````
---
title: "Parcial1_BeltranRuizLoganDaniel_1000382874_Clase12"
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output: html_document
---

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
library(readxl)
library(ape)
library(sp)
library(sf)
library(readxl)
library(psych)
library(openxlsx)
library(ggplot2)
library(dplyr)

```

## R Markdown

```{r}
datos_xp <- read_excel("C:\\Users\\logan\\OneDrive\\Escritorio\\Otros\
\Semestre 2022-1\\Computacion estadistica\\XPABLO.xlsx")
names(datos_xp)
```
##Redefiniendo df##
```{r}
df <- datos_xp[-c(15,16,17,18,19)]
names(df)
```
##Variables Ca/K
```{r}
model_1 <- lm(Ca ~ K, data = df)
summary(model_1)
```
$$Y_{Ca} = 5.0613 + 11.2126X_{K}$$


```{r}
ggplot(df, aes(y = Ca, x = K)) +
  geom_point()+
  geom_smooth(method='lm', se = F)
```
## Filtrado K > 0.6

```{r}
df_2 <- df |>
  filter(K <= 0.6)
df_2
```
```{r}
model_2 <- lm(Ca ~ K, data = df_2)
summary(model_2)
```
````

```{r}
ggplot(df_2, aes(y = Ca, x = K)) +
  geom_point()+
  geom_smooth(method='lm', se = F)
```
```{r}
res_2 <- model_2$residuals
hist(res_2)
```
Sin valor absoluto (Con valores negativos)
```{r}
res_2 <- model_2$residuals

ggplot(df_2, aes(Long, Lat))+
  geom_point(size = res_2)
```

Con correción

```{r}
ggplot(df_2, aes(Long, Lat))+
  geom_point(size = abs(res_2))
```

```{r}
groups_col <- cut(res_2, breaks = 5)
#color <-
ggplot(df_2, aes(Long, Lat, color = groups_col))+
  geom_point(size = 5)
```

Moran Index para residuales

```{r}
matriz_dist <- as.matrix(dist(cbind(x = df_2$Long, y = df_2$Lat)))

dim(matriz_dist)
```

```{r}
m_dist_inv <- 1/matriz_dist
m_dist_inv[is.infinite(m_dist_inv)] <- 0
diag(m_dist_inv) <- 0
m_dist_inv
```

```{r}
Moran.I(res_2, m_dist_inv)
```

Modelo de regresión multiple

```{r}
model_3 <- lm(Ca ~ K + CICE, data = df)
summary(model_3)
```
```{r}
res_3 <- model_3$residuals
```

```

## Moran Index para residuales model 3

```{r}
matriz_dist <- as.matrix(dist(cbind(x = df$Long, y = df$Lat)))

dim(matriz_dist)
```

```{r}
m_dist_inv <- 1/matriz_dist
m_dist_inv[is.infinite(m_dist_inv)] <- 0
diag(m_dist_inv) <- 0
m_dist_inv
```

```{r}
Moran.I(res_3, m_dist_inv)
```

```{r}
model_4 <- lm(Ca ~ K + Long + Lat + I(Long**2) + I(Lat**2), data = df)
#datos georrefenciados
summary(model_4)
```

```{r}
res_4 <- model_4$residuals
shapiro.test(res_4)
plot(res_4, pch = 16)
Moran.I(res_4, m_dist_inv)
```

```{r}
groups_col <- cut(res_4, breaks = 5)
ggplot(df, aes(Long, Lat, color = groups_col))+
  geom_point(size = 3)
```

##

```{r}
model_5 <- lm(Ca ~ K + I(Long**2) + I(Lat**2) + I(Ca**2)+ Long + Lat , data
= df) #datos georrefenciados
summary(model_5)
```
```{r}
res_5 <- model_5$residuals
Moran.I(res_5, m_dist_inv)
```

Modelos de regresión espacial

```{r}
xy = as.matrix(df[,c(2,3)])
```
```

```{r}
contnb <- dnearneigh(coordinates(xy),0,380000,longlat = F)
dlist <- nbdists(contnb, xy)
dlist <- lapply(dlist, function(x) 1/x)            #inverse distance
Wve <- nb2listw(contnb,glist=dlist,style = "W")       #W matriz-standarized
```

Modelo autoregresivo puro

```{r}
model_auto <- spautolm(Ca ~ 1,data = df,listw=Wve)
summary(model_auto)
```

```{r}
res_6 <- model_auto$fit$residuals
```

```{r}
Moran.I(res_6, m_dist_inv)
```