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## DS 460

## Challenge SafeGraph Church sp22

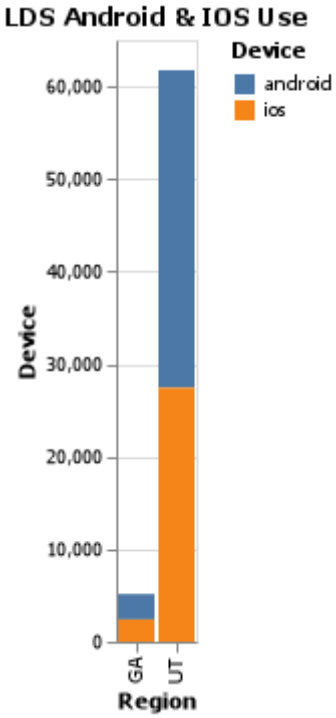
# Exploring Data Challenge

For this challenge, we will be comparing church buildings from Utah to the state of Georgia.

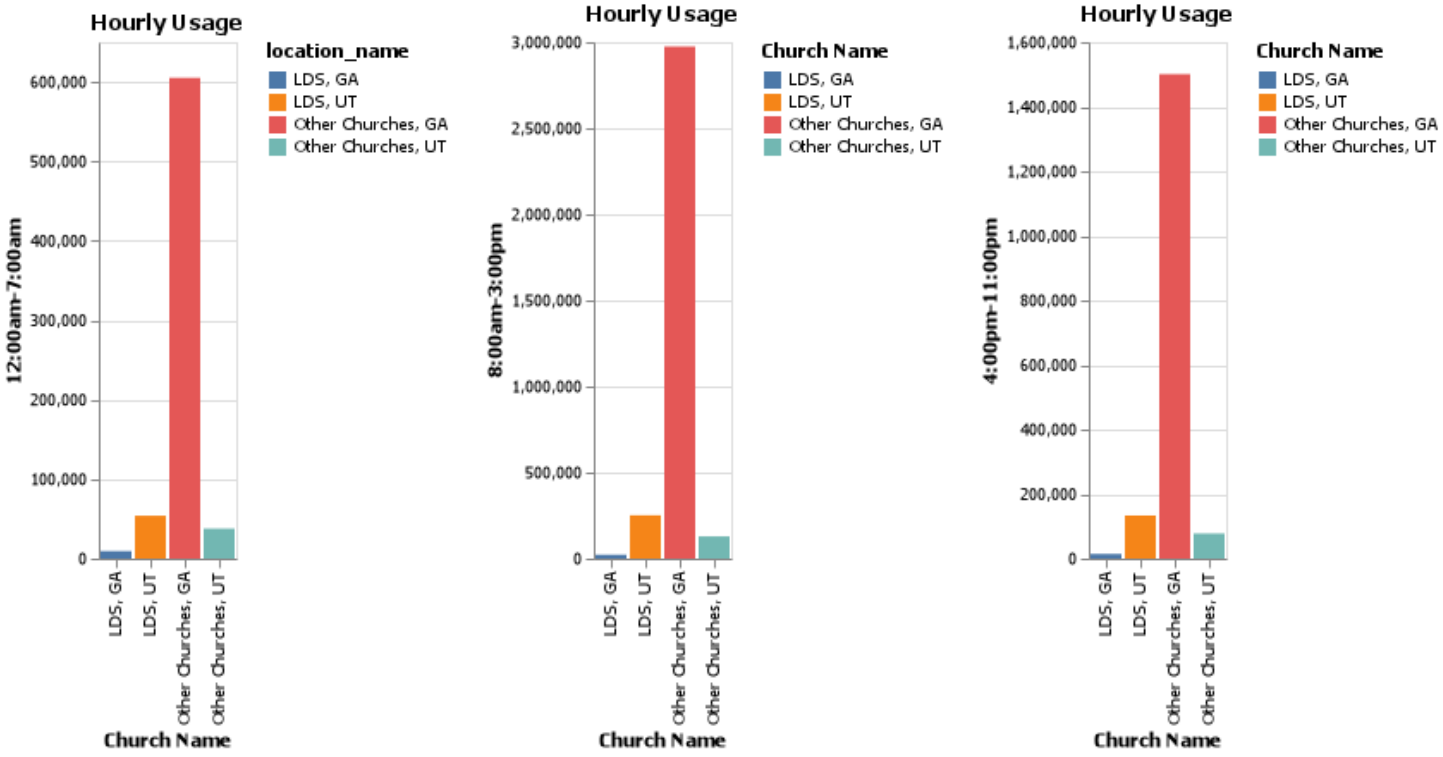
# Coding Challenge Questions

1. 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?
2. Compare hourly usage patterns between The Church of Jesus Christ of Latter-day Saints and the other churches in each state.
3. 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.
4. This is a bit of a reach. Compare `related_same_day_brand` of temples, seminary buildings, and meetinghouses of The Church of Jesus Christ of Latter-day Saints.

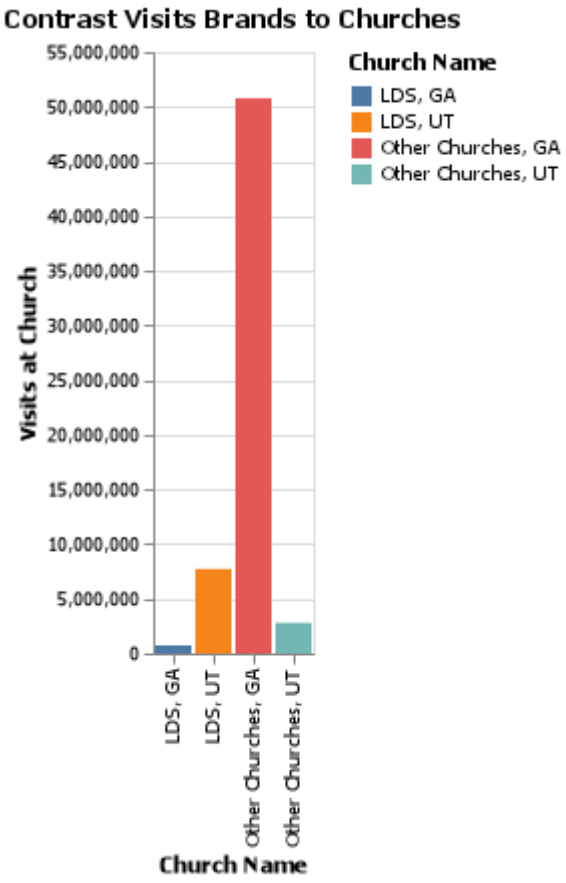
### What differences are there between iPhone and Android users when comparing visits to The Church of Jesus Christ buildings of Latter-day Saints in Utah and Georgia?

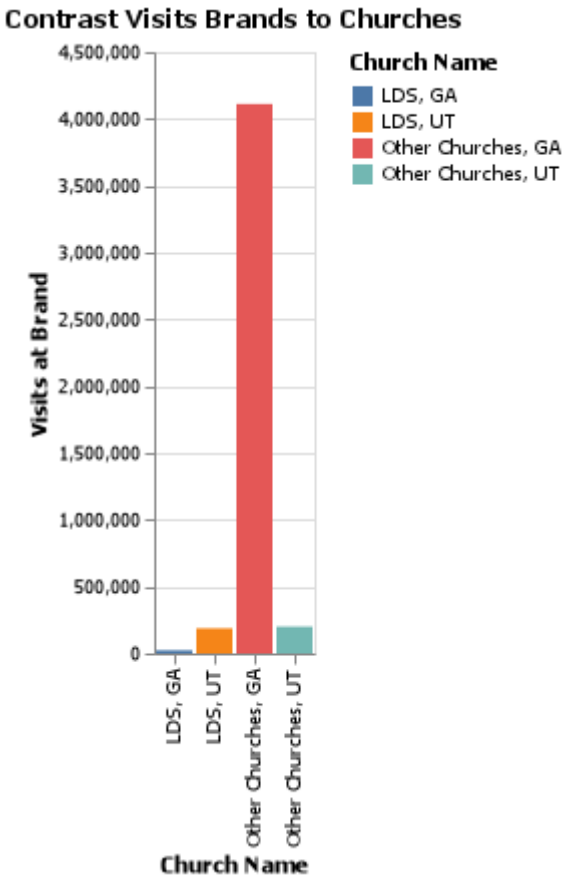



**Compare hourly usage patterns between The Church of Jesus Christ of Latter-day Saints and the other churches in each state.**




**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.**




**4. This is a bit of a reach. Compare `related_same_day_brand` of temples, seminary buildings, and meetinghouses of The Church of Jesus Christ of Latter-day Saints.**

N/A

```
import pandas as pd
import altair as alt
import numpy as np
import os

directory = os.fsencode("data\parquet")
path = "data/parquet/"
church_data = {}

for file in os.listdir(directory):
     filename = os.fsdecode(file)
     if filename.endswith(".parquet"):
         # print(os.path.join(directory, filename))
         church_data.update({filename[:-8] : filename})
         continue
     else:
         continue

for k , v in church_data.items():
    print(k+"\t\t\t", v)

# data = data.join(data_device.set_index('placekey'), on='placekey')
# data =pd.merge(data, data_device[["placekey", "startDate", "endDate", "device_type", "value",
# data = data.set_index('placekey').join(data_device.set_index('placekey'))

data_poi = pd.read_parquet(path + church_data["poi"])
data_device = pd.read_parquet(path + church_data["device_type"])
data_device["android"] = data_device["device_type"] == "android"
data_device["ios"] = data_device["device_type"] == "ios"
data__hour_usage = pd.read_parquet(path + church_data["open_hours"])
data_popularity_by_hour = pd.read_parquet(path + church_data["popularity_by_hour"])
data_visits_by_day = pd.read_parquet(path + church_data["visits_by_day"])
data_visitor_country_of_origin = pd.read_parquet(path + church_data["visitor_country_of_origin"]
data_visitor_home_aggregation = pd.read_parquet(path + church_data["visitor_home_aggregation"])
data_related_same_day_brand = pd.read_parquet(path + church_data["related_same_day_brand"])



# What differences are there between iPhone and Android users when comparing visits to The Churc
data_q1 = data_poi.merge(data_device, how='left', on='placekey')
data_q1 = data_q1.drop_duplicates(subset= ["placekey", "device_type"])
data_q1 = data_q1[data_q1["location_name"].isin(["The Church of Jesus Christ of Latter day Saint
"The Church Of Jesus Christ Of Latter Day Saints", "The Church Of Jesus Christ Of Latter Day Sai
 "The Church of Jesus Christ of Latter Day Saints", "The Church of Jesus Christ of Latter day Sa
data_q1 = data_q1[data_q1["region"].isin(["UT", "GA"])]
data_q1_filtered = data_q1[["location_name", "region", "device_type", "value"]]
data_q1_ut = data_q1_filtered[data_q1_filtered["region"] == "UT"]
data_q1_ga = data_q1_filtered[data_q1_filtered["region"] == "GA"]
# print(f"UT: {data_q1_ut.sum(numeric_only=True)}\nGA: {data_q1_ga.sum(numeric_only=True)}")
data_q1_ut = data_q1_ut.groupby(["device_type", "region"]).sum().reset_index()
```

```
data_q1_ga = data_q1_ga.groupby(["device_type", "region"]).sum().reset_index()

data_q1_revised = data_q1_ut
data_q1_revised = data_q1_revised.append(data_q1_ga)

# Visual
differences = alt.Chart(data_q1_revised).mark_bar().encode(
    alt.X("region", title= "Region"),
    alt.Y("value", title="Device"),
    alt.Color("device_type", title="Device")

).properties(
    title= "LDS Android & IOS Use"
)
differences.save("screenshots/differences.png")

differences


# Compare hourly usage patterns between The Church of Jesus Christ of Latter-day Saints and the
import regex as re
from datetime import datetime
from datetime import timezone
import numpy as np
import seaborn as sns
alt.data_transformers.disable_max_rows()
alt.renderers.enable('default')

data_q2 = data_poi.merge(data_popularity_by_hour, how='left', on='placekey')
data_q2 = data_q2.merge(data__hour_usage, how='left', on='placekey')
data_q2 = data_q2.drop_duplicates(subset= ["placekey", "region", "location_name", "hour", "open_

# splitting hour blocks
data_q2["12:00am-7:00am"] = data_q2["popularity_by_hour"].where(data_q2["hour"].isin([1, 2, 3, 4
data_q2["8:00am-3:00pm"] = data_q2["popularity_by_hour"].where(data_q2["hour"].isin([9, 10, 11,
data_q2["4:00pm-11:00pm"] = data_q2["popularity_by_hour"].where(data_q2["hour"].isin([17, 18, 19
data_q2_days = data_q2[["region", "location_name", "12:00am-7:00am", "8:00am-3:00pm", "4:00pm-11
data_q2_filtered = data_q2[["location_name", "region", "hour", "popularity_by_hour", "open_hours

# sums
#data_q2_filtered.loc[(data_q2_filtered["open_hours"].isin(["Mon", "Tue", "Wed", "Thu", "Fri", "
data_q2_days = data_q2_days.groupby(["location_name", "region"]).sum().reset_index()

# mean of other churches
data_other_churches = data_q2_days[~data_q2_days["location_name"].isin(["The Church of Jesus Chr
"The Church Of Jesus Christ Of Latter Day Saints", "The Church Of Jesus Christ Of Latter Day Sai
 "The Church of Jesus Christ of Latter Day Saints", "The Church of Jesus Christ of Latter day Sa

data_other_churches = data_other_churches.groupby("region").sum()
print(data_other_churches.groupby("region").mean())
other_ga = {"location_name": "Other Churches, GA", "region": "GA", "12:00am-7:00am": 605190.0, "
```

```
other_ut = {"location_name": "Other Churches, UT", "region": "UT", "12:00am-7:00am": 37785.0, "8

data_q2_days = data_q2_days.append(other_ga, ignore_index= True)
data_q2_days = data_q2_days.append(other_ut, ignore_index= True)

data_q2_days = data_q2_days[data_q2_days["location_name"].isin(["The Church of Jesus Christ of L
"The Church Of Jesus Christ Of Latter Day Saints", "The Church Of Jesus Christ Of Latter Day Sai
 "The Church of Jesus Christ of Latter Day Saints", "The Church of Jesus Christ of Latter day Sa

# mean of lds
data_lds = data_q2_days[data_q2_days["location_name"].isin(["The Church of Jesus Christ of Latte
"The Church Of Jesus Christ Of Latter Day Saints", "The Church Of Jesus Christ Of Latter Day Sai
 "The Church of Jesus Christ of Latter Day Saints", "The Church of Jesus Christ of Latter day Sa

data_lds = data_lds.groupby("region").sum()
data_lds.groupby("region").mean()
lds_ga = {"location_name": "LDS, GA", "region": "GA", "12:00am-7:00am": 9415.0, "8:00am-3:00pm":
lds_ut = {"location_name": "LDS, UT", "region": "UT", "12:00am-7:00am": 53922.0, "8:00am-3:00pm"

data_q2_days = data_q2_days[data_q2_days["location_name"].isin(["Other Churches, GA", "Other Chu
data_q2_days = data_q2_days.append(lds_ga, ignore_index= True)
data_q2_days = data_q2_days.append(lds_ut, ignore_index= True)


# Visual
time_1 = alt.Chart(data_q2_days).mark_bar(opacity=1).encode(
    alt.X("location_name", title="Church Name"),
    alt.Y("12:00am-7:00am"),
    color="location_name"

).properties(
    title= "Hourly Usage"
)

time_2 = alt.Chart(data_q2_days).mark_bar(opacity=1).encode(
    alt.X("location_name", title="Church Name"),
    alt.Y("8:00am-3:00pm"),
    alt.Color("location_name", title="Church Name")
).properties(
    title= "Hourly Usage"
)

time_3 = alt.Chart(data_q2_days).mark_bar(opacity=1).encode(
    alt.X("location_name", title="Church Name"),
    alt.Y("4:00pm-11:00pm"),
    alt.Color("location_name", title="Church Name")
).properties(
    title= "Hourly Usage"
)

q2 = alt.hconcat(
```

```
    time_1, time_2, time_3
).resolve_scale(
    color="independent"
)

q2.save("screenshots/q2.png")

q2
```

```
# Contrast the related_same_day_brand brands between those who visit the Church of Jesus Christ
data_q3 = data_poi.merge(data_related_same_day_brand, how='left', on='placekey')
data_q3 = data_q3.drop_duplicates(subset= ["placekey", "region", "location_name", "related_same_

data_q3 = data_q3[["location_name", "region", "raw_visit_counts", "related_same_day_brand", "val

# mean of other churches
data_other_churches = data_q3[~data_q3["location_name"].isin(["The Church of Jesus Christ of Lat
"The Church Of Jesus Christ Of Latter Day Saints", "The Church Of Jesus Christ Of Latter Day Sai
 "The Church of Jesus Christ of Latter Day Saints", "The Church of Jesus Christ of Latter day Sa

data_other_churches = data_other_churches.groupby(["region"]).sum().reset_index()
data_other_churches.groupby(["region"]).mean()
other_ga = {"location_name": "Other Churches, GA", "region": "GA", "raw_visit_counts": 50777561.
other_ut = {"location_name": "Other Churches, UT", "region": "UT", "raw_visit_counts": 2805629.0

data_q3 = data_q3.append(other_ga, ignore_index= True)
data_q3 = data_q3.append(other_ut, ignore_index= True)

data_q3 = data_q3[data_q3["location_name"].isin(["The Church of Jesus Christ of Latter day Saint
"The Church Of Jesus Christ Of Latter Day Saints", "The Church Of Jesus Christ Of Latter Day Sai
"The Church of Jesus Christ of Latter Day Saints", "The Church of Jesus Christ of Latter day Sai

# mean of lds churches
data_lds = data_q3[data_q3["location_name"].isin(["The Church of Jesus Christ of Latter day Sair
"The Church Of Jesus Christ Of Latter Day Saints", "The Church Of Jesus Christ Of Latter Day Sai
"The Church of Jesus Christ of Latter Day Saints", "The Church of Jesus Christ of Latter day Sai


data_lds = data_lds.groupby("region").sum().reset_index()
data_lds.groupby("region").mean()
lds_ga = {"location_name": "LDS, GA", "region": "GA", "raw_visit_counts": 739050.0, "same_day_br
lds_ut = {"location_name": "LDS, UT", "region": "UT", "raw_visit_counts": 7725706.0, "same_day_b


data_q3 = data_q3[data_q3["location_name"].isin(["Other Churches, GA", "Other Churches, UT"])]
data_q3 = data_q3.append(lds_ga, ignore_index= True)
data_q3 = data_q3.append(lds_ut, ignore_index= True)
```

```
# Visual
time_1 = alt.Chart(data_q3).mark_bar(opacity=1).encode(
    alt.X("location_name", title="Church Name"),
    alt.Y("raw_visit_counts", title="Visits at Church"),
    alt.Color("location_name", title="Church Name")

).properties(
    title= "Contrast Visits Brands to Churches"
)

time_2 = alt.Chart(data_q3).mark_bar(opacity=1).encode(
    alt.X("location_name", title="Church Name"),
    alt.Y("same_day_brand_value", title="Visits at Brand"),
    alt.Color("location_name", title="Church Name")
).properties(
    title= "Contrast Visits Brands to Churches"
)


q3 = alt.hconcat(
    time_1, time_2
).resolve_scale(
    color="independent"
)


q3.save("screenshots/q3.png")

q3




# This is a bit of a reach. Compare related_same_day_brand of temples, seminary buildings, and m




#data_q2["hours"] = data_q2["value"].astype(str)
# data_q2["hours"] = data_q2["hours"].str.replace(":", ".", regex=True)
# data_q2["hours"] = data_q2["hours"].str.extract(r"([\D+])")
# data_q2["hours"] =
# beep = data_q2["value"].apply(pd.Series)
# beep2 = beep[0].apply(pd.Series)
# beep2

#data_q2['hours'] = data_q2["value"].tolist()
#data_q2['hourOpen'] = np.hsplit(data_q2["hours"], 2)
#data_q2["hours"] = data_q2["hours"].astype(str)
```

```
# data_q2['hourDifference'] = data_q2['date_range_start'].sub(data_q2['date_range_end'], axis=0)


#data_q2_filitered.loc[(data_q2_filitered["12:00am-7:00am"] == True), "12:00am-7:00am-popularity
#data_q2_filitered.loc[(data_q2_filitered["8:00am-3:00pm"] == True), "12:00am-7:00am-popularity"
#data_q2_filtered["12:00am-7:00am-popularity"] = np.where((data_q2_filtered["12:00am-7:00am"]) =
#data_q2_filtered["12:00am-7:00am-popularity"] = data_q2_filtered.loc[data_q2_filtered["12:00am-
```