Modeling and Estimating the LST using ML

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## R Markdown

LST\_24 <- rast("2024LST.tif")  
LST\_03 <- rast("2003LST.tif")  
LST\_84 <- rast("1984LST.tif")  
  
# Converting raster data to a dataframe   
# lines of code.  
rasterdf <- function(x, aggregate = 1) {  
 resampleFactor <- aggregate  
 inputRaster <- x  
 inCols <- ncol(inputRaster)  
 inRows <- nrow(inputRaster)  
 # Compute numbers of columns and rows in the resampled raster  
 resampledRaster <- rast(ncol=(inCols / resampleFactor),  
 nrow=(inRows / resampleFactor),  
 crs = crs(inputRaster))  
 # Match to the extent of the original raster  
 ext(resampledRaster) <- ext(inputRaster)  
 # Resample data on the new raster  
 y <- resample(inputRaster,resampledRaster,method='near')  
 # Extract cell coordinates into a dataframe  
 coords <- xyFromCell(y, seq\_len(ncell(y)))  
 # Extract layer names  
 dat <- stack(values(y, dataframe = TRUE))  
 # Add names-'value' for data,'variable' for different  
 # layer names in a multilayerraster  
 names(dat) <- c('value', 'variable')  
 dat <- cbind(coords, dat)  
 dat  
}  
  
# ThefollowingcodeconvertstheLSTrastertoadataframeafter  
# aggregating thecellvaluesbyafactorofthree.  
  
lst\_df\_24 <- rasterdf(LST\_24, aggregate = 3)  
summary(lst\_df\_24)

## x y value variable   
## Min. :434204 Min. :1310203 Min. :26.97 Band\_1:107712   
## 1st Qu.:441036 1st Qu.:1318093 1st Qu.:34.97   
## Median :447914 Median :1325983 Median :35.62   
## Mean :447914 Mean :1325983 Mean :35.63   
## 3rd Qu.:454791 3rd Qu.:1333873 3rd Qu.:36.37   
## Max. :461624 Max. :1341763 Max. :41.00   
## NA's :37089

head(lst\_df\_24)

## x y value variable  
## 1 434203.7 1341763 NA Band\_1  
## 2 434293.6 1341763 NA Band\_1  
## 3 434383.5 1341763 NA Band\_1  
## 4 434473.4 1341763 NA Band\_1  
## 5 434563.3 1341763 NA Band\_1  
## 6 434653.2 1341763 NA Band\_1

# lst\_1 <- ifel(lst\_df\_24 == 0, NA, lst)  
# lst\_1\_c <- lst\_1 \* 0.02 - 273.15  
  
A <- ggplot(data = lst\_df\_24) +  
 geom\_raster(aes(x = x,  
 y = y,  
 fill = value)) +  
 scale\_fill\_gradient(name = "Degrees C",  
 low = "blue",  
 high = "red") +  
 coord\_sf(expand = FALSE) +  
 labs(title = "LST-2024",  
 x = "longitude",  
 y = "latitude") +  
 theme(legend.position = "bottom")  
  
lst\_df\_84 <- rasterdf(LST\_84, aggregate = 3)  
summary(lst\_df\_84)

## x y value variable   
## Min. :434204 Min. :1310203 Min. :21.06 Band\_1:107712   
## 1st Qu.:441036 1st Qu.:1318093 1st Qu.:28.33   
## Median :447914 Median :1325983 Median :28.82   
## Mean :447914 Mean :1325983 Mean :28.59   
## 3rd Qu.:454791 3rd Qu.:1333873 3rd Qu.:29.14   
## Max. :461624 Max. :1341763 Max. :31.82   
## NA's :37089

lst\_df\_84%>%filter(value!="NA")%>%head()

## x y value variable  
## 1 449577.0 1341763 28.69418 Band\_1  
## 2 449487.1 1341673 28.33435 Band\_1  
## 3 449577.0 1341673 28.40637 Band\_1  
## 4 449666.9 1341673 28.79483 Band\_1  
## 5 449756.8 1341673 28.50717 Band\_1  
## 6 449846.7 1341673 28.50717 Band\_1

B <- ggplot(data = lst\_df\_84) +  
 geom\_raster(aes(x = x,  
 y = y,  
 fill = value)) +  
 scale\_fill\_gradient(name = "Degrees C",  
 low = "blue",  
 high = "red") +  
 coord\_sf(expand = FALSE) +  
 labs(title = "LST-1984",  
 x = "longitude",  
 y = "latitude") +  
 theme(legend.position = "bottom")  
  
lst\_df\_03 <- rasterdf(LST\_03, aggregate = 3)  
summary(lst\_df\_03)

## x y value variable   
## Min. :434204 Min. :1310203 Min. :22.08 Band\_1:107712   
## 1st Qu.:441036 1st Qu.:1318093 1st Qu.:33.70   
## Median :447914 Median :1325983 Median :34.48   
## Mean :447914 Mean :1325983 Mean :34.24   
## 3rd Qu.:454791 3rd Qu.:1333873 3rd Qu.:34.96   
## Max. :461624 Max. :1341763 Max. :38.24   
## NA's :37089

lst\_df\_84%>%filter(value!="NA")%>%head()

## x y value variable  
## 1 449577.0 1341763 28.69418 Band\_1  
## 2 449487.1 1341673 28.33435 Band\_1  
## 3 449577.0 1341673 28.40637 Band\_1  
## 4 449666.9 1341673 28.79483 Band\_1  
## 5 449756.8 1341673 28.50717 Band\_1  
## 6 449846.7 1341673 28.50717 Band\_1

C <- ggplot(data = lst\_df\_03) +  
 geom\_raster(aes(x = x,  
 y = y,  
 fill = value)) +  
 scale\_fill\_gradient(name = "Degrees C",  
 low = "blue",  
 high = "red") +  
 coord\_sf(expand = FALSE) +  
 labs(title = "LST 2003",  
 x = "longitude",  
 y = "latitude") +  
 theme(legend.position = "bottom")  
  
ggarrange(A,B,C,nrow = 1,labels = c(  
 "2024","1984","2003"  
))



