VISUALIZING BIG DATA WITH TRELLISCOPE

Case Study: Montreal BIXI Bike Data

Ryan Hafen
Author, TrelliscopeJS

BIXI Bikeshare Data

```
# A tibble: 1,000,000 x 12
   start_date          start_station_c… end_date            end_station_code
   <dttm>                         <int> <dttm>                         <int>
 1 2017-09-18 13:35:00             6906 2017-09-18 13:40:00             6913
 2 2017-08-21 14:31:00             6316 2017-08-21 14:34:00             6316
 3 2017-06-14 16:05:00             6381 2017-06-14 16:20:00             6380
 4 2017-08-26 20:25:00             7067 2017-08-26 20:36:00             7071
 5 2017-10-04 13:29:00             6502 2017-10-04 13:38:00             6359
 6 2017-09-11 06:49:00             6161 2017-09-11 07:03:00             6008
 7 2017-07-24 16:46:00             6406 2017-07-24 16:53:00             7052
 8 2017-10-10 14:15:00             6174 2017-10-10 14:24:00             6078
 9 2017-08-12 15:51:00             6249 2017-08-12 15:56:00             6329
10 2017-06-02 07:37:00             6363 2017-06-02 08:06:00             6043
# ... with 999,990 more rows, and 8 more variables: duration_sec <int>,
#   start_day <date>, start_dow <fct>, weekday <fct>, start_hod <dbl>,
#   start_mon <dbl>, start_wk <dbl>, membership <fct>
```

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Let's Dive In!

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Summary Visualization Recap

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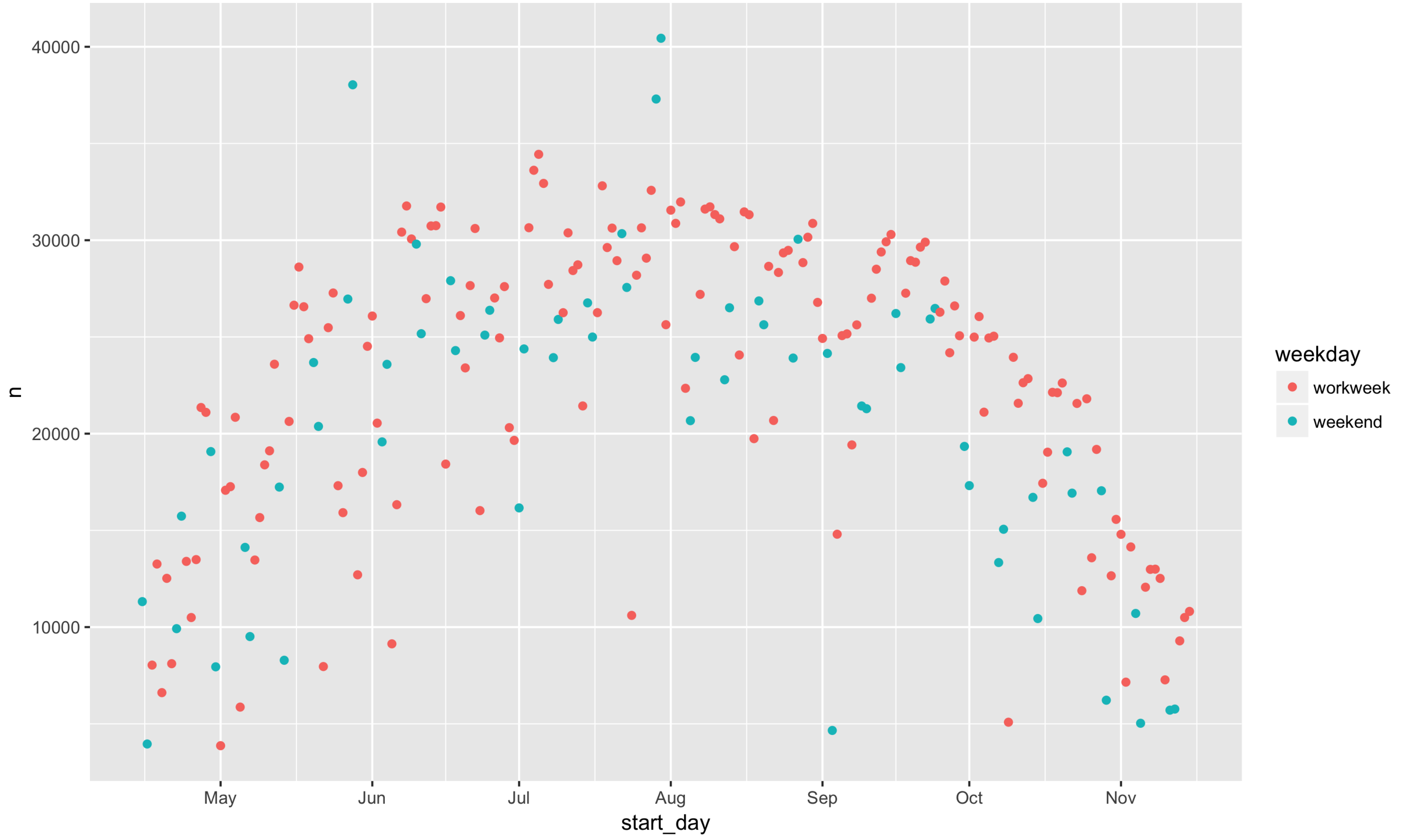
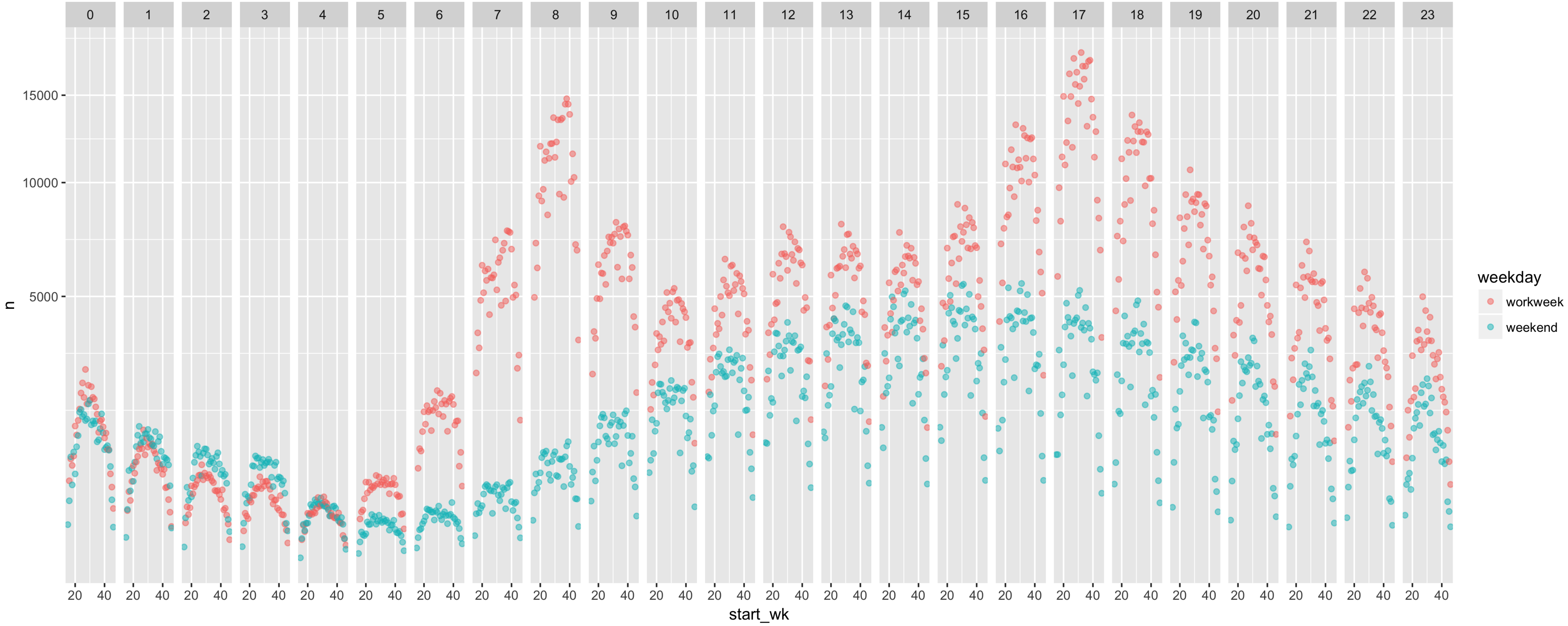
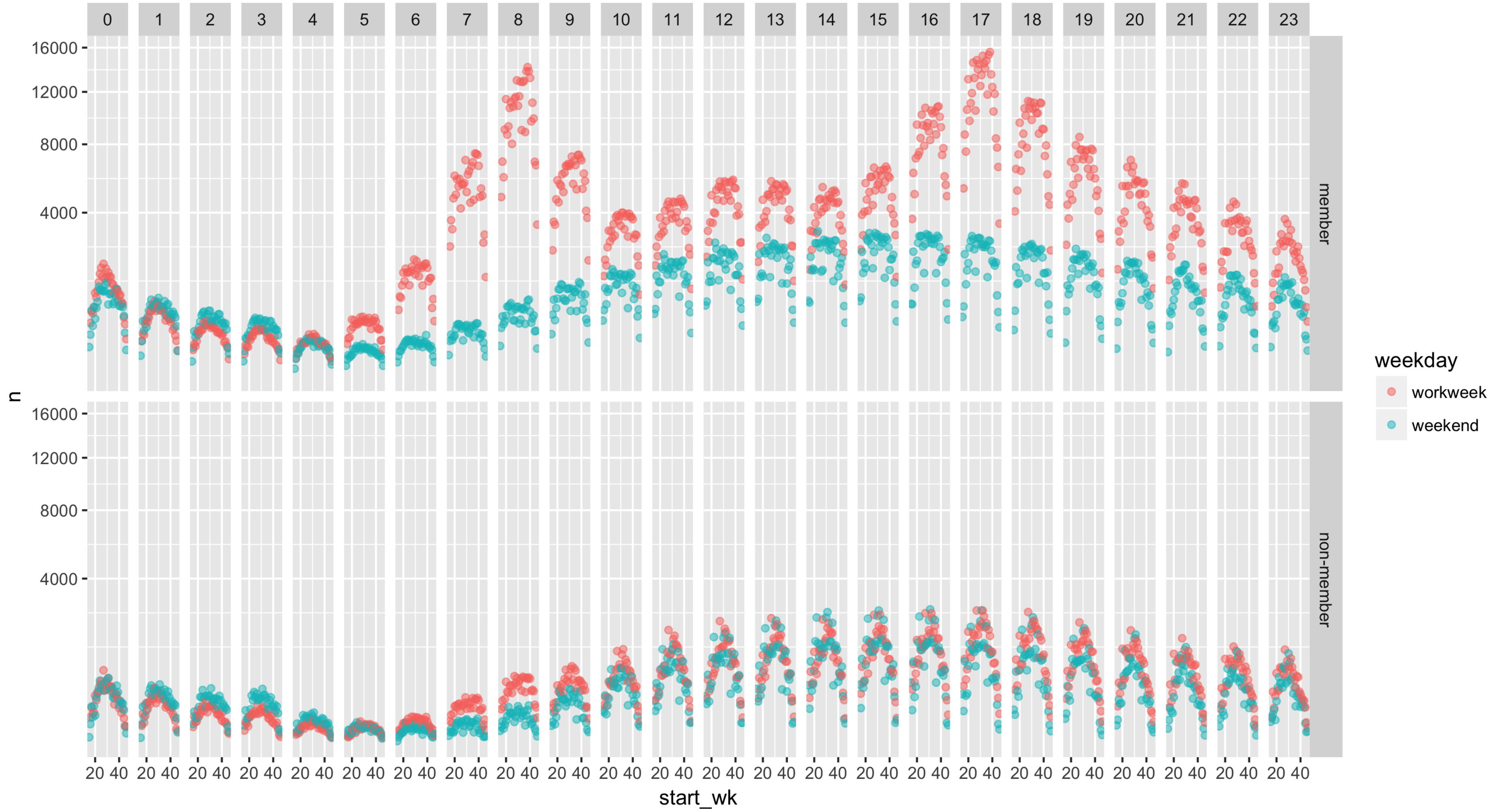
Daily Rides


40000
30000
20000
10000
n
May
Jun
Jul
Aug
Sep
Oct
Nov
start_day
weekday
● workweek
● weekend

Hourly Rides Over Time



Hourly Rides Over Time + Membership



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Diving Deeper

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Top 100 Routes Dataset

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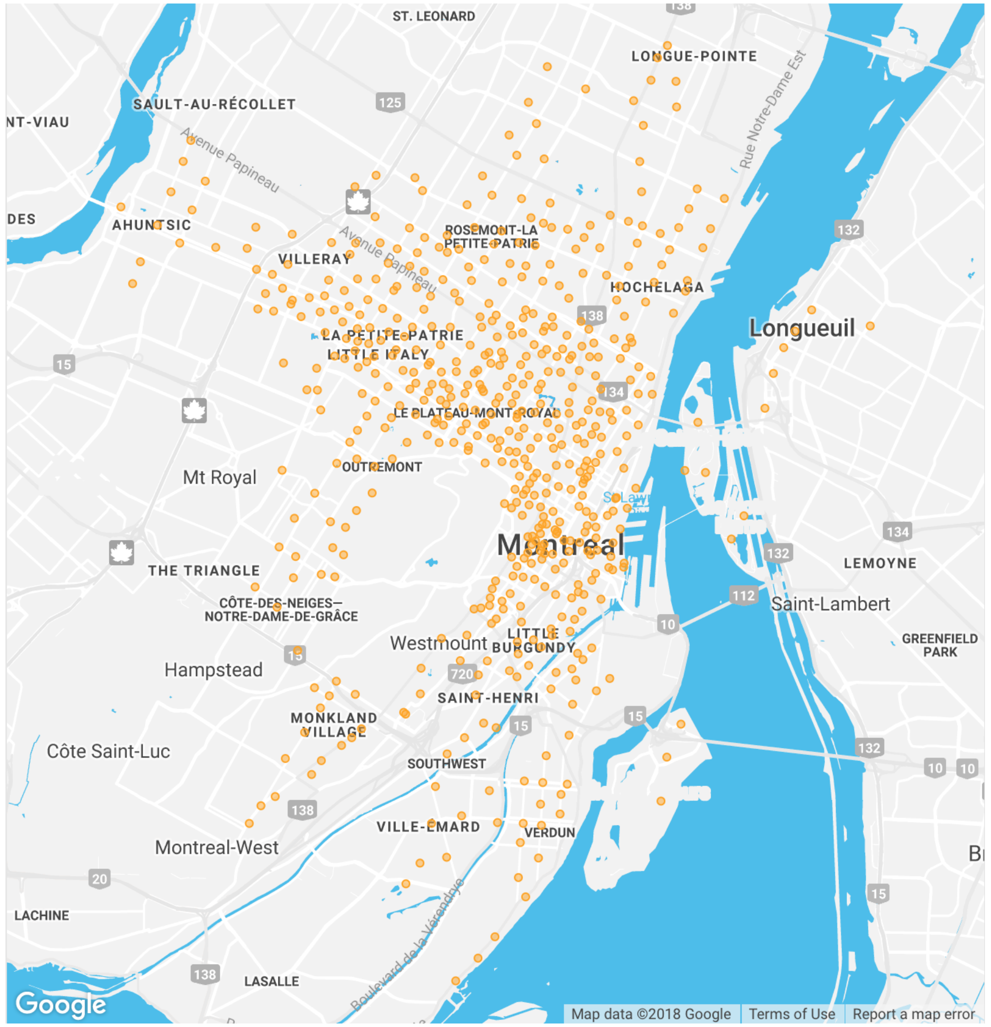
Studying Routes



Route Frequency

```
route_tab <- bike %>%
  filter(start_station_code != end_station_code) %>%
  group_by(start_station_code, end_station_code) %>%
  summarise(n = n()) %>%
  arrange(-n)
```

```
# A tibble: 193,632 x 3
# Groups:   start_station_code [546]
   start_station_code end_station_code     n
                <int>            <int> <int>
 1               6050             6406  2428
 2               6406             6052  2364
 3               6136             6163  2352
 4               6052             6026  2001
 5               6052             6406  1983
 6              10002             7052  1955
 7               6426             6706  1909
 8               6036             6406  1876
 9               6706             6426  1816
10               6078             6100  1810
# ... with 193,622 more rows
```

Data For the Top 100 Routes

```
top_routes <- paste(
  route_tab$start_station_code[1:100],
  route_tab$end_station_code[1:100])

top100 <- bike %>%
  filter(paste(start_station_code, end_station_code) %in% top_routes)
```

```
# A tibble: 133,786 x 12
   start_date          start_station_code end_date            end_station_code
   <dttm>                           <int> <dttm>                         <int>
 1 2017-04-15 00:10:00               6386 2017-04-15 00:13:00             6393
 2 2017-04-15 00:20:00               6221 2017-04-15 00:24:00             6184
 3 2017-04-15 00:42:00               6206 2017-04-15 00:45:00             6411
 4 2017-04-15 00:48:00               6350 2017-04-15 00:50:00            10002
 5 2017-04-15 02:09:00               6070 2017-04-15 02:12:00             6205
 6 2017-04-15 02:07:00               6221 2017-04-15 02:11:00             6184
 7 2017-04-15 02:28:00               6078 2017-04-15 02:37:00             6064
 8 2017-04-15 06:12:00               6136 2017-04-15 06:15:00             7026
 9 2017-04-15 06:35:00               6706 2017-04-15 06:40:00             6426
10 2017-04-15 07:02:00               6394 2017-04-15 07:04:00             6387
# ... with 133,776 more rows, and 8 more variables: duration_sec <int>,
#   start_day <date>, start_dow <fct>, weekday <fct>, start_hod <dbl>,
#   start_mon <dbl>, start_wk <dbl>, membership <fct>
```

Getting Ready for Visualization

```
route_hod <- top100 %>%
  group_by(start_station_code, end_station_code, start_hod, weekday) %>%
  summarise(n = n())

# join station metadata
route_hod <- route_hod %>%
  left_join(start_stations) %>%
  left_join(end_stations)
```

```
# A tibble: 4,114 x 11
# Groups:   start_station_code, end_station_code, start_hod [?]
   start_station_co… end_station_code start_hod weekday     n start_station_na…
               <int>            <int>     <dbl> <fct>   <int> <chr>
 1              6012             6015      0    workwe…    12 Métro St-Laurent…
 2              6012             6015      0    weekend    13 Métro St-Laurent…
 3              6012             6015      1.00 workwe…    11 Métro St-Laurent…
 4              6012             6015      1.00 weekend     2 Métro St-Laurent…
 5              6012             6015      2.00 workwe…     2 Métro St-Laurent…
 6              6012             6015      2.00 weekend     6 Métro St-Laurent…
 7              6012             6015      3.00 workwe…     3 Métro St-Laurent…
 8              6012             6015      3.00 weekend     3 Métro St-Laurent…
 9              6012             6015      4.00 weekend     1 Métro St-Laurent…
10              6012             6015      5.00 weekend     1 Métro St-Laurent…
# ... with 4,104 more rows, and 5 more variables: start_lat <dbl>,
#   start_lon <dbl>, end_station_name <chr>, end_lat <dbl>, end_lon <dbl>
```

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Let's visualize!

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Au revoir

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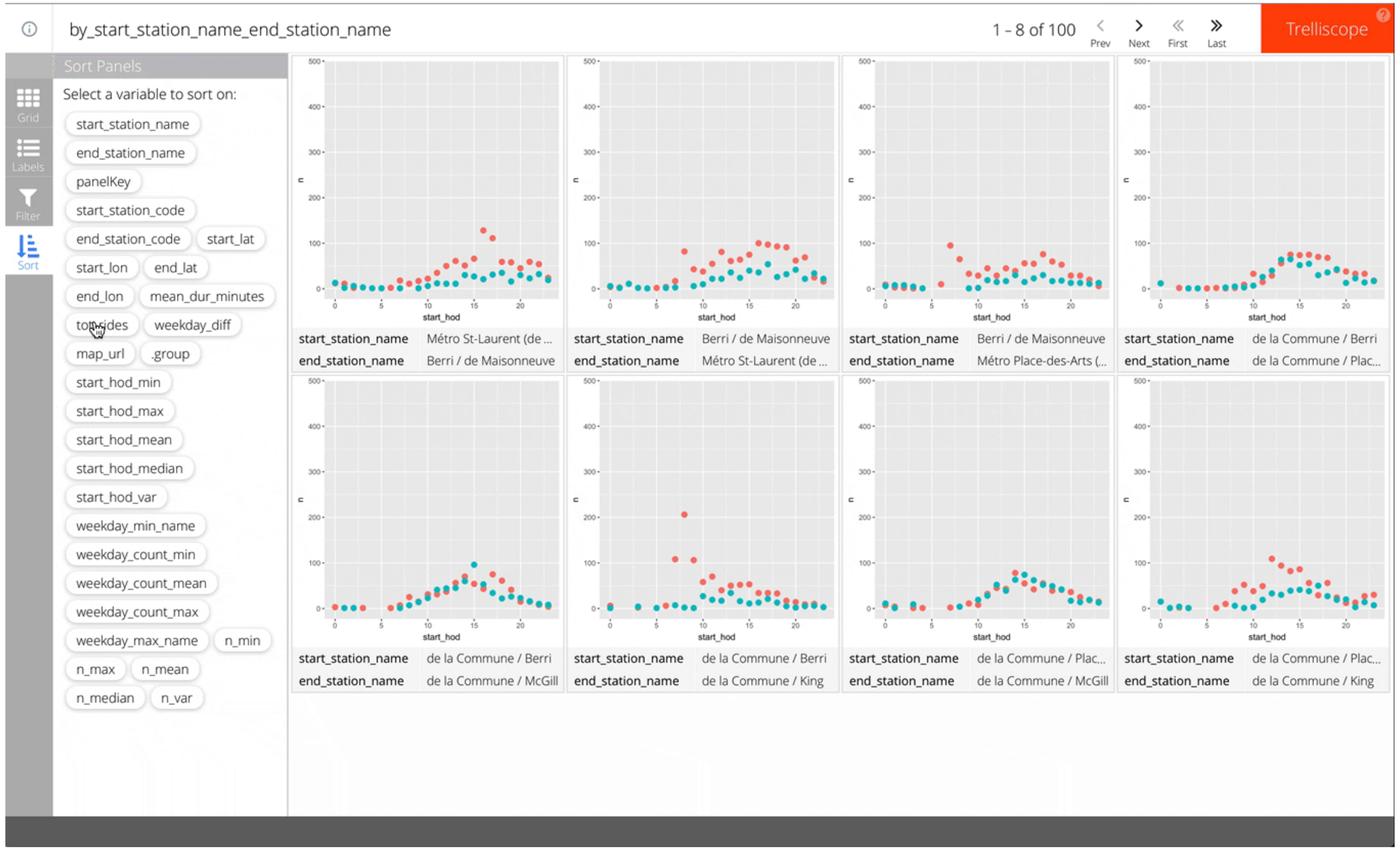
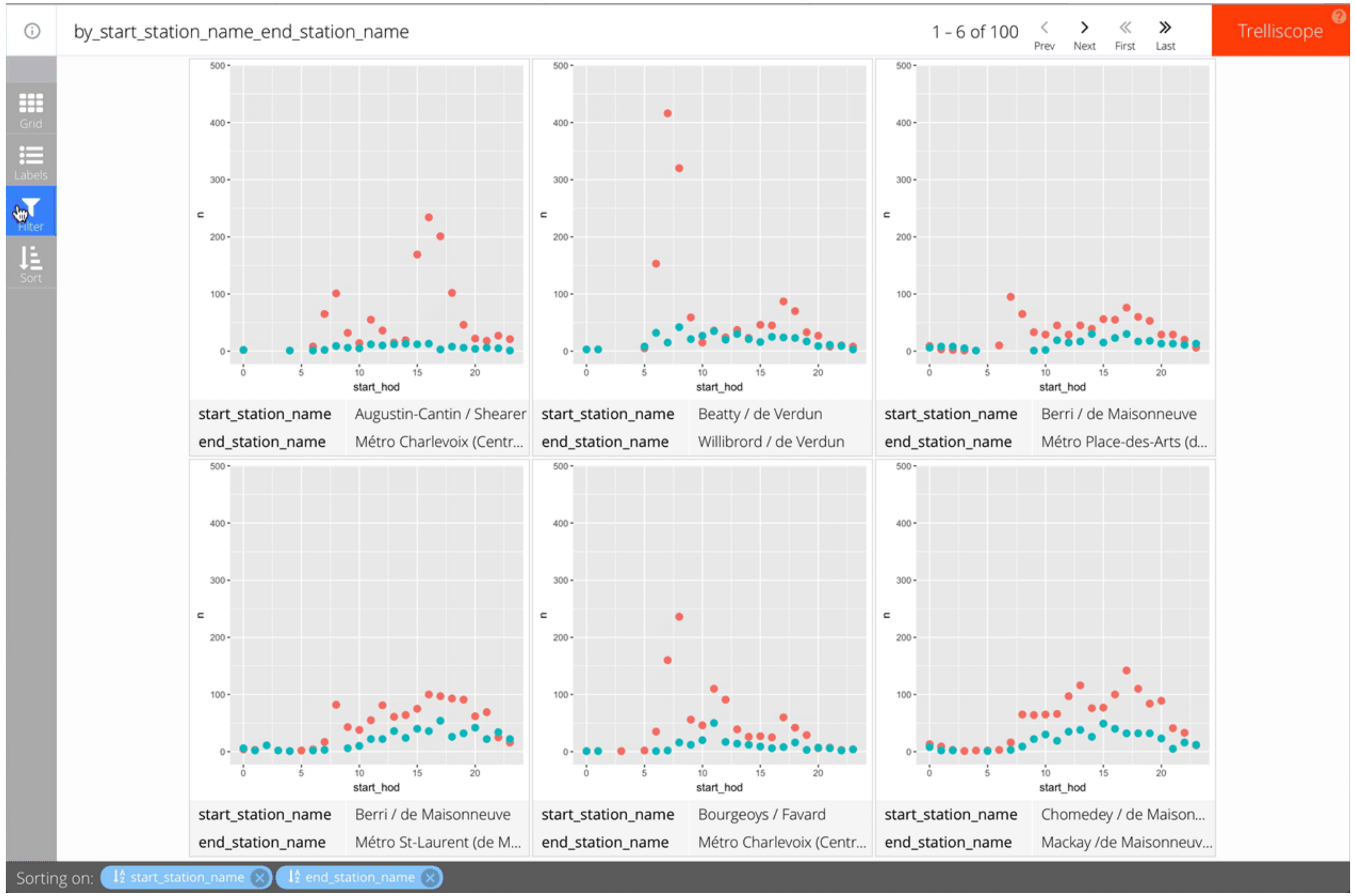
The Most Popular Route



Select a variable to sort on:

start_station_name	Métro St-Laurent (de ...
end_station_name	Berri / de Maisonneuve
start_station_name	Berri / de Maisonneuve
end_station_name	Métro St-Laurent (de ...
start_station_name	Berri / de Maisonneuve
end_station_name	Métro Place-des-Arts (...
start_station_name	de la Commune / Berri
end_station_name	de la Commune / Plac...
start_station_name	de la Commune / Berri
end_station_name	de la Commune / McGill
start_station_name	de la Commune / Berri
end_station_name	de la Commune / King
start_station_name	de la Commune / Plac...
end_station_name	de la Commune / McGill
start_station_name	de la Commune / Plac...
end_station_name	de la Commune / King

Prominent Stations



by_start_station_name_end_station_name

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start_station_name Augustin-Cantin / Shearer
end_station_name Métro Charlevoix (Centr...

start_station_name Beatty / de Verdun
end_station_name Willibrord / de Verdun

start_station_name Berri / de Maisonneuve
end_station_name Métro Place-des-Arts (d...

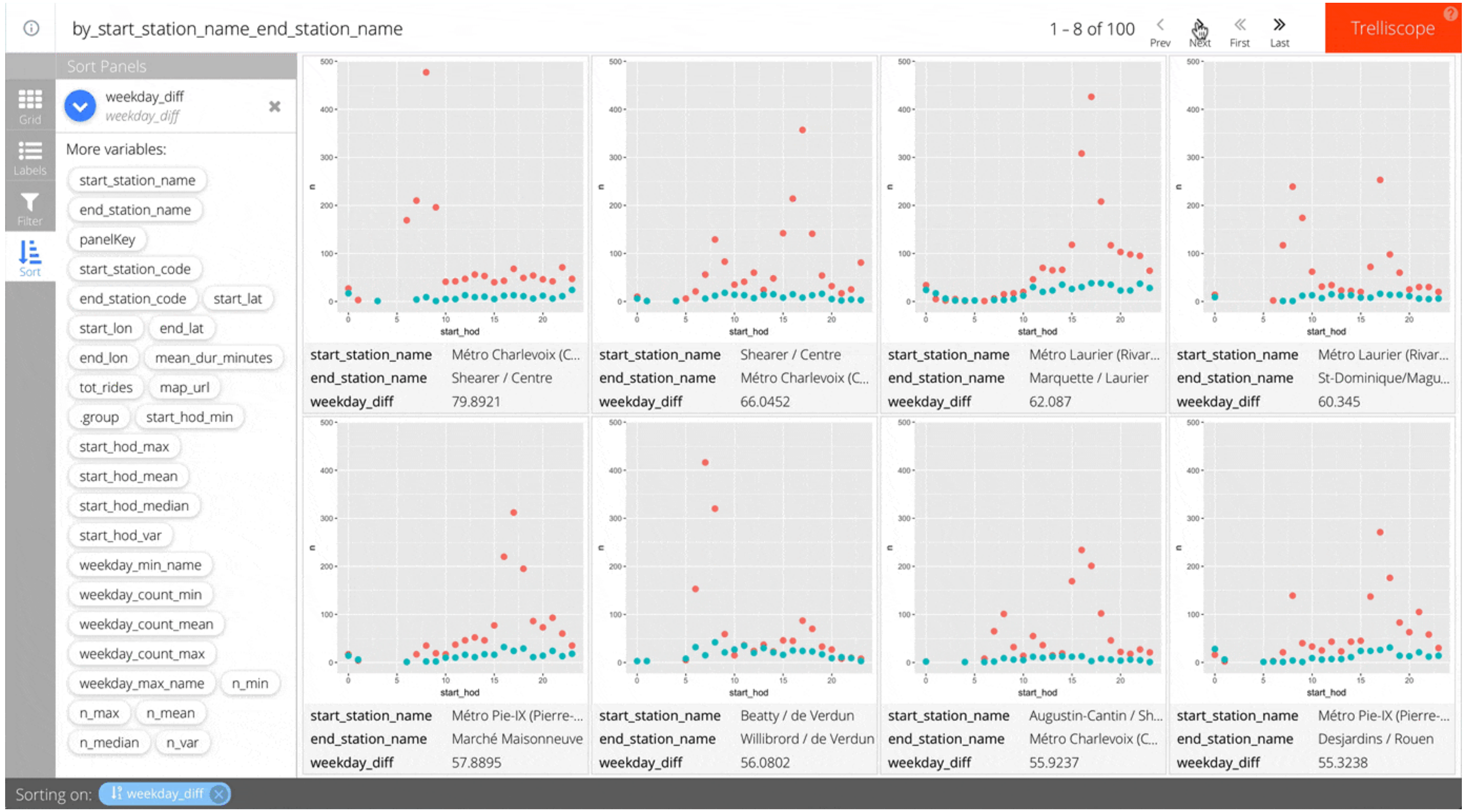
start_station_name Berri / de Maisonneuve
end_station_name Métro St-Laurent (de M...

start_station_name Bourgeoys / Favard
end_station_name Métro Charlevoix (Centr...

start_station_name Chomedey / de Maison...
end_station_name Mackay /de Maisonneuv...

Sorting on: start_station_name end_station_name

Commuter vs. Non-Commuter



start_station_name	Métro Charlevoix (C...
end_station_name	Shearer / Centre
weekday_diff	79.8921

start_station_name	Shearer / Centre
end_station_name	Métro Charlevoix (C...
weekday_diff	66.0452

start_station_name	Métro Laurier (Rivar...
end_station_name	Marquette / Laurier
weekday_diff	62.087

start_station_name	Métro Laurier (Rivar...
end_station_name	St-Dominique/Magu...
weekday_diff	60.345

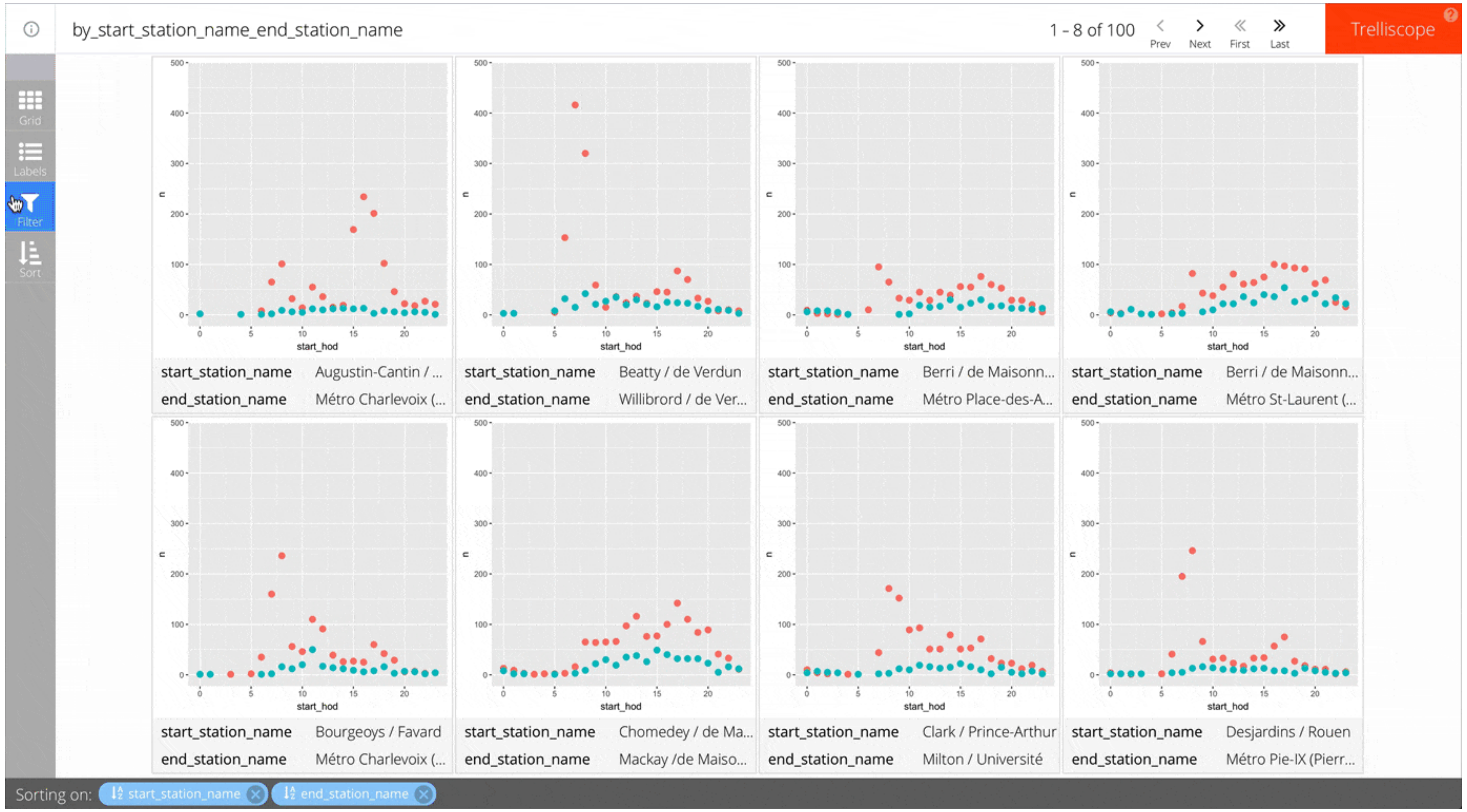
start_station_name	Métro Pie-IX (Pierre-...
end_station_name	Marché Maisonneuve
weekday_diff	57.8895

start_station_name	Beatty / de Verdun
end_station_name	Willibrord / de Verdun
weekday_diff	56.0802

start_station_name	Augustin-Cantin / Sh...
end_station_name	Métro Charlevoix (C...
weekday_diff	55.9237

start_station_name	Métro Pie-IX (Pierre-...
end_station_name	Desjardins / Rouen
weekday_diff	55.3238

Commuter Routes are Short



by_start_station_name_end_station_name

1 - 8 of 100

start_station_name Augustin-Cantin / ...	start_station_name Beatty / de Verdun	start_station_name Berri / de Maisonn...	start_station_name Berri / de Maisonn...
end_station_name Métro Charlevoix (...	end_station_name Willibrord / de Ver...	end_station_name Métro Place-des-A...	end_station_name Métro St-Laurent (...
start_station_name Bourgeoys / Favard	start_station_name Chomedey / de Ma...	start_station_name Clark / Prince-Arthur	start_station_name Desjardins / Rouen
end_station_name Métro Charlevoix (...	end_station_name Mackay /de Maiso...	end_station_name Milton / Université	end_station_name Métro Pie-IX (Pierr...

Sorting on: start_station_name end_station_name

More Displays

Resources

- Documentation: https://hafen.github.io/trelliscopejs/
- Github: https://github.com/hafen/trelliscopejs
- Blog: http://ryanhafen.com/blog/

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Congratulations!