Exercises 3

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2/6/2023

Stat Computing - Exercises 03 - Billboard Charts

On canvas, there is a file called `Hot_100.csv`, which contains data from the Billboard 100 music charts going back to 1958. Below are some exercises on functions and subsetting that make use of the data. For all questions, include 3 examples to demonstrate calling your function with different arguments.

```
dat = read.csv("C:/Users/Nick/Downloads/Hot_100.csv")
```

1. Write a function that takes in a character string indicating a date, an optional format argument that has a default date format. The function should return the #1 song and its performer during the week that contains the date argument. Assume that the date in the dataset is the date of the beginning of the week. Your function should use the default date format if a format is not provided, and it should use the user-supplied format if it is supplied. Test your function with a few different dates and different formats.

```
topsong <- function(date, format = "%Y-%m-%d") {
  date = as.Date(date, format = format)
  weekdaychange = 6 - as.numeric(format(date, "%u"))

  date = format(date+weekdaychange, "%Y-%m-%d")

  return(dat[(dat$chart_date == date) & (dat$chart_position == 1),
          c("song","performer")])
}

topsong("1990-05-05")
```

```
##                         song       performer
## 203116 Nothing Compares 2 U Sinead O'Connor
```

```
topsong("1990-07-17" , format = "%Y-%m-%d")
```

```
##                        song                               performer
## 241183 She Ain't Worth It Glenn Medeiros Featuring Bobby Brown
```

```
topsong("1990/07/17" , format = "%Y/%m/%d")
```

```
##                        song                               performer
## 241183 She Ain't Worth It Glenn Medeiros Featuring Bobby Brown
```

```r
topsong("17-07-1990" , format = "%d-%m-%Y")
```

```
##                 song                         performer
## 241183 She Ain't Worth It Glenn Medeiros Featuring Bobby Brown
```

```r
topsong("28-09-1990" , format = "%d-%m-%Y")
```

```
##                                    song performer
## 449 (Can't Live Without Your) Love And Affection    Nelson
```

2. Modify your function to add a `top` argument, indicating that the function should return the top `top` songs on the specified date. Make sure that the returned songs are listed in order according to the weekly ranking. Test your function by printing the top 10 songs on the day you were born.

```r
topsong <- function(date, format = "%Y-%m-%d", top = 1) {
  date = as.Date(date, format = format)
  weekdaychange = 6 - as.numeric(format(date, "%u"))

  date = format(date+weekdaychange, "%Y-%m-%d")

  result = (dat[(dat$chart_date == date) & (dat$chart_position <= top),
            c("song","performer", "chart_position")])


  return(result[order(result$chart_position),c("song", "performer")])
}

topsong("2002-07-17", top = 10)
```

```
##                                    song
## 116086           Hot In Herre
## 323731           Without Me
## 110455                 Hero
## 52114           Complicated
## 128869 I Need A Girl (Part Two)
## 204531                 Oh Boy
## 280667           The Middle
## 7465        A Thousand Miles
## 86333               Foolish
## 137034     I'm Gonna Be Alright
##                                                        performer
## 116086                                                     Nelly
## 323731                                                    Eminem
## 110455                           Chad Kroeger Featuring Josey Scott
## 52114                                              Avril Lavigne
## 128869 P. Diddy & Ginuwine Featuring Loon, Mario Winans & Tammy Ruggeri
## 204531                           Cam'Ron Featuring Juelz Santana
## 280667                                            Jimmy Eat World
## 7465                                              Vanessa Carlton
## 86333                                                     Ashanti
## 137034                           Jennifer Lopez Featuring Nas
```

```r
topsong("2002-2-11", top = 5)
```

```
##                     song                          performer
## 300515     U Got It Bad                              Usher
## 118526 How You Remind Me                         Nickelback
## 14747     Always On Time       Ja Rule Featuring Ashanti
## 9831      Ain't It Funny  Jennifer Lopez Featuring Ja Rule
## 144231       In The End                         Linkin Park
```

```r
topsong("2022-2-10", top = 1)
```

```
##                                 song
## 309010 We Don't Talk About Bruno
##
## 309010 Carolina Gaitan, Mauro Castillo, Adassa, Rhenzy Feliz, Diane Guerrero, Stephanie Beatriz & En
```

```r
topsong("2002-1-28", top = 5)
```

```
##                      song                   performer
## 300513         U Got It Bad                      Usher
## 118524    How You Remind Me                 Nickelback
## 14745        Always On Time Ja Rule Featuring Ashanti
## 92673  Get The Party Started                      P!nk
## 194746          My Sacrifice                      Creed
```

3. Write a function to search for matching performer names. The function should take in a character string as its argument, find all unique performer names that contain the argument, and return them. Include an argument to determine whether or not to do exact matching on uppercase vs. lowercase. It may be a good idea to look at the documentation `grep`, `tolower`, and `toupper`.

```r
SearchArtist <- function(artist, MatchCase = FALSE){
  if (MatchCase == FALSE){
    return ( dat[grep(artist, dat$performer, ignore.case = TRUE,
                  fixed = FALSE),])
  } else if (MatchCase == TRUE) {
    return ( dat[grep(artist, dat$performer, ignore.case = FALSE,
                  fixed = TRUE),])
  }
}

head(SearchArtist("Emin"))
```

```
##       chart_position chart_date         song performer              song_id
## 3949              92 2010-07-10    25 To Life    Eminem    25 To LifeEminem
## 4160              32 2009-05-16           3am    Eminem             3amEminem
## 19812             83 2005-06-18 Ass Like That    Eminem Ass Like ThatEminem
## 19813             71 2005-06-25 Ass Like That    Eminem Ass Like ThatEminem
## 19814             60 2005-07-02 Ass Like That    Eminem Ass Like ThatEminem
## 19815             67 2005-07-09 Ass Like That    Eminem Ass Like ThatEminem
##       instance time_on_chart consecutive_weeks previous_week peak_position
```

```
## 3949          1          1          NA        NA        92
## 4160          1          1          NA        NA        32
## 19812         1          1          NA        NA        83
## 19813         1          2          1         83        71
## 19814         1          3          2         71        60
## 19815         1          4          3         60        60
##        worst_position chart_debut
## 3949              92  2010-07-10
## 4160              32  2009-05-16
## 19812             83  2005-06-18
## 19813             83  2005-06-18
## 19814             83  2005-06-18
## 19815             83  2005-06-18
##                                                chart_url
## 3949  https://www.billboard.com/charts/hot-100/2010-07-10
## 4160  https://www.billboard.com/charts/hot-100/2009-05-16
## 19812 https://www.billboard.com/charts/hot-100/2005-06-18
## 19813 https://www.billboard.com/charts/hot-100/2005-06-25
## 19814 https://www.billboard.com/charts/hot-100/2005-07-02
## 19815 https://www.billboard.com/charts/hot-100/2005-07-09
```

```r
head(SearchArtist(("Charlie Puth"), MatchCase = TRUE))
```

```
##       chart_position chart_date    song    performer           song_id
## 20140             68 2017-05-13 Attention Charlie Puth AttentionCharlie Puth
## 20141             64 2017-05-20 Attention Charlie Puth AttentionCharlie Puth
## 20142             53 2017-05-27 Attention Charlie Puth AttentionCharlie Puth
## 20143             45 2017-06-03 Attention Charlie Puth AttentionCharlie Puth
## 20144             35 2017-06-10 Attention Charlie Puth AttentionCharlie Puth
## 20145             37 2017-06-17 Attention Charlie Puth AttentionCharlie Puth
##       instance time_on_chart consecutive_weeks previous_week peak_position
## 20140        1             1                NA            NA            68
## 20141        1             2                 1            68            64
## 20142        1             3                 2            64            53
## 20143        1             4                 3            53            45
## 20144        1             5                 4            45            35
## 20145        1             6                 5            35            35
##       worst_position chart_debut
## 20140             68  2017-05-13
## 20141             68  2017-05-13
## 20142             68  2017-05-13
## 20143             68  2017-05-13
## 20144             68  2017-05-13
## 20145             68  2017-05-13
##                                                chart_url
## 20140 https://www.billboard.com/charts/hot-100/2017-05-13
## 20141 https://www.billboard.com/charts/hot-100/2017-05-20
## 20142 https://www.billboard.com/charts/hot-100/2017-05-27
## 20143 https://www.billboard.com/charts/hot-100/2017-06-03
## 20144 https://www.billboard.com/charts/hot-100/2017-06-10
## 20145 https://www.billboard.com/charts/hot-100/2017-06-17
```

```r
head(SearchArtist(("Joe"), MatchCase = TRUE))
```

```
##      chart_position chart_date                        song
## 1307            94 1964-01-25           (It's No) Sin
## 1308            82 1964-02-01           (It's No) Sin
## 1309            74 1964-02-08           (It's No) Sin
## 1310            88 1964-02-15           (It's No) Sin
## 1311            84 1964-02-22           (It's No) Sin
## 2303            88 1968-04-13 (You Keep Me) Hangin' On
##                         performer
## 1307 The Duprees featuring Joey Vann
## 1308 The Duprees featuring Joey Vann
## 1309 The Duprees featuring Joey Vann
## 1310 The Duprees featuring Joey Vann
## 1311 The Duprees featuring Joey Vann
## 2303                    Joe Simon
##                                   song_id instance time_on_chart
## 1307 (It's No) SinThe Duprees featuring Joey Vann        1             1
## 1308 (It's No) SinThe Duprees featuring Joey Vann        1             2
## 1309 (It's No) SinThe Duprees featuring Joey Vann        1             3
## 1310 (It's No) SinThe Duprees featuring Joey Vann        1             4
## 1311 (It's No) SinThe Duprees featuring Joey Vann        1             5
## 2303           (You Keep Me) Hangin' OnJoe Simon        1             1
##      consecutive_weeks previous_week peak_position worst_position chart_debut
## 1307               NA            NA            94             94 1964-01-25
## 1308                1            94            82             94 1964-01-25
## 1309                2            82            74             94 1964-01-25
## 1310                3            74            74             94 1964-01-25
## 1311                4            88            74             94 1964-01-25
## 2303               NA            NA            88             88 1968-04-13
##                                   chart_url
## 1307 https://www.billboard.com/charts/hot-100/1964-01-25
## 1308 https://www.billboard.com/charts/hot-100/1964-02-01
## 1309 https://www.billboard.com/charts/hot-100/1964-02-08
## 1310 https://www.billboard.com/charts/hot-100/1964-02-15
## 1311 https://www.billboard.com/charts/hot-100/1964-02-22
## 2303 https://www.billboard.com/charts/hot-100/1968-04-13
```

4. Write a function to take in a performer name, and return all of the songs belonging to that performer that appeared on the Billboard list. Use exact matching for performer names.

```r
artistsongs <- function (artist) {
  return ( unique(dat[grep(artist, dat$performer, ignore.case = FALSE,
                      fixed = TRUE), "song"]))
}

artistsongs("Black Eyed Peas")
```

```
##  [1] "Boom Boom Pow"           "Don't Lie"
##  [3] "Don't Phunk With My Heart" "Don't Stop The Party"
##  [5] "Girl Like Me"            "Hey Mama"
##  [7] "I Gotta Feeling"         "Imma Be"
```

```
##  [9] "Just Can't Get Enough"       "Let's Get It Started"
## [11] "Mamacita"                    "Meet Me Halfway"
## [13] "My Humps"                    "Pump It"
## [15] "RITMO (Bad Boys For Life)"   "Request Line"
## [17] "Rock That Body"              "The Time (Dirty Bit)"
## [19] "Where Is The Love?"
```

```r
cat("\n")
```

```r
artistsongs("Yung Gravy")
```

```
## [1] "Betty (Get Money)"
```

```r
cat("\n")
```

```r
artistsongs("Foo Fighters")
```

```
##  [1] "All My Life"        "Best Of You"       "DOA"
##  [4] "Learn To Fly"       "Long Road To Ruin" "Rope"
##  [7] "The Pretender"      "Times Like These"  "Walk"
## [10] "Wheels"
```

5. Song statistics: write a function that takes in a song id, and returns the following statistics for the song: number of weeks in the top 100, number of weeks in the top 40, number of weeks in the top 10, number of weeks at #1, lowest position (i.e. best position). The return type should be a data frame with columns for the song name, the performer, the first week it appeared on the charts, and all of the statistics.

```r
Song_Statistics <- function (song_ID) {

  song_dat = dat[dat$song_id == song_ID,]
  top_100 = length(song_dat$song)
  top_40 = length(song_dat[song_dat$chart_position <= 40 , "song"])
  top_10 = length(song_dat[song_dat$chart_position <= 10 , "song"])
  top_1 = length(song_dat[song_dat$chart_position <= 1 , "song"])
  top = min(song_dat$chart_position)

  result = data.frame(song = song_dat[1,"song"],
                      performer = song_dat[1,"performer"],
                      first_week = song_dat[1,"chart_date"] ,
                      top_100 = top_100, top_40 = top_40 ,
                      top_10 = top_10, top_1 = top_1,
                      best = top)

  return ((result))

}

Song_Statistics("PepasFarruko")
```

```
##    song performer first_week top_100 top_40 top_10 top_1 best
## 1 Pepas   Farruko 2021-08-07      21     12      0     0   25
```

```
Song_Statistics("HelloAdele")
```

```
##   song performer first_week top_100 top_40 top_10 top_1 best
## 1 Hello     Adele 2015-11-14      26     26     18    10    1
```

```
Song_Statistics("Blinding LightsThe Weeknd")
```

```
##             song  performer first_week top_100 top_40 top_10 top_1 best
## 1 Blinding Lights The Weeknd 2019-12-14      90     86     57     4    1
```

6. Song rankings: write a function that ranks all of the songs according to the statistics in the previous question. The function should take a statistic name as its argument, and return a data frame whose first column is the song name, second column is the performer, third column is the week the song first appeared, and the fourth column is the statistic. The data frame should be ordered with the best value of the statistic at the top of the data frame. Print out the rankings of the top 10 songs for 3 of the statistics.

```r
# Citation: Idea for code of this problem came from office hours

Rankings = function(statistic) {
  songs_id <- unique(dat$song_id)

  df2 = data.frame(colnames(c("song","performer", "chart_debut", "top_100",
                              "top_40", "top_10", "top_1", "best")))

   for ( i in seq_along(songs_id)) {
     stats2 <- Song_Statistics(songs_id[i])
     df2 <- rbind(df2, stats2)

  }

  if (statistic == "best") {
     resultdf <- (df2[order(df2[,statistic], decreasing = FALSE),c("song",
                              "performer", "first_week", statistic)])
  } else {
     resultdf <- (df2[order(df2[,statistic], decreasing = TRUE),c("song",
                              "performer", "first_week", statistic)])
  }

  finalresult <- head(resultdf, 10)
  return ( finalresult )

}

Rankings("top_40")
```

```
##                        song               performer
## 2986        Blinding Lights               The Weeknd
## 9746            Heat Waves            Glass Animals
## 21408       Save Your Tears  The Weeknd & Ariana Grande
## 20220          Radioactive           Imagine Dragons
```

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```
## 23414                                       Stay The Kid LAROI & Justin Bieber
## 12544                              I'm Yours                    Jason Mraz
## 4345                                Circles                    Post Malone
## 10592                          How Do I Live                    LeAnn Rimes
## 7738   Foolish Games/You Were Meant For Me                          Jewel
## 21848                            Shape Of You                    Ed Sheeran
##        first_week top_40
## 2986   2019-12-14     86
## 9746   2021-01-16     76
## 21408 2021-01-09     64
## 20220 2012-08-18     63
## 23414 2021-07-24     63
## 12544 2008-05-03     62
## 4345   2019-09-14     61
## 10592 1997-06-21     61
## 7738   1996-11-30     60
## 21848 2017-01-28     58
```

Rankings("top_1")

```
##                                                                song
## 18650                                               Old Town Road
## 5507                                                    Despacito
## 18906                                                One Sweet Day
## 1794                                                     As It Was
## 3924   Candle In The Wind 1997/Something About The Way You Look Tonight
## 11299                                               I Gotta Feeling
## 11942                                           I Will Always Love You
## 12162                                            I'll Make Love To You
## 16278                                       Macarena (Bayside Boys Mix)
## 27480                                                  Uptown Funk!
##                                         performer first_week top_1
## 18650         Lil Nas X Featuring Billy Ray Cyrus 2019-03-16     19
## 5507   Luis Fonsi & Daddy Yankee Featuring Justin Bieber 2017-02-04     16
## 18906                    Mariah Carey & Boyz II Men 1995-12-02     16
## 1794                                 Harry Styles 2022-04-16     15
## 3924                                   Elton John 1997-10-11     14
## 11299                           The Black Eyed Peas 2009-06-27     14
## 11942                               Whitney Houston 1992-11-14     14
## 12162                                  Boyz II Men 1994-08-13     14
## 16278                                  Los Del Rio 1995-09-02     14
## 27480             Mark Ronson Featuring Bruno Mars 2014-11-29     14
```

Rankings("best")

```
##                                                                  song
## 41                    (Can't Live Without Your) Love And Affection
## 56                              (Everything I Do) I Do It For You
## 67   (Hey Won't You Play) Another Somebody Done Somebody Wrong Song
## 76                                  (I Can't Get No) Satisfaction
## 84                                    (I Just) Died In Your Arms
## 110                             (I've Had) The Time Of My Life
## 128                                 (Just Like) Starting Over
```

```
## 136                                              (Love Is) Thicker Than Water
## 162                                 (Shake, Shake, Shake) Shake Your Booty
## 171                                     (Sittin' On) The Dock Of The Bay
##                          performer first_week best
## 41                          Nelson 1990-07-07    1
## 56                     Bryan Adams 1991-06-29    1
## 67                     B.J. Thomas 1975-02-01    1
## 76             The Rolling Stones 1965-06-12    1
## 84                    Cutting Crew 1987-03-07    1
## 110 Bill Medley & Jennifer Warnes 1987-09-26    1
## 128                    John Lennon 1980-11-01    1
## 136                      Andy Gibb 1977-11-05    1
## 162      KC And The Sunshine Band 1976-07-10    1
## 171                   Otis Redding 1968-01-27    1
```