ClassifyRain - hardRain implementation

SulagnaSaha

2024-10-22

R Markdown

```
# Define the paths to your rain and norain folders
norain_dir <- "Norain"
withrain_dir <- "withrain"

# Get the list of .wav files from both "Norain" and "Withrain" folders
files.Norain <- list.files(path = norain_dir, pattern = "\\.wav$", full.names = TRUE)
files.Withrain <- list.files(path = withrain_dir, pattern = "\\.wav$", full.names = TRUE)

# Combine both rain and no-rain files into one list
all_files <- c(files.Norain, files.Withrain)
files.Norain
```

```
##  [1] "Norain/SM20_20210706_060200.wav" "Norain/SM20_20210706_061700.wav"
##  [3] "Norain/SM20_20210706_063200.wav" "Norain/SM20_20210706_064700.wav"
##  [5] "Norain/SM20_20210706_070200.wav" "Norain/SM20_20210706_071700.wav"
##  [7] "Norain/SM20_20210706_073200.wav" "Norain/SM20_20210706_074700.wav"
##  [9] "Norain/SM21_20210706_060400.wav" "Norain/SM21_20210706_061900.wav"
## [11] "Norain/SM21_20210706_063400.wav" "Norain/SM21_20210706_064900.wav"
## [13] "Norain/SM22_20210706_060400.wav" "Norain/SM22_20210706_061900.wav"
## [15] "Norain/SM22_20210706_063400.wav" "Norain/SM22_20210706_064900.wav"
## [17] "Norain/SM23_20210706_060300.wav" "Norain/SM23_20210706_061800.wav"
## [19] "Norain/SM23_20210706_063300.wav" "Norain/SM23_20210706_064800.wav"
## [21] "Norain/SM23_20210718_071300.wav" "Norain/SM23_20210718_072800.wav"
## [23] "Norain/SM23_20210718_074300.wav" "Norain/SM23_20210718_075800.wav"
## [25] "Norain/SM24_20210706_060200.wav" "Norain/SM24_20210706_061700.wav"
## [27] "Norain/SM24_20210706_063200.wav" "Norain/SM24_20210706_064700.wav"
## [29] "Norain/SM24_20210706_070200.wav" "Norain/SM24_20210706_071700.wav"
## [31] "Norain/SM24_20210706_073200.wav" "Norain/SM24_20210706_074700.wav"
```

```
files.Withrain
```

```
##  [1] "withrain/SM13_20210529_060100.wav" "withrain/SM13_20210529_061600.wav"
##  [3] "withrain/SM14_20210529_060200.wav" "withrain/SM14_20210529_061700.wav"
##  [5] "withrain/SM2_20210428_060100.wav"  "withrain/SM2_20210428_061600.wav"
##  [7] "withrain/SM2_20210428_063100.wav"  "withrain/SM2_20210428_064600.wav"
##  [9] "withrain/SM3_20210706_064700.wav"  "withrain/SM8_20210708_070500.wav"
## [11] "withrain/SM9_20210708_060600.wav"  "withrain/SM9_20210708_062100.wav"
## [13] "withrain/SM9_20210708_063600.wav"  "withrain/SM9_20210708_065100.wav"
```

```
# Calculate the threshold using your "withrain" folder (rain data)
library(hardRain)
trAll <- getThreshold(files.Withrain)
```

```
##   |                                                                      |
```

```
trAll
```

```
##       band.1.psd   band.2.psd band.1.s2n band.2.s2n
## min 6.827869e-05 1.312850e-05   1.802747   1.411780
## Q2  1.204878e-04 7.067955e-05   1.906355   1.746153
```

```
# Classify all files based on the thresholds from the "Withrain" folder
resAll <- classifyRain(all_files, thresh.vals = trAll, threshold = "min")
```

```
##   |                                                                      |
```

```
# Check classification results (how many files were classified as rain/non-rain)
table(resAll)
```

```
## , , value = FALSE
##
##                            threshold
## filename                    min
##   SM13_20210529_060100.wav   0
##   SM13_20210529_061600.wav   0
##   SM14_20210529_060200.wav   0
##   SM14_20210529_061700.wav   0
##   SM2_20210428_060100.wav    0
##   SM2_20210428_061600.wav    0
##   SM2_20210428_063100.wav    0
##   SM2_20210428_064600.wav    0
##   SM20_20210706_060200.wav   0
##   SM20_20210706_061700.wav   0
##   SM20_20210706_063200.wav   0
##   SM20_20210706_064700.wav   0
##   SM20_20210706_070200.wav   1
##   SM20_20210706_071700.wav   1
##   SM20_20210706_073200.wav   1
##   SM20_20210706_074700.wav   1
##   SM21_20210706_060400.wav   1
##   SM21_20210706_061900.wav   1
##   SM21_20210706_063400.wav   1
##   SM21_20210706_064900.wav   1
##   SM22_20210706_060400.wav   1
##   SM22_20210706_061900.wav   1
##   SM22_20210706_063400.wav   1
##   SM22_20210706_064900.wav   1
##   SM23_20210706_060300.wav   1
##   SM23_20210706_061800.wav   1
##   SM23_20210706_063300.wav   1
##   SM23_20210706_064800.wav   1
##   SM23_20210718_071300.wav   0
##   SM23_20210718_072800.wav   0
##   SM23_20210718_074300.wav   0
##   SM23_20210718_075800.wav   0
##   SM24_20210706_060200.wav   1
##   SM24_20210706_061700.wav   1
##   SM24_20210706_063200.wav   0
##   SM24_20210706_064700.wav   1
##   SM24_20210706_070200.wav   1
```

```
##   SM24_20210706_071700.wav   1
##   SM24_20210706_073200.wav   1
##   SM24_20210706_074700.wav   1
##   SM3_20210706_064700.wav    0
##   SM8_20210708_070500.wav    0
##   SM9_20210708_060600.wav    0
##   SM9_20210708_062100.wav    0
##   SM9_20210708_063600.wav    0
##   SM9_20210708_065100.wav    0
##
## , , value = TRUE
##
##                            threshold
## filename                    min
##   SM13_20210529_060100.wav   1
##   SM13_20210529_061600.wav   1
##   SM14_20210529_060200.wav   1
##   SM14_20210529_061700.wav   1
##   SM2_20210428_060100.wav    1
##   SM2_20210428_061600.wav    1
##   SM2_20210428_063100.wav    1
##   SM2_20210428_064600.wav    1
##   SM20_20210706_060200.wav   1
##   SM20_20210706_061700.wav   1
##   SM20_20210706_063200.wav   1
##   SM20_20210706_064700.wav   1
##   SM20_20210706_070200.wav   0
##   SM20_20210706_071700.wav   0
##   SM20_20210706_073200.wav   0
##   SM20_20210706_074700.wav   0
##   SM21_20210706_060400.wav   0
##   SM21_20210706_061900.wav   0
##   SM21_20210706_063400.wav   0
##   SM21_20210706_064900.wav   0
##   SM22_20210706_060400.wav   0
##   SM22_20210706_061900.wav   0
##   SM22_20210706_063400.wav   0
##   SM22_20210706_064900.wav   0
##   SM23_20210706_060300.wav   0
##   SM23_20210706_061800.wav   0
##   SM23_20210706_063300.wav   0
##   SM23_20210706_064800.wav   0
##   SM23_20210718_071300.wav   1
##   SM23_20210718_072800.wav   1
##   SM23_20210718_074300.wav   1
##   SM23_20210718_075800.wav   1
##   SM24_20210706_060200.wav   0
##   SM24_20210706_061700.wav   0
##   SM24_20210706_063200.wav   1
##   SM24_20210706_064700.wav   0
##   SM24_20210706_070200.wav   0
##   SM24_20210706_071700.wav   0
##   SM24_20210706_073200.wav   0
##   SM24_20210706_074700.wav   0
```

```
##   SM3_20210706_064700.wav    1
##   SM8_20210708_070500.wav    1
##   SM9_20210708_060600.wav    1
##   SM9_20210708_062100.wav    1
##   SM9_20210708_063600.wav    1
##   SM9_20210708_065100.wav    1
```

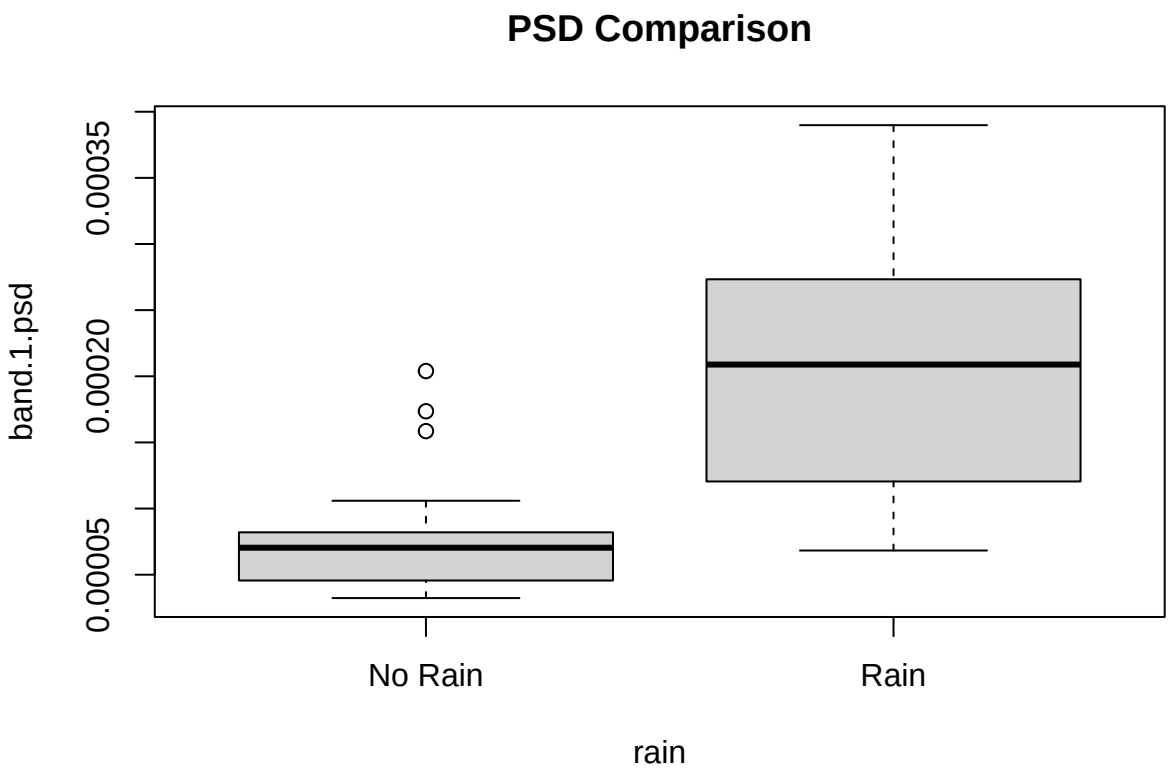
```
# Get the metrics for all files
metAll <- getMetrics(all_files)
```

```
##   |                                                                      |
```

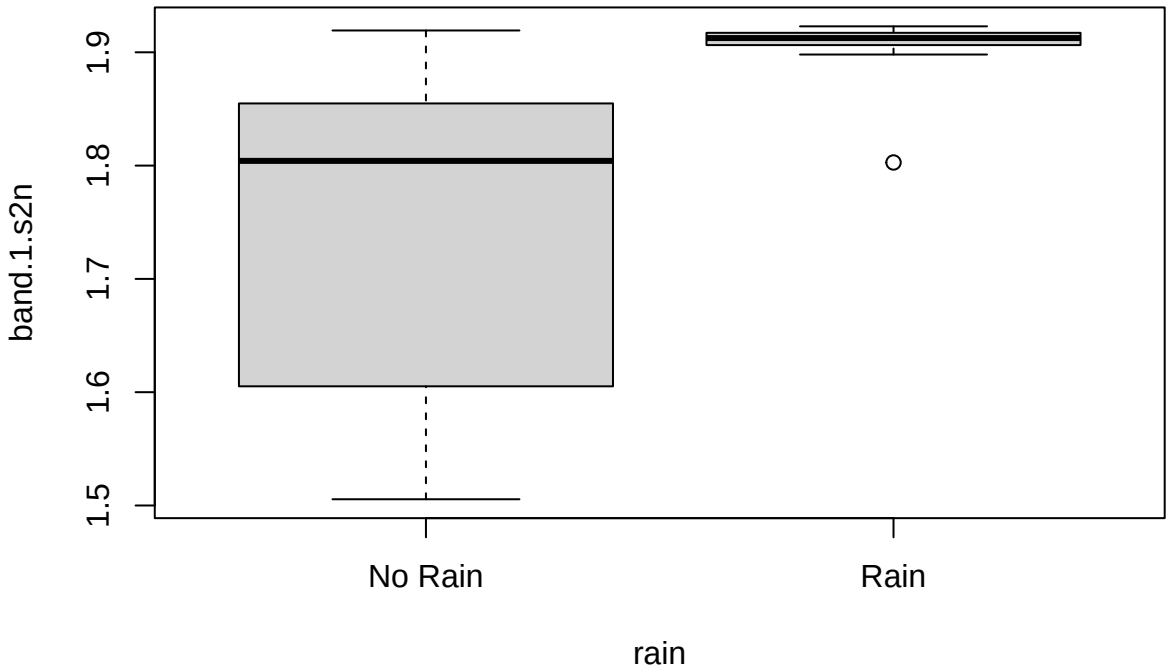
```
# Create a label to distinguish between rain and no-rain files
labels <- c(rep("No Rain", length(files.Norain)), rep("Rain", length(files.Withrain)))

# Bind into a data frame and visualize the differences
psd_s2n <- data.frame(filename = all_files, metAll, rain = labels)

str(metAll)
```

```
##  num [1:46, 1:4] 7.46e-05 8.25e-05 7.67e-05 7.54e-05 4.15e-05 ...
##  - attr(*, "dimnames")=List of 2
##   ..$ : Named chr [1:46] "SM20_20210706_060200.wav" "SM20_20210706_061700.wav" "SM20_20210706_063200
##   .. ..- attr(*, "names")= chr [1:46] "SM20_20210706_060200.wav" "SM20_20210706_061700.wav" "SM20_201
##   ..$ : chr [1:4] "band.1.psd" "band.2.psd" "band.1.s2n" "band.2.s2n"
```

```
boxplot(band.1.psd ~ rain, data = psd_s2n, main = "PSD Comparison")
```




```
boxplot(band.1.s2n ~ rain, data = psd_s2n, main = "S2N Comparison")
```




```
# Create a label to differentiate between "withrain" and "norain" files
labels <- c(rep("No Rain", length(files.Norain)), rep("Rain", length(files.Withrain)))

# Combine the file paths with their labels into a data frame
all_files_labeled <- data.frame(filename = all_files, label = labels)

# Now classify with the labeled files
resAll <- classifyRain(all_files_labeled$filename, thresh.vals = trAll, threshold = "min")
```

```
##   |                                                                      |
```

```
# Add the classification result back to the data frame
all_files_labeled$result <- resAll$value

# Now you can view which files were classified as rain or no rain
print(all_files_labeled)
```

```
##                            filename   label result
## 1    Norain/SM20_20210706_060200.wav No Rain   TRUE
## 2    Norain/SM20_20210706_061700.wav No Rain   TRUE
## 3    Norain/SM20_20210706_063200.wav No Rain   TRUE
## 4    Norain/SM20_20210706_064700.wav No Rain   TRUE
## 5    Norain/SM20_20210706_070200.wav No Rain  FALSE
## 6    Norain/SM20_20210706_071700.wav No Rain  FALSE
## 7    Norain/SM20_20210706_073200.wav No Rain  FALSE
## 8    Norain/SM20_20210706_074700.wav No Rain  FALSE
## 9    Norain/SM21_20210706_060400.wav No Rain  FALSE
## 10   Norain/SM21_20210706_061900.wav No Rain  FALSE
## 11   Norain/SM21_20210706_063400.wav No Rain  FALSE
## 12   Norain/SM21_20210706_064900.wav No Rain  FALSE
## 13   Norain/SM22_20210706_060400.wav No Rain  FALSE
```

```
## 14   Norain/SM22_20210706_061900.wav No Rain  FALSE
## 15   Norain/SM22_20210706_063400.wav No Rain  FALSE
## 16   Norain/SM22_20210706_064900.wav No Rain  FALSE
## 17   Norain/SM23_20210706_060300.wav No Rain  FALSE
## 18   Norain/SM23_20210706_061800.wav No Rain  FALSE
## 19   Norain/SM23_20210706_063300.wav No Rain  FALSE
## 20   Norain/SM23_20210706_064800.wav No Rain  FALSE
## 21   Norain/SM23_20210718_071300.wav No Rain   TRUE
## 22   Norain/SM23_20210718_072800.wav No Rain   TRUE
## 23   Norain/SM23_20210718_074300.wav No Rain   TRUE
## 24   Norain/SM23_20210718_075800.wav No Rain   TRUE
## 25   Norain/SM24_20210706_060200.wav No Rain  FALSE
## 26   Norain/SM24_20210706_061700.wav No Rain  FALSE
## 27   Norain/SM24_20210706_063200.wav No Rain   TRUE
## 28   Norain/SM24_20210706_064700.wav No Rain  FALSE
## 29   Norain/SM24_20210706_070200.wav No Rain  FALSE
## 30   Norain/SM24_20210706_071700.wav No Rain  FALSE
## 31   Norain/SM24_20210706_073200.wav No Rain  FALSE
## 32   Norain/SM24_20210706_074700.wav No Rain  FALSE
## 33 withrain/SM13_20210529_060100.wav    Rain   TRUE
## 34 withrain/SM13_20210529_061600.wav    Rain   TRUE
## 35 withrain/SM14_20210529_060200.wav    Rain   TRUE
## 36 withrain/SM14_20210529_061700.wav    Rain   TRUE
## 37  withrain/SM2_20210428_060100.wav    Rain   TRUE
## 38  withrain/SM2_20210428_061600.wav    Rain   TRUE
## 39  withrain/SM2_20210428_063100.wav    Rain   TRUE
## 40  withrain/SM2_20210428_064600.wav    Rain   TRUE
## 41  withrain/SM3_20210706_064700.wav    Rain   TRUE
## 42  withrain/SM8_20210708_070500.wav    Rain   TRUE
## 43  withrain/SM9_20210708_060600.wav    Rain   TRUE
## 44  withrain/SM9_20210708_062100.wav    Rain   TRUE
## 45  withrain/SM9_20210708_063600.wav    Rain   TRUE
## 46  withrain/SM9_20210708_065100.wav    Rain   TRUE
```