

Church Buildings in Utah vs Georgia

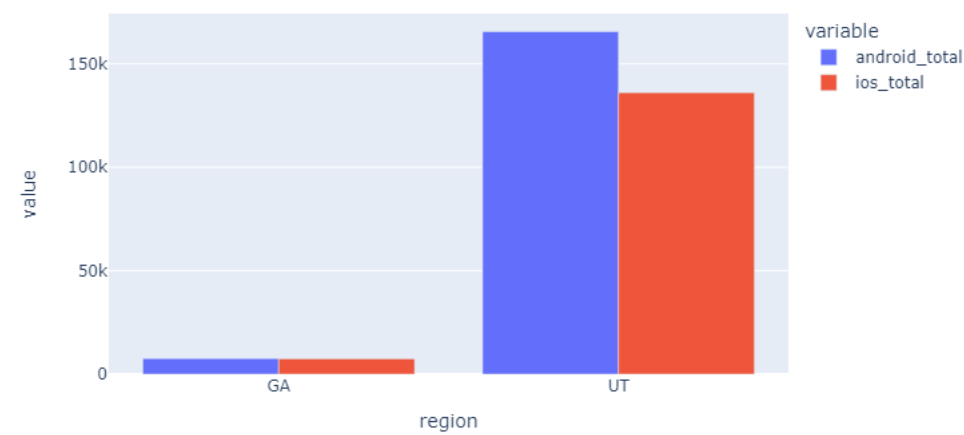
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What differences are there between iPhone and Android users when comparing visits to The Church of Jesus Christ buildings of Latter-day Saints in Utah and Georgia?

```
device = patterns\
  .select("placekey", "date_range_start", "device_type")\
  .explode("device_type")\
  .unnest("device_type")\
  .pivot(
    index=["placekey", "date_range_start"],
    values="value",
    columns="key",
    aggregate_function="first"
  )\
  .join(places,          # combine patterns with places based on placekey
        on=["placekey"],
        how="inner"
      )\
  .filter(               # only look at data for LDS church buildings
    pl.col("location_name").str.contains("[Ll]atter|lds|LDS")
  )\
  .select(               # get only columns that are relevant
    pl.col(["placekey", "date_range_start", "android", "ios", "region", "location_name"])
  )
```

	placekey	date_range_start	android	ios	region	location_name
0	zzy-223@5qc-x6f-8d9	2019-11-01T00:00:00-06:00	44	25	UT	The Church of Jesus Christ of Latter day Saints
1	zzw-222@5qd-38t-j35	2019-11-01T00:00:00-06:00	23	4	UT	The Church of Jesus Christ of Latter day Saints
2	zzy-222@5qd-38r-yjv	2019-12-01T00:00:00-07:00	24	20	UT	The Church of Jesus Christ of Latter day Saints
3	zzy-222@5qc-x45-4d9	2019-10-01T00:00:00-06:00	5	9	UT	The Church of Jesus Christ of Latter day Saints
4	zzy-222@5qc-x45-4d9	2019-10-01T00:00:00-06:00	5	9	UT	The Church of Jesus Christ of Latter day Saints

iPhone vs Android Users in LDS churches in UT and GA



The most notable difference is the fact that there are considerably more cellphone users in Utah. When totaled, Georgia's cellphone users does not even come close to the less popular brand in Utah. The second notable difference is that there are more android users than ios users who visit LDS church buildings in both Georgia and Utah, with Utah having much more android users.

Compare hourly usage patterns between The Church of Jesus Christ of Latter-day Saints and the other churches in each state.

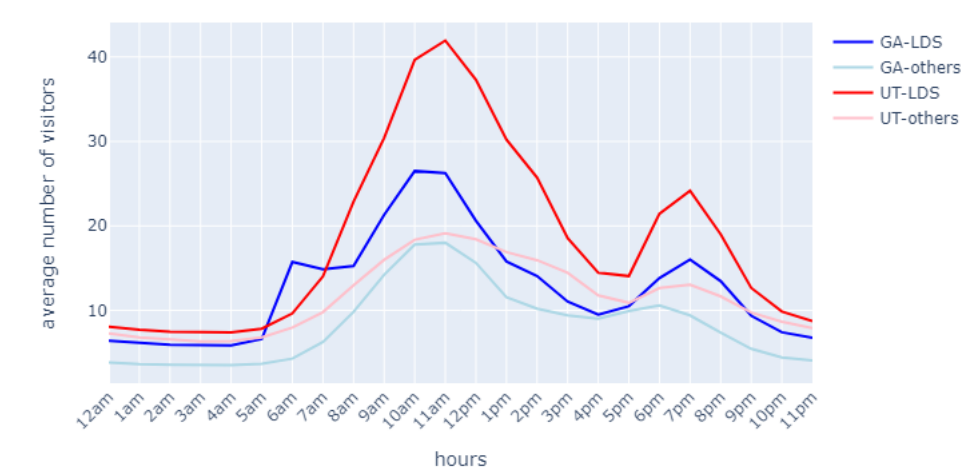
```
other_hours = patterns\
  .select("placekey", "raw_visitor_counts", "popularity_by_hour")\
  .join(places,          # combine patterns with places based on placekey
```

```
on=["placekey"],
how="inner"
)\
.filter(
  ~pl.col("location_name").str.contains("[Ll]atter|lds|LDS")
)\
.select(pl.col(cols_we_want))\
.with_columns(
  LDS_others = pl.lit("others")
)

hours = pl.concat([lds_hours,other_hours])
```

	region	LDS_others	12am_mean	1am_mean	2am_mean	3am_mean	4am_mean	5am_mean	6am_mean	7am_mean	8am_mean	9am_r
0	UT	LDS	8.07035	7.71674	7.49906	7.43757	7.40504	7.83614	9.64521	14.0254	22.8854	30.
1	GA	LDS	6.41425	6.1504	5.95251	5.88127	5.87071	6.61478	15.7335	14.8734	15.2718	21.
2	GA	others	3.84804	3.63332	3.56184	3.53409	3.52798	3.6716	4.29294	6.25614	9.83706	14.
3	UT	others	7.28873	6.79437	6.5662	6.34178	6.37958	6.81408	7.96667	9.80188	12.9833	15.

average number of church visitors per hour UT vs GA



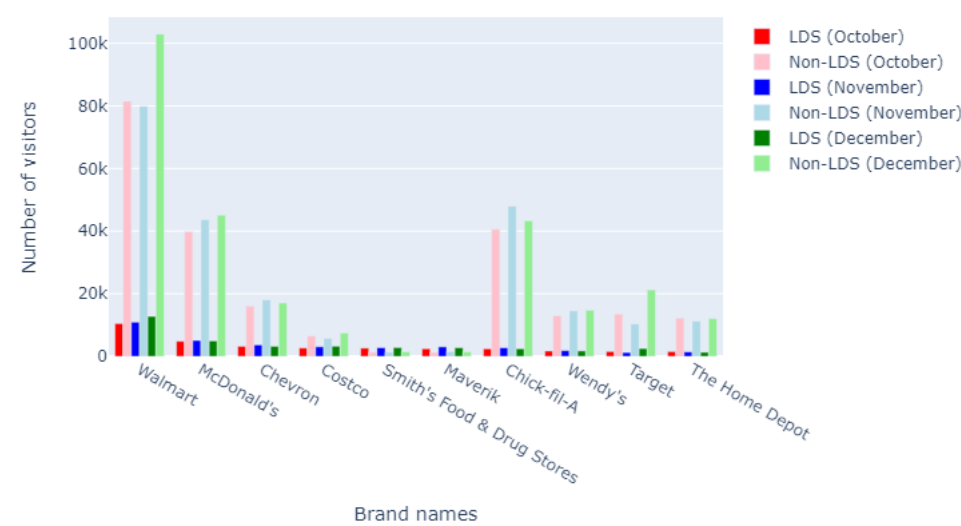
On average, there are always more visitors to an LDS church building in comparison to non LDS churches, no matter the state. There are always more visitors in Utah compared to Georgia. The average number of visitors peak at around 10am-noon, with a second, much lower peak at around 7pm. Notice how the average number of visitors are similar for all categories until peak times, when the LDS churches in Utah triumphs.

Contrast the related_same_day_brand brands between those who visit the Church of Jesus Christ of Latter-day Saints and those who visit other churches.

```
brand = patterns\
.unique(subset=["placekey", "date_range_start"])\
.select("placekey", "date_range_start", "raw_visit_counts", scol)\
.explode(scol)\
.unnest(scol)\
.rename(
  {"key": "brand", "value": "brand_percent"}
)\
.with_columns(
  brand_visit_counts = pl.col("brand_percent")/100*pl.col("raw_visit_counts")
)\
.join(
  LDS_other_places,
  on="placekey",
  how="inner"
)\
.select(
  "placekey", "date_range_start",
  "brand", "brand_visit_counts",
  "LDS_other"
)\
.unique(subset=["placekey", "date_range_start", "brand"])\
.sort("brand_visit_counts", descending=True)\
.drop_nulls()
```

	placekey	date_range_start	brand	brand_visit_counts	LDS_other
0	222-222@8gb-7gv-t9z	2019-12-01T00:00:00-05:00	Jos. A. Bank Clothiers	9784.71	other
1	222-222@8gb-7gv-t9z	2019-11-01T00:00:00-04:00	Jos. A. Bank Clothiers	7127.66	other
2	222-222@8gb-7gv-t9z	2019-10-01T00:00:00-04:00	Jos. A. Bank Clothiers	4159.2	other
3	222-222@8gb-7gv-t9z	2019-12-01T00:00:00-05:00	Walmart	2508.9	other
4	222-222@8gb-7gv-t9z	2019-12-01T00:00:00-05:00	Target	2007.12	other

2019 Top Same Day Brands (LDS vs Non-LDS)



The most obvious conclusion we can make out from the chart is that there are much more non-LDS visitors to all stores, due to the fact that all of the non-LDS church visitors were grouped into one large non-Lds group. Most of the brands visited were fast food, gas stations, or grocery stores. There does not seem to be a noticeable pattern of which month the brand is more popular in, as the amounts changed each month. The most obvious, however, is that Walmart stays the most popular, regardless of the church categories or month.