次年3月

tianjin$num <- c(1:nrow(tianjin)) # 月份的数量

# 5\_19y

tianjin$non\_school <- tianjin$i0\_4y+tianjin$i20\_64y+tianjin$i65y

a <- lm(data=tianjin,formula = y5\_19y~cum5\_19y+school\_break+non\_school+temp+rh)# 合并非学龄 model.0

b <- lm(data=tianjin,formula = y5\_19y~ns(num,df= 6)+cum5\_19y+school\_break+non\_school+temp+rh)# model.1

summary(b)

step(a, scope=list(lower=y5\_19y~1), direction="both")#后退法

# 比较 a 与 b

AIC(a,b)

car::vif(a)

pred.plim <- predict(a,new =tianjin,interval = "prediction") #预测值的预测期间

pred.clim <- predict(a,new =tianjin,interval = "confidence") #预测值的置信区间

pred.plim2 <- predict(b,new =tianjin,interval = "prediction") #预测值的预测期间

pred.clim2 <- predict(b,new =tianjin,interval = "confidence") #预测值的置信区间

date2 <- c("2013\_10","2013\_11","2013\_12","2014\_1","2014\_2","2014\_3",#"2014\_4","2014\_5","2014\_6","2014\_7","2014\_8","2014\_9",

"2014\_10","2014\_11","2014\_12","2015\_1","2015\_2","2015\_3",#"2015\_4","2015\_5","2015\_6","2015\_7","2015\_8","2015\_9",

"2015\_10","2015\_11","2015\_12","2016\_1","2016\_2","2016\_3",#"2016\_4","2016\_5","2016\_6","2016\_7","2016\_8","2016\_9",

"2016\_10","2016\_11","2016\_12","2017\_1","2017\_2","2017\_3",#"2017\_4","2017\_5","2017\_6","2017\_7","2017\_8","2017\_9",

"2017\_10","2017\_11","2017\_12","2018\_1","2018\_2","2018\_3"#"2018\_4","2018\_5","2018\_6","2018\_7","2018\_8","2018\_9"

)

tianjin$date <- date2

data\_rowname <- as.vector(date2)

tianjin$date <- factor(tianjin$date, levels=data\_rowname, ordered=T)# 设为因子

con <- data.frame(pred.clim)

pre <- data.frame(pred.plim)

con2 <- data.frame(pred.clim2)

pre2 <- data.frame(pred.plim2)

g <- ggplot(tianjin, aes(x=date, y=y5\_19y,group= prov),colour = "black") + #

geom\_line(aes(y=y5\_19y,colour = prov),size = 0.4,colour = "black")+ ### 画实际值的曲线

# scale\_color\_brewer(palette = "PRGn")+ # 多个省份时用于分组的颜色板

theme\_bw() + #去除背景

theme(panel.grid=element\_blank())+#去除网格线

geom\_point()+

labs(title = "tianjin-Y5\_19y", subtitle = "",caption = "",#标题副标题引用

x = "date",y = "",#横纵轴标题

colour = "实际值")+ #图例的标题

annotate("rect",xmin=3.5, xmax=5.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定区域并添加有阴影

annotate("rect",xmin=9.5, xmax=11.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定区域并添加有阴影

annotate("rect",xmin=15.5, xmax=17.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定区域并添加有阴影

annotate("rect",xmin=21.5, xmax=23.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定区域并添加有阴影

annotate("rect",xmin=27.5, xmax=29.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定区域并添加有阴影

# annotate("rect",xmin=39.5, xmax=41.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定区域并添加有阴影

# annotate("rect",xmin=51.5, xmax=53.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定区域并添加有阴影

#annotate("rect",xmin=9.5, xmax=11.5, ymin=-Inf, ymax=Inf, fill="gray", alpha=0.4)+#指定暑假区域并添加有阴影

theme(axis.text.x = element\_text(angle = 45, hjust = 1,size = 6),#横轴

axis.text.y = element\_text(size = 10),#纵轴

axis.title.x = element\_text(size = 12),#横轴标签

plot.title = element\_text(size = 17,vjust = -3),#标题

legend.background = element\_rect(fill = "white",size = .5,linetype = "solid")) #标签颜色

g <- g+geom\_ribbon(aes(ymin = con$lwr, ymax = con$upr,fill= "G0"),alpha= 0.2)+

geom\_ribbon(aes(ymin = con2$lwr, ymax = con2$upr,fill= "G3"),alpha= 0.2)+

geom\_line(aes(y = pre$fit), size = 0.4,colour = "red",linetype = "longdash")+#预测值线

geom\_line(aes(y = pre2$fit), size = 0.4,colour = "#3399ff",linetype = "longdash")#预测值线

g

# 导出图片

png(filename = "04.png",width = 2000,height = 1000,units = "px",res = 250)

g

dev.off()