

Bayesian

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5 de diciembre de 2017

Script para calcular probabilidades condicionadas de frecuencia dada la precipitación a nivel de AGEB.

1. Importar datos

```
Bayesiano <-read.csv
("C:\\Users\\Usuario\\Documents\\Inundaciones\\Precipitacion_Inundacion\\
Datos_Bayesiano\\Datos0714.csv", header=T)
str(Bayesiano)

## 'data.frame':    2052 obs. of  6 variables:
## $ Rel_AGEB_Colonia_csv_AGEB_ID : int  5959 5960 5961 5962 5963 5964
5966 5967 5968 5969 ...
## $ Rel_AGEB_Colonia_csv_OBJECTID: int  11394 11394 11394 11394 11394
11394 11416 11416 11433 11409 ...
## $ MuniColo                : Factor w/ 957 levels "ALVARO
OBREGON_2DA AMPL PRESIDENTES",...: 115 115 115 115 115 115 138 138 111 147
...
## $ Frecuencia                : int  70 70 70 70 70 70 14 14 1 10
...
## $ Volumen                    : num  107 107 107 107 107 ...
## $ Precipitacion              : num  682 679 687 683 690 ...
```

2. Obtener percentiles

```
quantile(Bayesiano$Precipitacion, c(.25, .50, .75))

##      25%      50%      75%
## 571.8471 638.8309 725.4617

range(Bayesiano$Precipitacion)

## [1] 472.1979 1145.3333

quantile(Bayesiano$Frecuencia, c(.25, .50, .75))

## 25% 50% 75%
##  5 17 50

quantile(Bayesiano$Volumen, c(.25, .50, .75))

##      25%      50%      75%
##  6.66250 21.47209 69.70946
```

3. Crear categorías

```
Bayesiano$FrecCateg<-ifelse(Bayesiano$Frecuencia<5,
"1",ifelse(Bayesiano$Frecuencia>4.99 &
Bayesiano$Frecuencia<21.4,"2",ifelse(Bayesiano$Frecuencia>21.39 &
Bayesiano$Frecuencia<69.7, "3", "4")))
Bayesiano$PrecCateg<-ifelse(Bayesiano$Precipitacion<571.8,
"1",ifelse(Bayesiano$Precipitacion>571.79
&Bayesiano$Precipitacion<638.8,"2",ifelse(Bayesiano$Precipitacion>638.79
& Bayesiano$Precipitacion<725.4, "3", "4")))
Bayesiano$VolCateg<-ifelse(Bayesiano$Volumen< 6.6,
"1",ifelse(Bayesiano$Volumen>
6.59&Bayesiano$Volumen<21.4,"2",ifelse(Bayesiano$Volumen>21.39 &
Bayesiano$Volumen<69.70, "3", "4")))
```

```
head(Bayesiano)
```

```
## Rel_AGEB_Colonia_csv_AGEB_ID Rel_AGEB_Colonia_csv_OBJECTID
## 1 5959 11394
## 2 5960 11394
## 3 5961 11394
## 4 5962 11394
## 5 5963 11394
## 6 5964 11394
## MuniColo Frecuencia Volumen Precipitacion
## 1 AZCAPOTZALCO_INFONAVIT EL ROSARIO 70 107.0416 682.2857
## 2 AZCAPOTZALCO_INFONAVIT EL ROSARIO 70 107.0416 678.8375
## 3 AZCAPOTZALCO_INFONAVIT EL ROSARIO 70 107.0416 687.4464
## 4 AZCAPOTZALCO_INFONAVIT EL ROSARIO 70 107.0416 682.7292
## 5 AZCAPOTZALCO_INFONAVIT EL ROSARIO 70 107.0416 690.0500
## 6 AZCAPOTZALCO_INFONAVIT EL ROSARIO 70 107.0416 686.9625
## FrecCateg PrecCateg VolCateg
## 1 4 3 4
## 2 4 3 4
## 3 4 3 4
## 4 4 3 4
## 5 4 3 4
## 6 4 3 4
```

4. Obtener el número de AGEBS en cada categoría

```
TablaPrecFrec <- xtabs(~FrecCateg+PrecCateg, data=Bayesiano)
TablaPrecVolu <- xtabs(~VolCateg+PrecCateg, data=Bayesiano)
TablaPrecFrec
```

```
## PrecCateg
## FrecCateg 1 2 3 4
## 1 79 118 110 155
## 2 155 177 169 175
## 3 170 140 122 108
## 4 109 77 112 76
```

```
TablaPrecVolu
```

```
##          PrecCateg
## VolCateg  1    2    3    4
##          1  79 132 128 165
##          2  90 136 180 111
##          3 138 150 112 118
##          4 206  94  93 120
```

5. Obtener probabilidades condicionadas

```
probF1<- TablaPrecFrec[,1]/sum(TablaPrecFrec[,1])
probF2<- TablaPrecFrec[,2]/sum(TablaPrecFrec[,2])
probF3<- TablaPrecFrec[,3]/sum(TablaPrecFrec[,3])
probF4<- TablaPrecFrec[,4]/sum(TablaPrecFrec[,4])
```

#ProbF1,2,3 y 4 corresponden a Las probabilidades de La columna 1,2,3 y 4 respectivamente (es decir a La categoría 1,2,3 y 4 de precipitación)

probF1

```
##          1          2          3          4
## 0.1539961 0.3021442 0.3313840 0.2124756
```

probF2

```
##          1          2          3          4
## 0.2304688 0.3457031 0.2734375 0.1503906
```

probF3

```
##          1          2          3          4
## 0.2144250 0.3294347 0.2378168 0.2183236
```

probF4

```
##          1          2          3          4
## 0.3015564 0.3404669 0.2101167 0.1478599
```

```
probV1<- TablaPrecVolu[,1]/sum(TablaPrecVolu[,1])
probV2<- TablaPrecVolu[,2]/sum(TablaPrecVolu[,2])
probV3<- TablaPrecVolu[,3]/sum(TablaPrecVolu[,3])
probV4<- TablaPrecVolu[,4]/sum(TablaPrecVolu[,4])
```

probV1

```
##          1          2          3          4
## 0.1539961 0.1754386 0.2690058 0.4015595
```

probV2

```
##          1          2          3          4
## 0.2578125 0.2656250 0.2929688 0.1835938
```

probV3

```
##          1          2          3          4
## 0.2495127 0.3508772 0.2183236 0.1812865
```

probV4

```
##          1          2          3          4
## 0.3210117 0.2159533 0.2295720 0.2334630
```

6. Asignar probabilidades a las AGEBS

```
Bayesiano$ProbaFP<-ifelse(Bayesiano$FrecCateg=="1"&
Bayesiano$PrecCateg=="1",probF1[1], ifelse(Bayesiano$FrecCateg=="2"&
Bayesiano$PrecCateg=="1",probF1[2],ifelse(Bayesiano$FrecCateg=="3"&
Bayesiano$PrecCateg=="1",probF1[3],ifelse(Bayesiano$FrecCateg=="4"&
Bayesiano$PrecCateg=="1",probF1[4], ifelse(Bayesiano$FrecCateg=="1"&
Bayesiano$PrecCateg=="2",probF2[1],ifelse(Bayesiano$FrecCateg=="2"&
Bayesiano$PrecCateg=="2",probF2[2],ifelse(Bayesiano$FrecCateg=="3"&
Bayesiano$PrecCateg=="2",probF2[3],ifelse(Bayesiano$FrecCateg=="4"&
Bayesiano$PrecCateg=="2",probF2[4],ifelse(Bayesiano$FrecCateg=="1"&
Bayesiano$PrecCateg=="3",probF3[1], ifelse(Bayesiano$FrecCateg=="2"&
Bayesiano$PrecCateg=="3",probF3[2],ifelse(Bayesiano$FrecCateg=="3"&
Bayesiano$PrecCateg=="3",probF3[3],ifelse(Bayesiano$FrecCateg=="4"&
Bayesiano$PrecCateg=="3",probF3[4],ifelse(Bayesiano$FrecCateg=="1"&
Bayesiano$PrecCateg=="4",probF4[1],ifelse(Bayesiano$FrecCateg=="2"&
Bayesiano$PrecCateg=="4",probF4[2],ifelse(Bayesiano$FrecCateg=="3"&
Bayesiano$PrecCateg=="4",probF4[3],probF4[4]))))))
```

```
Bayesiano$ProbaVP<-ifelse(Bayesiano$VolCateg=="1"&
Bayesiano$PrecCateg=="1",probV1[1], ifelse(Bayesiano$VolCateg=="2"&
Bayesiano$PrecCateg=="1",probV1[2],ifelse(Bayesiano$VolCateg=="3"&
Bayesiano$PrecCateg=="1",probV1[3],ifelse(Bayesiano$VolCateg=="4"&
Bayesiano$PrecCateg=="1",probV1[4], ifelse(Bayesiano$VolCateg=="1"&
Bayesiano$PrecCateg=="2",probV2[1],ifelse(Bayesiano$VolCateg=="2"&
Bayesiano$PrecCateg=="2",probV2[2],ifelse(Bayesiano$VolCateg=="3"&
Bayesiano$PrecCateg=="2",probV2[3],ifelse(Bayesiano$VolCateg=="4"&
Bayesiano$PrecCateg=="2",probV2[4],ifelse(Bayesiano$VolCateg=="1"&
Bayesiano$PrecCateg=="3",probV3[1], ifelse(Bayesiano$VolCateg=="2"&
Bayesiano$PrecCateg=="3",probV3[2],ifelse(Bayesiano$VolCateg=="3"&
Bayesiano$PrecCateg=="3",probV3[3],ifelse(Bayesiano$VolCateg=="4"&
Bayesiano$PrecCateg=="3",probV3[4],ifelse(Bayesiano$VolCateg=="1"&
Bayesiano$PrecCateg=="4",probV4[1],ifelse(Bayesiano$VolCateg=="2"&
Bayesiano$PrecCateg=="4",probV4[2],ifelse(Bayesiano$VolCateg=="3"&
Bayesiano$PrecCateg=="4",probV4[3],probV4[4])))
```

7. Probabilidades acumuladas para cada categoría de precipitación

```
#####Sacar probabilidades acumuladas
cumulativeP1 <- c(probF1[1],
probF1[1]+probF1[2],probF1[1]+probF1[2]+probF1[3],probF1[1]+probF1[2]+pro
bF1[3]+probF1[4])
cumulativeP2 <- c(probF2[1],
probF2[1]+probF2[2],probF2[1]+probF2[2]+probF2[3],probF2[1]+probF2[2]+pro
```

```

bF2[3]+probF2[4])
cummulativeP3 <- c(probF3[1],
probF3[1]+probF3[2],probF3[1]+probF3[2]+probF3[3],probF3[1]+probF3[2]+pro
bF3[3]+probF3[4])
cummulativeP4 <- c(probF4[1],
probF4[1]+probF4[2],probF4[1]+probF4[2]+probF4[3],probF4[1]+probF4[2]+pro
bF4[3]+probF4[4])

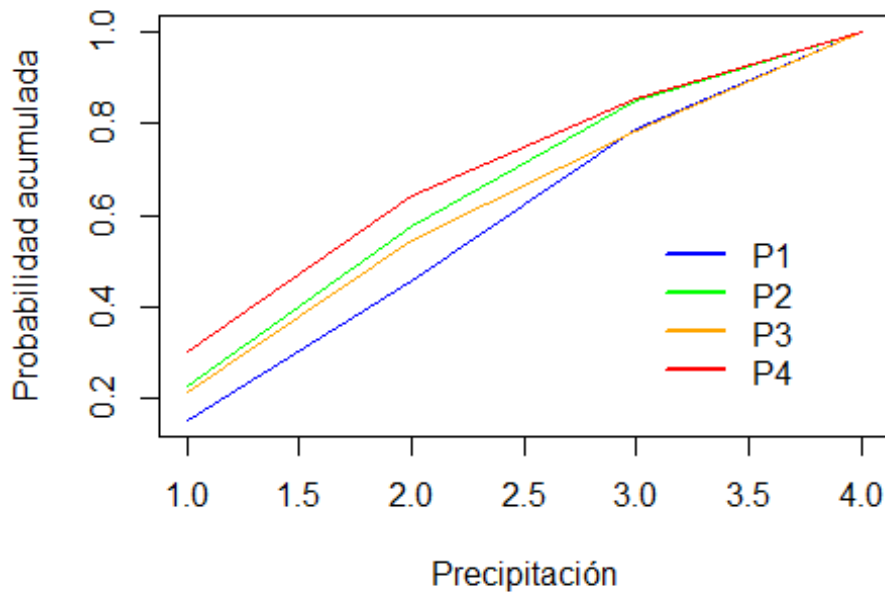
```

8. Graficar probabilidades acumuladas

```

plot(cummulativeP1,type="l", col="blue", ylab= "Probabilidad acumulada",
xlab="Precipitación")
lines(cummulativeP2,type="l", col="green")
lines(cummulativeP3,type="l", col="orange")
lines(cummulativeP4,type="l", col="red")
legend(3,0.6, c("P1", "P2", "P3", "P4"), horiz=F,bty="n",
lty=1,lwd=2,col=c("blue", "green", "orange", "red"))

```



9. Salvar resultados

```

write.csv(Bayesiano,
file="C:\\Users\\Usuario\\Documents\\Inundaciones\\Precipitacion_Inundacion\\ProbabilidadesbayesianAGEB0714.csv")

```

10. Una vez lista la tabla, se utilizó ArcGIS para asignar un ID de Colonias, un ID de AGEB y un valor de precipitación promedio para el periodo 2007-2014 a nivel de AGEB.