Tidy Tuesday: Billboard Hot 100

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```
tuesdata <- tidytuesdayR::tt_load("2021-09-14")
```

```
    Downloading file 1 of 2: ‘billboard.csv‘
    Downloading file 2 of 2: ‘audio_features.csv‘
```

```
billboard <- tuesdata$billboard
audio <- tuesdata$audio_features |>
  group_by(song) |>
  mutate(instance = seq_len(n())) |>
  ungroup()
theme_standard <- ggplot2::theme(
  panel.background = element_blank(),
  panel.border = element_rect(color = "black", fill = NA),
  panel.grid = element_blank(), panel.grid.major.x = element_line(
    color =
      "gray93"
  ),
  legend.background = element_rect(fill = "gray93"), plot.title = element_text(
    size = 15,
    family = "sans", face = "bold", vjust = 1.3
  ), plot.title.position =
    "plot",
  plot.subtitle = element_text(size = 10, family = "sans"),
  legend.title = element_text(
    size = 10, family = "sans",
    face = "bold"
  ), axis.title = element_text(
    size = 9,
    family = "sans", face = "bold"
  ), axis.text = element_text(
    size = 8,
    family = "sans"
  ), strip.background = element_rect(
    color = "black",
    fill = "black"
  ), strip.text.x = element_text(color = "white"),
  strip.text.y = element_text(color = "white")
)
```

Preliminary EDA

Total weeks on any position on the chart

```
ggplot2::theme_set(theme_standard)
billboard |>
  count(song, instance, sort = TRUE) |>
  slice_head(n = 10)
```

song	instance	n
Stay	1	208
Hold On	1	200
Angel	1	196
I Like It	1	188
Crazy	1	175
You	1	172
Heaven	1	168
Forever	1	164
Please Don't Go	1	152
Without You	1	152

```
billboard |>
  group_by(song, instance) |>
  summarize(weighted = sum(101 - week_position)) |>
  ungroup() |>
  arrange(desc(weighted)) |>
  slice_head(n = 10)
```

song	instance	weighted
Stay	1	13382
I Like It	1	12373
Angel	1	12026
Crazy	1	10118
Hold On	1	10062
Heaven	1	9979
Someday	1	9444
Without You	1	9251
Forever	1	9206
Closer	1	8466

What is it with "Stay"? Showing my age here. Remarkable it (well) stayed on the charts that long.

```
billboard |>
  filter(song == "Stay") |>
  nrow()
```

```
[1] 208
```

Not suprisingly, Christmas songs come back again…and again..and again.

```
billboard |>
  group_by(song) |>
  summarize(duplicates = n_distinct(instance)) |>
  arrange(-duplicates) |>
  head(n = 10)
```

song	duplicates
All I Want For Christmas Is You	10
Rockin' Around The Christmas Tree	10
Jingle Bell Rock	9
The Christmas Song (Merry Christmas To You)	9
White Christmas	8
Goosebumps	7
Thriller	7
B.S.	6
El Amante	6
Heartless	6

Who spent the longest on the chart?

```
billboard |>
  group_by(performer) |>
  filter(week_position >= 10) |>
  summarize(top_10_weeks = n()) |>
  arrange(-top_10_weeks) |>
  head(n = 10)
```

performer	top_10_weeks
Taylor Swift	890
Kenny Chesney	758
Elton John	752
Tim McGraw	731
Keith Urban	673
Madonna	657
Drake	624
Rascal Flatts	601
Rod Stewart	581
Brad Paisley	559

How about weeks *per song* in the top 10?

```
billboard |>
  filter(week_position > -10) |>
  group_by(performer) |>
  count(song) |>
  summarize(weeks_top_10 = sum(n)) |>
  arrange(-weeks_top_10) |>
  head(n = 10)
```

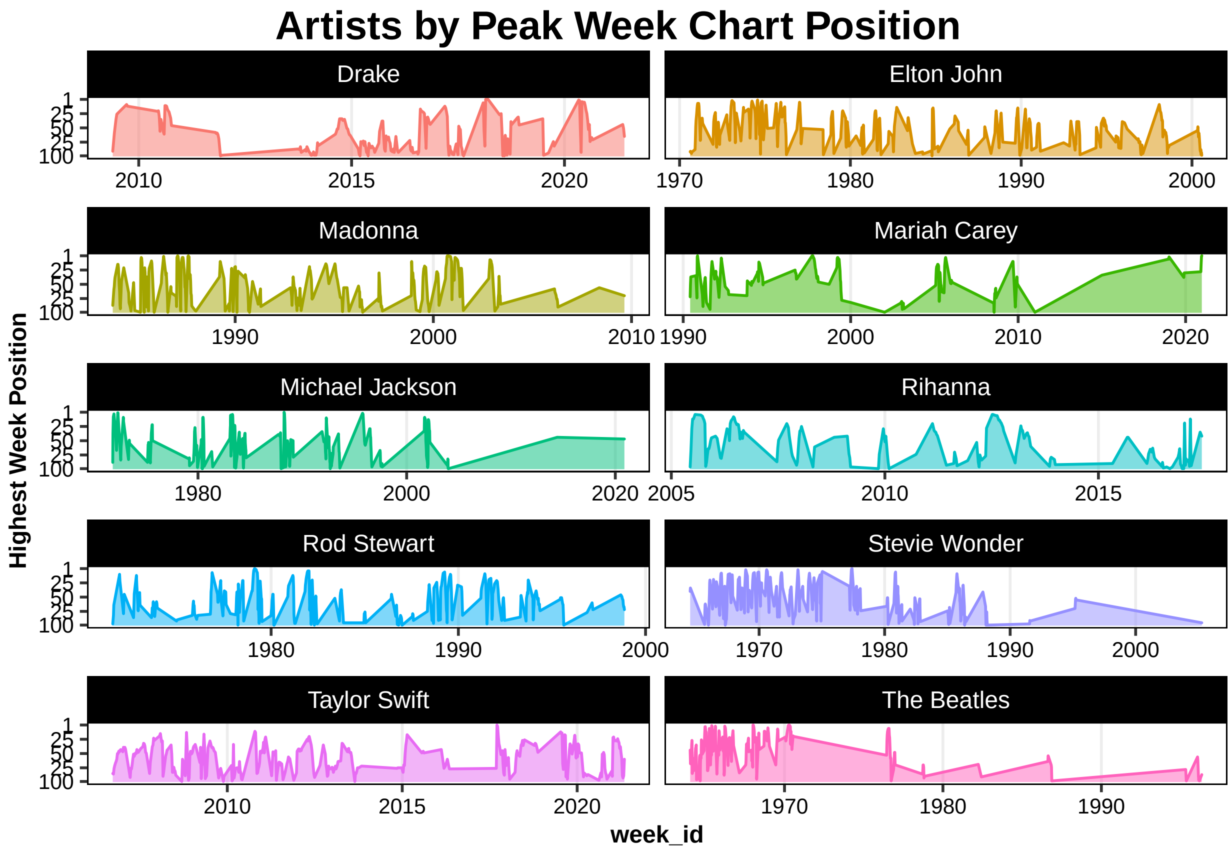
performer	weeks_top_10
Taylor Swift	1022
Elton John	889
Madonna	857
Kenny Chesney	758
Drake	746
Tim McGraw	731
Keith Urban	673
Stevie Wonder	659
Rod Stewart	657
Mariah Carey	621

Plotting

```r
top_artists <- billboard |>
  group_by(performer) |>
  summarize(weighted = sum(101 - week_position)) |>
  arrange(-weighted) |>
  slice_head(n = 10)
```

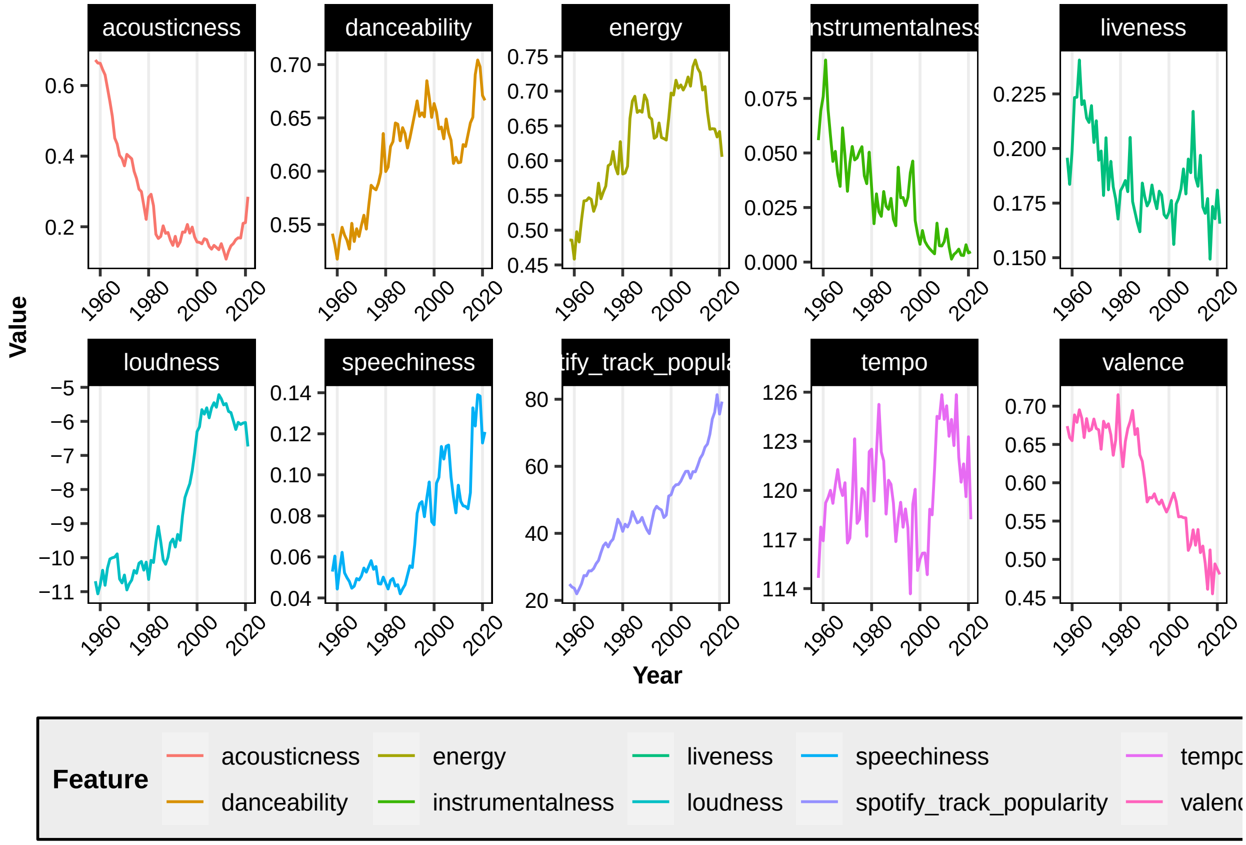
Artists by peak week song position.

```r
billboard |>
  semi_join(top_artists) |>
  group_by(week_id) |>
  slice_max(week_position, n = 1) |>
  ungroup() |>
  mutate(week_id = lubridate::mdy(week_id)) |>
  ggplot(aes(x = week_id, y = 101 - week_position, color = performer, fill = performer)) +
  geom_area(alpha = .5) +
  scale_y_continuous(breaks = c(100, 75, 50, 25, 1), labels = c(1, 25, 50, 25, 100)) +
  facet_wrap(~performer, ncol = 2, scales = "free_x") +
  labs(title = "Artists by Peak Week Chart Position", y = "Highest Week Position") +
  theme(legend.position = "none")
```



How do audio features vary across hits over time?

```
combined <- inner_join(billboard, audio, on = c("song", "performer"))
combined |>
  mutate(Year = lubridate::year(lubridate::mdy(week_id))) |>
  select(-c(mode, key, time_signature)) |>
  group_by(Year) |>
  summarize(across(danceability:last_col(), mean, na.rm = TRUE)) |>
  pivot_longer(danceability:last_col(), names_to = "Feature", values_to = "Value") |>
  ggplot(aes(x = Year, y = Value, color = Feature)) +
  geom_line() +
  facet_wrap(~Feature, nrow = 2, scales = "free") +
  theme(legend.position = "bottom", axis.text.x = element_text(angle = 45))
```

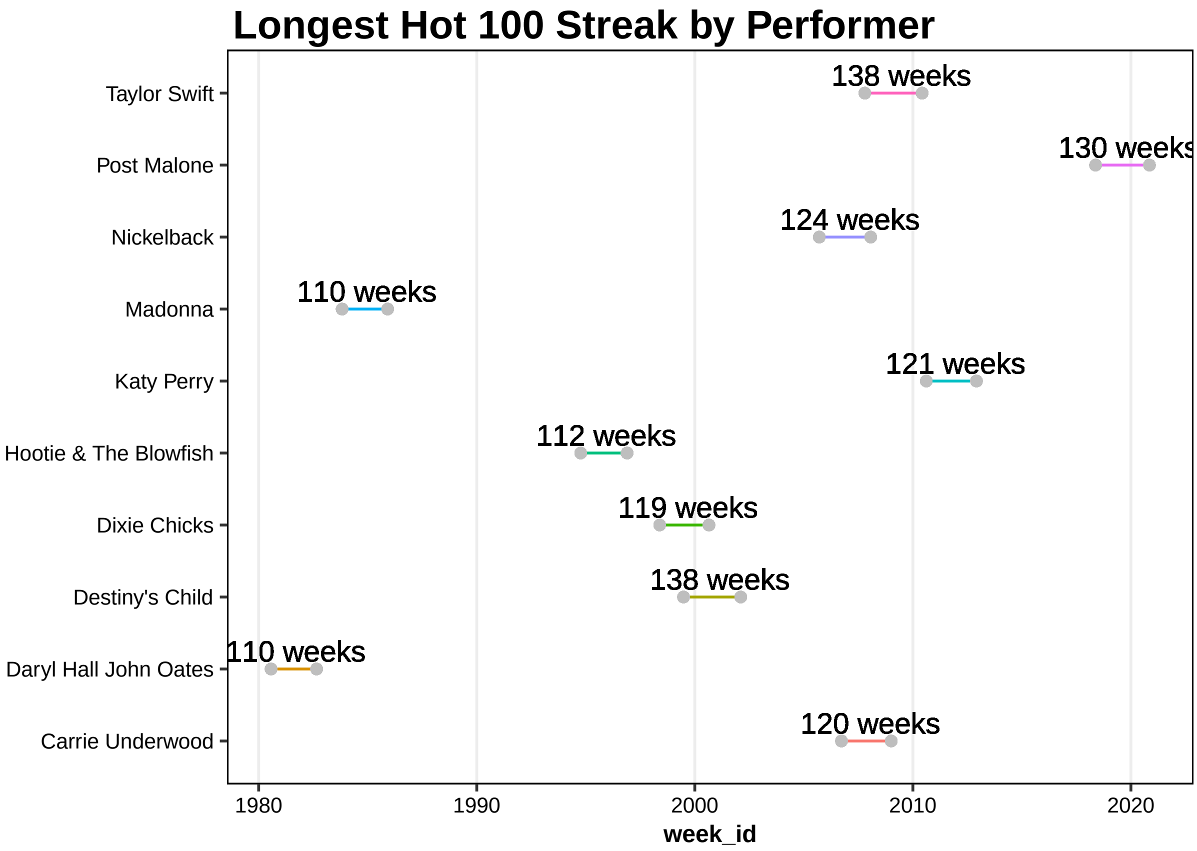


Who had the longest streaks of at least one song on the Hot 100?

```r
longest_streak <- function(subscript, which = c("first", "last", "all")) {
  if (length(unique(subscript)) == 1L) {
    return(subscript)
  }
  comparator <- match.arg(which)
  comparator <- switch(comparator,
    "first" = min,
    "last" = max,
    "all" = c
  )
  unlist(with(rle(subscript), mapply(rep, values & seq_along(lengths) %in% comparator(which(lengths ==
}

streaks <- billboard |>
  group_by(performer) |>
  filter(n() > 1) |>
  mutate(week_id = lubridate::mdy(week_id)) |>
  distinct(week_id, .keep_all = TRUE) |>
  arrange(week_id) |>
  mutate(
    streak = (week_id - 7) == lag(week_id, default = min(week_id) - 7),
    longest_streak = longest_streak(streak)
  ) |>
  filter(any(longest_streak)) |>
  mutate(
    start = week_id[min(which(longest_streak))],
    end = week_id[max(which(longest_streak))], max_streak = sum(longest_streak)
  ) |>
  filter(longest_streak) |>
  ungroup() |>
  filter(performer %in% names(sort(table(performer), decreasing = TRUE)[1:10])) |>
  mutate(y = as.integer(as.factor(performer)))

streaks |>
  ggplot(aes(x = week_id, y = performer, color = performer)) +
  geom_line() +
  geom_point(aes(x = start, y = y), col = "grey") +
  geom_point(aes(x = end, y = y), col = "grey") +
  geom_text(aes(label = paste(max_streak, "weeks"), x = end - 350, y = y + .25), color = "black") +
  labs(y = "", title = "Longest Hot 100 Streak by Performer") +
  theme(legend.position = "none")
```


Longest Hot 100 Streak by Performer
Taylor Swift
Post Malone
Nickelback
Madonna
Katy Perry
Hootie & The Blowfish
Dixie Chicks
Destiny's Child
Daryl Hall John Oates
Carrie Underwood
138 weeks
130 weeks
124 weeks
110 weeks
121 weeks
112 weeks
119 weeks
138 weeks
110 weeks
120 weeks
week_id