

BART and json data

Today we are going to take a look at the BART website and look at the visualizations presented on the website analytics.bart.gov.

We will take a look at *json* formatted data, which is a very common data format for sharing data on the internet.

Directions:

1. Create an R Project call it BART.
2. Download the devices data into your project.
3. Try the following R code to make the bar graph for the devices used to access the BART website. (It may be that the website is not updating properly, so try to select the latest date that is available.)

Load the libraries used.

```
library(pacman)
p_load(tidyverse, lubridate, jsonlite)
```

Read in the json data.

```
json_file <- "devices.json"

json_data <- fromJSON(json_file)
json_data
```

```
##           date  device visits
## 1  20200614 desktop   3373
## 2  20200614  mobile  10418
## 3  20200614  tablet    360
## 4  20200615 desktop   6384
## 5  20200615  mobile  11165
## 6  20200615  tablet    378
## 7  20200616 desktop   5144
## 8  20200616  mobile   9554
## 9  20200616  tablet    304
## 10 20200617 desktop   4625
## 11 20200617  mobile   9375
## 12 20200617  tablet    242
## 13 20200618 desktop   4755
## 14 20200618  mobile   9773
## 15 20200618  tablet    270
## 16 20200619 desktop   4404
## 17 20200619  mobile   9964
## 18 20200619  tablet    256
## 19 20200620 desktop   2277
## 20 20200620  mobile   8715
## 21 20200620  tablet    248
## 22 20200621 desktop   2347
```

##	23	20200621	mobile	8518
##	24	20200621	tablet	222
##	25	20200622	desktop	4721
##	26	20200622	mobile	8895
##	27	20200622	tablet	260
##	28	20200623	desktop	4566
##	29	20200623	mobile	8736
##	30	20200623	tablet	208
##	31	20200624	desktop	4388
##	32	20200624	mobile	8380
##	33	20200624	tablet	234
##	34	20200625	desktop	4845
##	35	20200625	mobile	8591
##	36	20200625	tablet	280
##	37	20200626	desktop	4115
##	38	20200626	mobile	8672
##	39	20200626	tablet	202
##	40	20200627	desktop	2151
##	41	20200627	mobile	7473
##	42	20200627	tablet	198
##	43	20200628	desktop	2186
##	44	20200628	mobile	7422
##	45	20200628	tablet	206
##	46	20200629	desktop	4573
##	47	20200629	mobile	8412
##	48	20200629	tablet	197
##	49	20200630	desktop	4656
##	50	20200630	mobile	8678
##	51	20200630	tablet	222
##	52	20200701	desktop	4538
##	53	20200701	mobile	8787
##	54	20200701	tablet	226
##	55	20200702	desktop	4426
##	56	20200702	mobile	8793
##	57	20200702	tablet	232
##	58	20200703	desktop	2497
##	59	20200703	mobile	7990
##	60	20200703	tablet	187
##	61	20200704	desktop	1616
##	62	20200704	mobile	7040
##	63	20200704	tablet	169
##	64	20200705	desktop	2015
##	65	20200705	mobile	6972
##	66	20200705	tablet	179
##	67	20200706	desktop	4043
##	68	20200706	mobile	8165
##	69	20200706	tablet	171
##	70	20200707	desktop	3882
##	71	20200707	mobile	8157
##	72	20200707	tablet	194
##	73	20200708	desktop	3819
##	74	20200708	mobile	8027
##	75	20200708	tablet	208
##	76	20200709	desktop	3584

## 77	20200709	mobile	7915
## 78	20200709	tablet	216
## 79	20200710	desktop	3497
## 80	20200710	mobile	8079
## 81	20200710	tablet	198
## 82	20200711	desktop	1808
## 83	20200711	mobile	6995
## 84	20200711	tablet	174
## 85	20200712	desktop	1903
## 86	20200712	mobile	7031
## 87	20200712	tablet	147
## 88	20200713	desktop	4063
## 89	20200713	mobile	8434
## 90	20200713	tablet	187
## 91	20200714	desktop	3785
## 92	20200714	mobile	7643
## 93	20200714	tablet	181
## 94	20200715	desktop	3966
## 95	20200715	mobile	8228
## 96	20200715	tablet	181
## 97	20200716	desktop	3816
## 98	20200716	mobile	7994
## 99	20200716	tablet	180
## 100	20200717	desktop	3434
## 101	20200717	mobile	7857
## 102	20200717	tablet	203
## 103	20200718	desktop	1727
## 104	20200718	mobile	6645
## 105	20200718	tablet	135
## 106	20200719	desktop	1773
## 107	20200719	mobile	6331
## 108	20200719	tablet	142
## 109	20200720	desktop	3688
## 110	20200720	mobile	7329
## 111	20200720	tablet	185
## 112	20200721	desktop	3773
## 113	20200721	mobile	7339
## 114	20200721	tablet	193
## 115	20200722	desktop	3387
## 116	20200722	mobile	7355
## 117	20200722	tablet	209
## 118	20200723	desktop	3891
## 119	20200723	mobile	7480
## 120	20200723	tablet	212
## 121	20200724	desktop	3136
## 122	20200724	mobile	7541
## 123	20200724	tablet	187
## 124	20200725	desktop	1658
## 125	20200725	mobile	6804
## 126	20200725	tablet	136
## 127	20200726	desktop	1810
## 128	20200726	mobile	6317
## 129	20200726	tablet	136
## 130	20200727	desktop	3460

##	131	20200727	mobile	7222
##	132	20200727	tablet	145
##	133	20200728	desktop	3347
##	134	20200728	mobile	7562
##	135	20200728	tablet	141
##	136	20200729	desktop	3367
##	137	20200729	mobile	7320
##	138	20200729	tablet	180
##	139	20200730	desktop	3822
##	140	20200730	mobile	8237
##	141	20200730	tablet	202
##	142	20200731	desktop	3302
##	143	20200731	mobile	8177
##	144	20200731	tablet	227
##	145	20200801	desktop	1798
##	146	20200801	mobile	7517
##	147	20200801	tablet	199
##	148	20200802	desktop	1868
##	149	20200802	mobile	6902
##	150	20200802	tablet	195
##	151	20200803	desktop	3508
##	152	20200803	mobile	7410
##	153	20200803	tablet	186
##	154	20200804	desktop	3536
##	155	20200804	mobile	7387
##	156	20200804	tablet	176
##	157	20200805	desktop	3386
##	158	20200805	mobile	7136
##	159	20200805	tablet	164
##	160	20200806	desktop	3387
##	161	20200806	mobile	7403
##	162	20200806	tablet	168
##	163	20200807	desktop	3242
##	164	20200807	mobile	7628
##	165	20200807	tablet	166
##	166	20200808	desktop	1709
##	167	20200808	mobile	6847
##	168	20200808	tablet	150
##	169	20200809	desktop	1892
##	170	20200809	mobile	6714
##	171	20200809	tablet	140
##	172	20200810	desktop	3677
##	173	20200810	mobile	7652
##	174	20200810	tablet	175
##	175	20200811	desktop	3463
##	176	20200811	mobile	7609
##	177	20200811	tablet	173
##	178	20200812	desktop	3347
##	179	20200812	mobile	7360
##	180	20200812	tablet	179
##	181	20200813	desktop	3610
##	182	20200813	mobile	7919
##	183	20200813	tablet	164
##	184	20200814	desktop	3151

##	185	20200814	mobile	8392
##	186	20200814	tablet	159
##	187	20200815	desktop	1678
##	188	20200815	mobile	6916
##	189	20200815	tablet	124
##	190	20200816	desktop	1805
##	191	20200816	mobile	6636
##	192	20200816	tablet	141
##	193	20200817	desktop	3489
##	194	20200817	mobile	7615
##	195	20200817	tablet	167
##	196	20200818	desktop	3523
##	197	20200818	mobile	7734
##	198	20200818	tablet	151
##	199	20200819	desktop	3438
##	200	20200819	mobile	7814
##	201	20200819	tablet	166
##	202	20200820	desktop	3748
##	203	20200820	mobile	8168
##	204	20200820	tablet	205
##	205	20200821	desktop	3351
##	206	20200821	mobile	8212
##	207	20200821	tablet	211
##	208	20200822	desktop	1912
##	209	20200822	mobile	7558
##	210	20200822	tablet	231
##	211	20200823	desktop	1760
##	212	20200823	mobile	6840
##	213	20200823	tablet	188
##	214	20200824	desktop	3419
##	215	20200824	mobile	7200
##	216	20200824	tablet	175
##	217	20200825	desktop	3550
##	218	20200825	mobile	7147
##	219	20200825	tablet	166
##	220	20200826	desktop	3736
##	221	20200826	mobile	7330
##	222	20200826	tablet	178
##	223	20200827	desktop	4059
##	224	20200827	mobile	7825
##	225	20200827	tablet	189
##	226	20200828	desktop	3307
##	227	20200828	mobile	7794
##	228	20200828	tablet	164
##	229	20200829	desktop	1945
##	230	20200829	mobile	7081
##	231	20200829	tablet	138
##	232	20200830	desktop	1941
##	233	20200830	mobile	6972
##	234	20200830	tablet	157
##	235	20200831	desktop	3692
##	236	20200831	mobile	7380
##	237	20200831	tablet	149
##	238	20200901	desktop	3934

```
## 239 20200901 mobile 7295
## 240 20200901 tablet 174
## 241 20200902 desktop 4146
## 242 20200902 mobile 7557
## 243 20200902 tablet 148
## 244 20200903 desktop 4489
## 245 20200903 mobile 8432
## 246 20200903 tablet 235
## 247 20200904 desktop 4084
## 248 20200904 mobile 8705
## 249 20200904 tablet 249
## 250 20200905 desktop 2488
## 251 20200905 mobile 8500
## 252 20200905 tablet 217
## 253 20200906 desktop 2028
## 254 20200906 mobile 7629
## 255 20200906 tablet 208
## 256 20200907 desktop 2666
## 257 20200907 mobile 8344
## 258 20200907 tablet 155
## 259 20200908 desktop 4235
## 260 20200908 mobile 8547
## 261 20200908 tablet 228
## 262 20200909 desktop 4936
## 263 20200909 mobile 8448
## 264 20200909 tablet 228
## 265 20200910 desktop 5218
## 266 20200910 mobile 9054
## 267 20200910 tablet 240
## 268 20200911 desktop 4324
## 269 20200911 mobile 8253
## 270 20200911 tablet 176
```

To view the .json file, click on the *devices.json* in the Files.

Fix the *date* variable so that it is a date value. Fix the *visits* column so that it is a numeric value. Note all of the columns read in a *character* variables. In general, when reading .json files, variables that are *numeric* need to have their type changed to numeric. Same for dates.

```
json_data <- json_data %>% mutate(date = as_date(date), visits = parse_number(visits))
json_data
```

```
##           date device visits
## 1 2020-06-14 desktop  3373
## 2 2020-06-14 mobile 10418
## 3 2020-06-14 tablet   360
## 4 2020-06-15 desktop  6384
## 5 2020-06-15 mobile 11165
## 6 2020-06-15 tablet   378
## 7 2020-06-16 desktop  5144
## 8 2020-06-16 mobile  9554
## 9 2020-06-16 tablet   304
## 10 2020-06-17 desktop  4625
## 11 2020-06-17 mobile  9375
## 12 2020-06-17 tablet   242
## 13 2020-06-18 desktop  4755
```

## 14	2020-06-18	mobile	9773
## 15	2020-06-18	tablet	270
## 16	2020-06-19	desktop	4404
## 17	2020-06-19	mobile	9964
## 18	2020-06-19	tablet	256
## 19	2020-06-20	desktop	2277
## 20	2020-06-20	mobile	8715
## 21	2020-06-20	tablet	248
## 22	2020-06-21	desktop	2347
## 23	2020-06-21	mobile	8518
## 24	2020-06-21	tablet	222
## 25	2020-06-22	desktop	4721
## 26	2020-06-22	mobile	8895
## 27	2020-06-22	tablet	260
## 28	2020-06-23	desktop	4566
## 29	2020-06-23	mobile	8736
## 30	2020-06-23	tablet	208
## 31	2020-06-24	desktop	4388
## 32	2020-06-24	mobile	8380
## 33	2020-06-24	tablet	234
## 34	2020-06-25	desktop	4845
## 35	2020-06-25	mobile	8591
## 36	2020-06-25	tablet	280
## 37	2020-06-26	desktop	4115
## 38	2020-06-26	mobile	8672
## 39	2020-06-26	tablet	202
## 40	2020-06-27	desktop	2151
## 41	2020-06-27	mobile	7473
## 42	2020-06-27	tablet	198
## 43	2020-06-28	desktop	2186
## 44	2020-06-28	mobile	7422
## 45	2020-06-28	tablet	206
## 46	2020-06-29	desktop	4573
## 47	2020-06-29	mobile	8412
## 48	2020-06-29	tablet	197
## 49	2020-06-30	desktop	4656
## 50	2020-06-30	mobile	8678
## 51	2020-06-30	tablet	222
## 52	2020-07-01	desktop	4538
## 53	2020-07-01	mobile	8787
## 54	2020-07-01	tablet	226
## 55	2020-07-02	desktop	4426
## 56	2020-07-02	mobile	8793
## 57	2020-07-02	tablet	232
## 58	2020-07-03	desktop	2497
## 59	2020-07-03	mobile	7990
## 60	2020-07-03	tablet	187
## 61	2020-07-04	desktop	1616
## 62	2020-07-04	mobile	7040
## 63	2020-07-04	tablet	169
## 64	2020-07-05	desktop	2015
## 65	2020-07-05	mobile	6972
## 66	2020-07-05	tablet	179
## 67	2020-07-06	desktop	4043

## 68	2020-07-06	mobile	8165
## 69	2020-07-06	tablet	171
## 70	2020-07-07	desktop	3882
## 71	2020-07-07	mobile	8157
## 72	2020-07-07	tablet	194
## 73	2020-07-08	desktop	3819
## 74	2020-07-08	mobile	8027
## 75	2020-07-08	tablet	208
## 76	2020-07-09	desktop	3584
## 77	2020-07-09	mobile	7915
## 78	2020-07-09	tablet	216
## 79	2020-07-10	desktop	3497
## 80	2020-07-10	mobile	8079
## 81	2020-07-10	tablet	198
## 82	2020-07-11	desktop	1808
## 83	2020-07-11	mobile	6995
## 84	2020-07-11	tablet	174
## 85	2020-07-12	desktop	1903
## 86	2020-07-12	mobile	7031
## 87	2020-07-12	tablet	147
## 88	2020-07-13	desktop	4063
## 89	2020-07-13	mobile	8434
## 90	2020-07-13	tablet	187
## 91	2020-07-14	desktop	3785
## 92	2020-07-14	mobile	7643
## 93	2020-07-14	tablet	181
## 94	2020-07-15	desktop	3966
## 95	2020-07-15	mobile	8228
## 96	2020-07-15	tablet	181
## 97	2020-07-16	desktop	3816
## 98	2020-07-16	mobile	7994
## 99	2020-07-16	tablet	180
## 100	2020-07-17	desktop	3434
## 101	2020-07-17	mobile	7857
## 102	2020-07-17	tablet	203
## 103	2020-07-18	desktop	1727
## 104	2020-07-18	mobile	6645
## 105	2020-07-18	tablet	135
## 106	2020-07-19	desktop	1773
## 107	2020-07-19	mobile	6331
## 108	2020-07-19	tablet	142
## 109	2020-07-20	desktop	3688
## 110	2020-07-20	mobile	7329
## 111	2020-07-20	tablet	185
## 112	2020-07-21	desktop	3773
## 113	2020-07-21	mobile	7339
## 114	2020-07-21	tablet	193
## 115	2020-07-22	desktop	3387
## 116	2020-07-22	mobile	7355
## 117	2020-07-22	tablet	209
## 118	2020-07-23	desktop	3891
## 119	2020-07-23	mobile	7480
## 120	2020-07-23	tablet	212
## 121	2020-07-24	desktop	3136

##	122	2020-07-24	mobile	7541
##	123	2020-07-24	tablet	187
##	124	2020-07-25	desktop	1658
##	125	2020-07-25	mobile	6804
##	126	2020-07-25	tablet	136
##	127	2020-07-26	desktop	1810
##	128	2020-07-26	mobile	6317
##	129	2020-07-26	tablet	136
##	130	2020-07-27	desktop	3460
##	131	2020-07-27	mobile	7222
##	132	2020-07-27	tablet	145
##	133	2020-07-28	desktop	3347
##	134	2020-07-28	mobile	7562
##	135	2020-07-28	tablet	141
##	136	2020-07-29	desktop	3367
##	137	2020-07-29	mobile	7320
##	138	2020-07-29	tablet	180
##	139	2020-07-30	desktop	3822
##	140	2020-07-30	mobile	8237
##	141	2020-07-30	tablet	202
##	142	2020-07-31	desktop	3302
##	143	2020-07-31	mobile	8177
##	144	2020-07-31	tablet	227
##	145	2020-08-01	desktop	1798
##	146	2020-08-01	mobile	7517
##	147	2020-08-01	tablet	199
##	148	2020-08-02	desktop	1868
##	149	2020-08-02	mobile	6902
##	150	2020-08-02	tablet	195
##	151	2020-08-03	desktop	3508
##	152	2020-08-03	mobile	7410
##	153	2020-08-03	tablet	186
##	154	2020-08-04	desktop	3536
##	155	2020-08-04	mobile	7387
##	156	2020-08-04	tablet	176
##	157	2020-08-05	desktop	3386
##	158	2020-08-05	mobile	7136
##	159	2020-08-05	tablet	164
##	160	2020-08-06	desktop	3387
##	161	2020-08-06	mobile	7403
##	162	2020-08-06	tablet	168
##	163	2020-08-07	desktop	3242
##	164	2020-08-07	mobile	7628
##	165	2020-08-07	tablet	166
##	166	2020-08-08	desktop	1709
##	167	2020-08-08	mobile	6847
##	168	2020-08-08	tablet	150
##	169	2020-08-09	desktop	1892
##	170	2020-08-09	mobile	6714
##	171	2020-08-09	tablet	140
##	172	2020-08-10	desktop	3677
##	173	2020-08-10	mobile	7652
##	174	2020-08-10	tablet	175
##	175	2020-08-11	desktop	3463

##	176	2020-08-11	mobile	7609
##	177	2020-08-11	tablet	173
##	178	2020-08-12	desktop	3347
##	179	2020-08-12	mobile	7360
##	180	2020-08-12	tablet	179
##	181	2020-08-13	desktop	3610
##	182	2020-08-13	mobile	7919
##	183	2020-08-13	tablet	164
##	184	2020-08-14	desktop	3151
##	185	2020-08-14	mobile	8392
##	186	2020-08-14	tablet	159
##	187	2020-08-15	desktop	1678
##	188	2020-08-15	mobile	6916
##	189	2020-08-15	tablet	124
##	190	2020-08-16	desktop	1805
##	191	2020-08-16	mobile	6636
##	192	2020-08-16	tablet	141
##	193	2020-08-17	desktop	3489
##	194	2020-08-17	mobile	7615
##	195	2020-08-17	tablet	167
##	196	2020-08-18	desktop	3523
##	197	2020-08-18	mobile	7734
##	198	2020-08-18	tablet	151
##	199	2020-08-19	desktop	3438
##	200	2020-08-19	mobile	7814
##	201	2020-08-19	tablet	166
##	202	2020-08-20	desktop	3748
##	203	2020-08-20	mobile	8168
##	204	2020-08-20	tablet	205
##	205	2020-08-21	desktop	3351
##	206	2020-08-21	mobile	8212
##	207	2020-08-21	tablet	211
##	208	2020-08-22	desktop	1912
##	209	2020-08-22	mobile	7558
##	210	2020-08-22	tablet	231
##	211	2020-08-23	desktop	1760
##	212	2020-08-23	mobile	6840
##	213	2020-08-23	tablet	188
##	214	2020-08-24	desktop	3419
##	215	2020-08-24	mobile	7200
##	216	2020-08-24	tablet	175
##	217	2020-08-25	desktop	3550
##	218	2020-08-25	mobile	7147
##	219	2020-08-25	tablet	166
##	220	2020-08-26	desktop	3736
##	221	2020-08-26	mobile	7330
##	222	2020-08-26	tablet	178
##	223	2020-08-27	desktop	4059
##	224	2020-08-27	mobile	7825
##	225	2020-08-27	tablet	189
##	226	2020-08-28	desktop	3307
##	227	2020-08-28	mobile	7794
##	228	2020-08-28	tablet	164
##	229	2020-08-29	desktop	1945

```
## 230 2020-08-29 mobile 7081
## 231 2020-08-29 tablet 138
## 232 2020-08-30 desktop 1941
## 233 2020-08-30 mobile 6972
## 234 2020-08-30 tablet 157
## 235 2020-08-31 desktop 3692
## 236 2020-08-31 mobile 7380
## 237 2020-08-31 tablet 149
## 238 2020-09-01 desktop 3934
## 239 2020-09-01 mobile 7295
## 240 2020-09-01 tablet 174
## 241 2020-09-02 desktop 4146
## 242 2020-09-02 mobile 7557
## 243 2020-09-02 tablet 148
## 244 2020-09-03 desktop 4489
## 245 2020-09-03 mobile 8432
## 246 2020-09-03 tablet 235
## 247 2020-09-04 desktop 4084
## 248 2020-09-04 mobile 8705
## 249 2020-09-04 tablet 249
## 250 2020-09-05 desktop 2488
## 251 2020-09-05 mobile 8500
## 252 2020-09-05 tablet 217
## 253 2020-09-06 desktop 2028
## 254 2020-09-06 mobile 7629
## 255 2020-09-06 tablet 208
## 256 2020-09-07 desktop 2666
## 257 2020-09-07 mobile 8344
## 258 2020-09-07 tablet 155
## 259 2020-09-08 desktop 4235
## 260 2020-09-08 mobile 8547
## 261 2020-09-08 tablet 228
## 262 2020-09-09 desktop 4936
## 263 2020-09-09 mobile 8448
## 264 2020-09-09 tablet 228
## 265 2020-09-10 desktop 5218
## 266 2020-09-10 mobile 9054
## 267 2020-09-10 tablet 240
## 268 2020-09-11 desktop 4324
## 269 2020-09-11 mobile 8253
## 270 2020-09-11 tablet 176
```

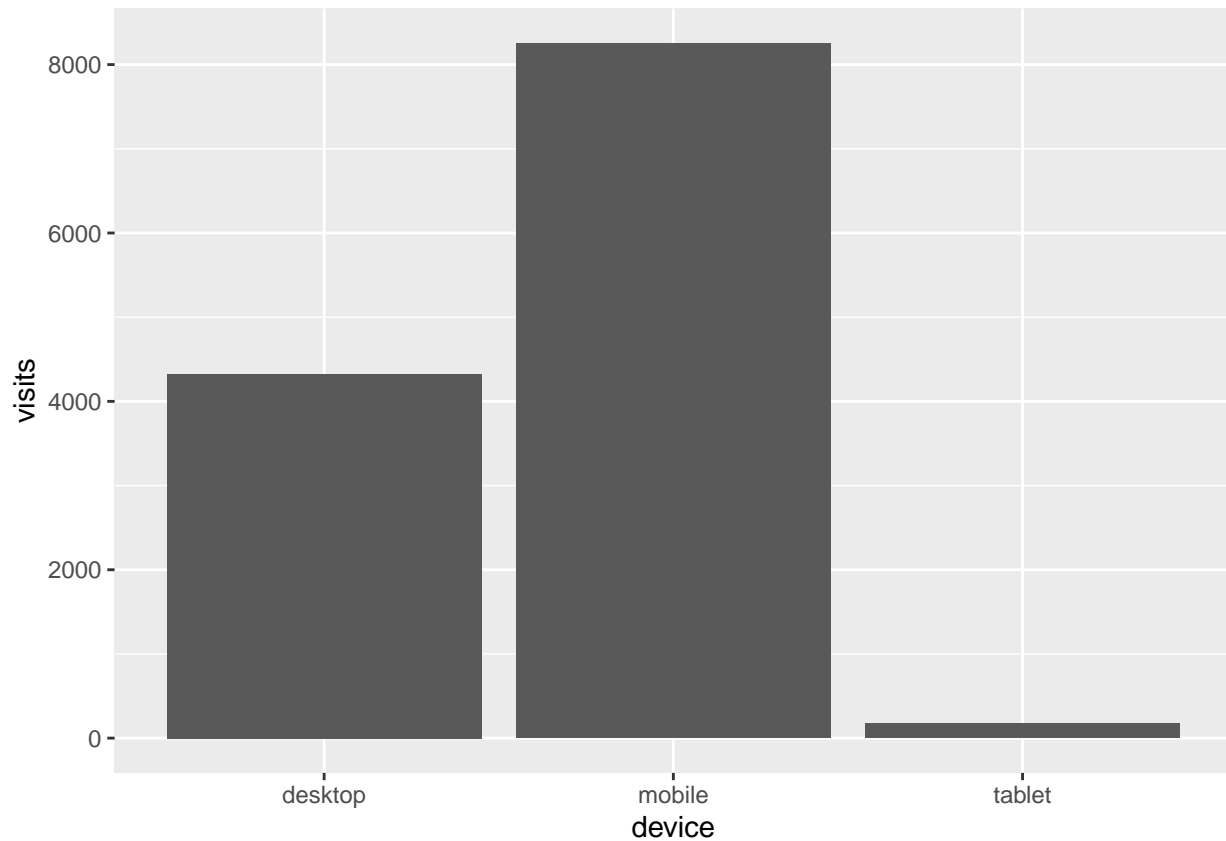
Make a table of the most recent day's data..

```
json_data %>% filter( date == "2020-09-11" ) %>%
  group_by(device)
```

```
## # A tibble: 3 x 3
## # Groups:   device [3]
##   date      device visits
##   <date>    <chr>   <dbl>
## 1 2020-09-11 desktop  4324
## 2 2020-09-11 mobile   8253
## 3 2020-09-11 tablet    176
```

Make a bar plot.

```
json_data %>% filter( date == "2020-09-11" ) %>%
  ggplot(aes(y = visits, x = device)) +
  geom_bar(stat="identity")
```



Make a bar plot using percentages.

```
json_data <- json_data %>% filter( date == "2020-09-11" ) %>%
  mutate(visits_percentage = 100*visits/sum(visits))
json_data
```

```
##      date  device visits visits_percentage
## 1 2020-09-11 desktop   4324          33.905748
## 2 2020-09-11 mobile   8253          64.714185
## 3 2020-09-11 tablet    176           1.380067
```

```
json_data %>% ggplot(aes(y = visits_percentage, x = device)) +
  geom_bar(stat="identity") +
  coord_flip()
```

