

Exploring the Arrondissements of Paris to Create a Travel Itinerary

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1. Introduction

1.1 Background

Paris is one of the world's most iconic cities. The French capital is a global center of finance, fashion, arts, science, and gastronomy, and history. From museums and historical boulevards to legendary restaurants and high-end boutiques, the City of Lights can be very intimidating and overwhelming to visit. It is advantageous to prepare a travel itinerary that prioritizes must-do activities and must-see sights in an efficient way but also have enough flexibility for exploration and spontaneous adventure.

1.2 Problem

Traveling to a new city as exciting and vibrant as Paris can be overwhelming. Utilizing an itinerary can maximize valuable time, prioritize must-do activities, and plan for easier and faster travel between attractions. This project aims to create an efficient itinerary that saves time, includes must-see attractions, and make suggestions for what to do, see, and eat, taking into account distance, time, and location.

1.3 Interest

More than 83 million visitors make the pilgrimage to Paris per year. These visitors would be interested in the results of this project for their next visit to Paris. Even Parisians can find benefits for exploring their hometown or a new arrondissement with the results of our analysis using location data.

2. Data

2.1 Data Source

The data we will use in this project will be gathered from a variety of online sources using web scraping techniques such as Beautiful Soup.

The arrondissements information was found on this [Wikipedia page](#). Its corresponding latitude and longitude were compiled manually using Nominatim. The top must-see Parisian landmarks were found on the [this website](#) as well as from Google Search, compiled with its corresponding latitude and longitude were found using Nominatim.

We will utilize a Paris arrondissements geojson file from [Carto](#) to map out the boundaries of each arrondissements and create visuals such as choropleth maps for population.

The venues data was found by using the Foursquare API.

2.2 Data Cleaning

The Arrondissement data that was scraped from Wikipedia site was fairly clean except for the “Arrondissement (R for Right Bank, L for Left Bank)” column, so we added another column to the data set named “Arrondissement” that included just the numbered arrondissement (i.e. 1st, 2nd, 3rd, 4th, etc.). We changed the longitude and latitude columns from an object to a float type. We also added another two columns for each arrondissement’s average longitude and latitude.

The famous landmarks data was compiled manually into a list and appended with its associated longitude and latitude.

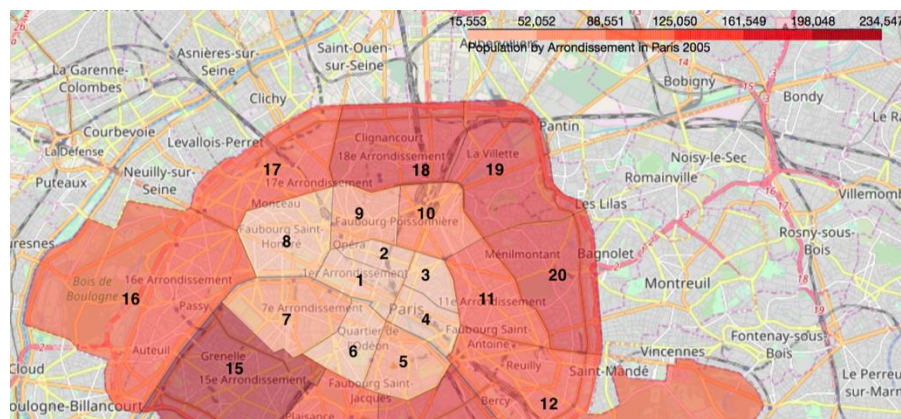
Utilizing Foursquare data, we downloaded the top 100 venues in each arrondissement within a 2000-meter distance from the arrondissement coordinate. The resulting table contained the arrondissement number, longitude, latitude, venue, venue longitude and latitude, and venue category. Since each arrondissement’s area is varied between 0.3 square miles to 3.3 square miles, there may be duplicates in our search results. We therefore dropped duplicate venues that appeared in our search.

The Paris geojson file we downloaded to create arrondissement boundaries in our maps had its arrondissement name formatted in French. Therefore, we created a new column that matched the format of the geojson and appended it with longitude and latitude to be utilized in the visualizations.

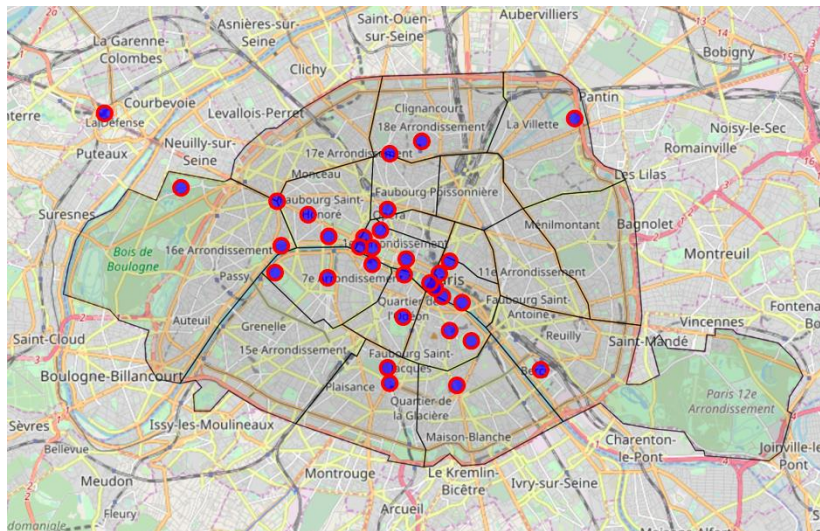
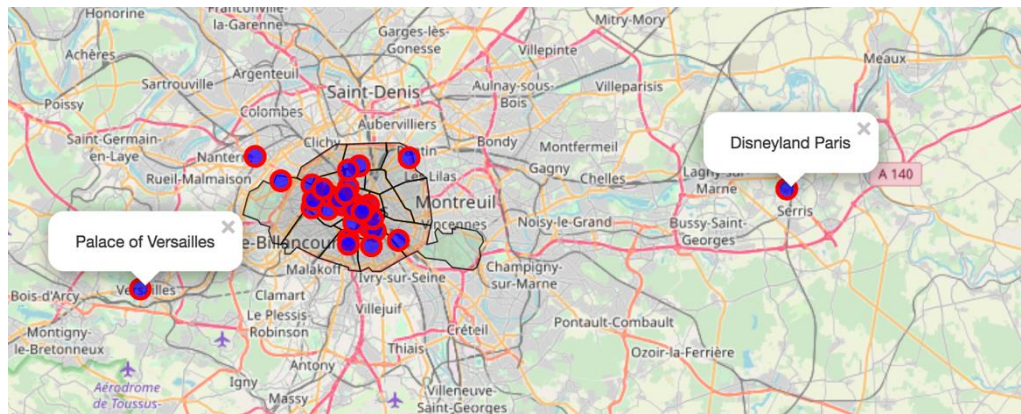
3. Methodology

3.1 Exploratory Data Analysis

The first exploratory data analysis I did was to create a choropleth and boundary map of Paris to get a visual of how and where the arrondissements are located. Then I used the 2005 Population information to shade each arrondissement, where darker red means higher population density and lighter red means lower population density.



Next, I created a map that showed the top landmarks of Paris according to users on Google, Lonely Planet, and other travel websites. The map below shows three zoom levels.



3.2 Clustering by Venues per Arrondissement using Foursquare Data

Next, we downloaded venues data from Foursquare and clustered the venues and venue category by arrondissement. We created the table below which shows the top 10 most common venues per arrondissement.

As you can see, the French love their food, as most arrondissements feature French restaurants as their top destination. The more food-inclined arrondissements are the 5th, 10th, 11th, and 17th,

If you're looking for a place to stay during your visit in Paris, the 1st and 8th arrondissements have many hotel options. Notice the 12th arrondissement is largely an extended park and green space. This would be a nice option to get away from the hustle and bustle of the city for a quiet afternoon!

Arrondissement	Latitude	Longitude	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
1st	48.864614	2.334396	4	Hotel	Plaza	Historic Site	French Restaurant	Cocktail Bar	Art Museum	Boutique	Italian Restaurant	Garden	Dessert Shop
2nd	48.868743	2.341688	3	Cocktail Bar	French Restaurant	Wine Bar	Hotel	Pizza Place	Concert Hall	Corsican Restaurant	Candy Store	Museum	Szechuan Restaurant
3rd	48.864212	2.360936	3	French Restaurant	Italian Restaurant	Bookstore	Café	Bakery	Hotel	Clothing Store	Cocktail Bar	Japanese Restaurant	Sandwich Place
4th	48.856202	2.355619	1	French Restaurant	Plaza	Cocktail Bar	Japanese Restaurant	Museum	Hotel	Beer Store	Tapas Restaurant	Burger Joint	Market
5th	48.846059	2.344523	1	French Restaurant	Plaza	Wine Bar	Bistro	Dessert Shop	Restaurant	Ice Cream Shop	Fountain	Seafood Restaurant	Tea Room
6th	48.850433	2.332951	0	French Restaurant	Hotel	Café	Cheese Shop	Coffee Shop	Creperie	Department Store	Furniture / Home Store	Garden	Tailor Shop
7th	48.857028	2.320195	0	French Restaurant	Historic Site	Garden	Plaza	Pastry Shop	Art Museum	Asian Restaurant	Lounge	Chocolate Shop	Hotel
8th	48.877316	2.317261	2	Hotel	French Restaurant	Japanese Restaurant	Gourmet Shop	Italian Restaurant	Bar	Clothing Store	Park	Cosmetics Shop	Art Gallery
9th	48.876019	2.339962	4	French Restaurant	Bakery	Hotel	Italian Restaurant	Indie Movie Theater	Scenic Lookout	Cheese Shop	Chocolate Shop	Church	Cocktail Bar
10th	48.876106	2.359910	0	Coffee Shop	French Restaurant	Cambodian Restaurant	Bar	Thai Restaurant	Pizza Place	Chinese Restaurant	Gastropub	Taco Place	Theater
11th	48.858416	2.379703	0	French Restaurant	Wine Bar	Bistro	Bar	Cocktail Bar	Pizza Place	Italian Restaurant	Restaurant	Park	Organic Grocery
12th	48.839615	2.395752	2	French Restaurant	Park	Bakery	Hotel	Plaza	Italian Restaurant	Bar	Garden	Farmers Market	Bistro
13th	48.832397	2.355583	2	French Restaurant	Vietnamese Restaurant	Thai Restaurant	Italian Restaurant	Café	Hotel	Bar	Bakery	Park	Supermarket
14th	48.833059	2.326959	3	French Restaurant	Hotel	Japanese Restaurant	Italian Restaurant	Bistro	Creperie	Bar	Dessert Shop	Vietnamese Restaurant	Museum
15th	48.841370	2.300383	3	French Restaurant	Hotel	Bakery	Bistro	Gym / Fitness Center	Plaza	Korean Restaurant	Italian Restaurant	Park	Lebanese Restaurant
16th	48.863171	2.275765	3	French Restaurant	Hotel	Italian Restaurant	Art Museum	Bakery	Plaza	Hotel Bar	Gym / Fitness Center	Garden	Museum
17th	48.884224	2.322364	0	French Restaurant	Hotel	Bistro	Bar	Bakery	Italian Restaurant	Plaza	Wine Bar	Dessert Shop	Beer Bar
18th	48.890012	2.346467	0	French Restaurant	Italian Restaurant	Pizza Place	Bar	Bistro	Music Venue	Bakery	Wine Shop	Coffee Shop	Restaurant
19th	48.889343	2.384360	2	French Restaurant	Restaurant	Multiplex	Japanese Restaurant	Bistro	Café	Concert Hall	Bar	Park	Pizza Place
20th	48.865042	2.398929	4	Bar	French Restaurant	Cocktail Bar	Pizza Place	Bakery	Italian Restaurant	Vietnamese Restaurant	Music Venue	Moroccan Restaurant	Mexican Restaurant

3.3 K-Means Clustering by Arrondissement

We attempted to perform a K-Means clustering algorithm on the arrondissement data and partition them into five different clusters to see if this machine learning algorithm could help us group the arrondissements into unique groups.

We also tried to use K-Means to perform clustering on the list of top Paris landmarks. However, the results proved to be confusing and we did not proceed further to derive meaning from the results.

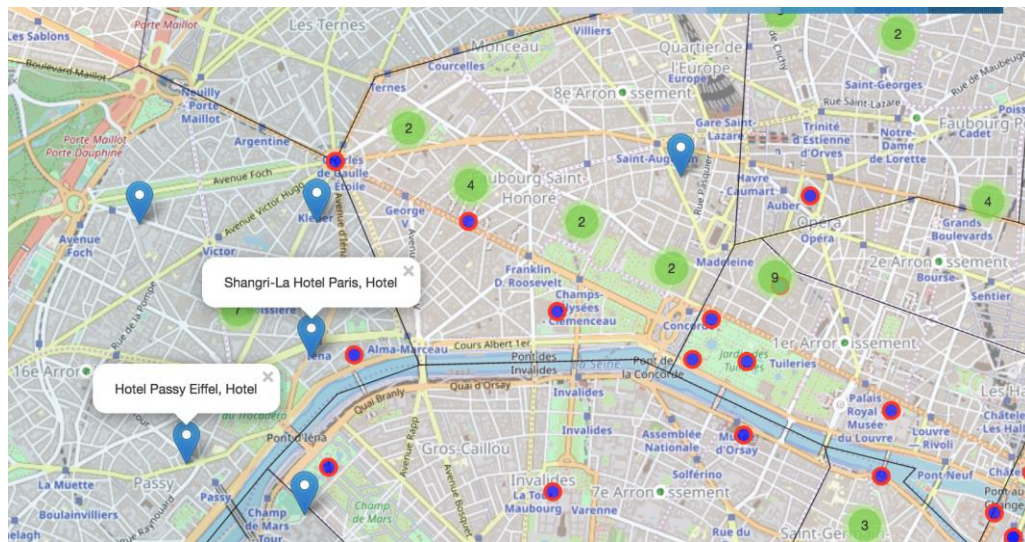
4. Visualizations

The bulk of our analysis when trying to build an itinerary will be dependent on creating maps to visualize where landmarks and venues are and what is nearby. We also included clustering by venue category in order to make a cleaner map.

You can click or zoom into each cluster for more details such as venue name and type. The blue pins are of individual venues that are not in cluster (due to distance or zoom).

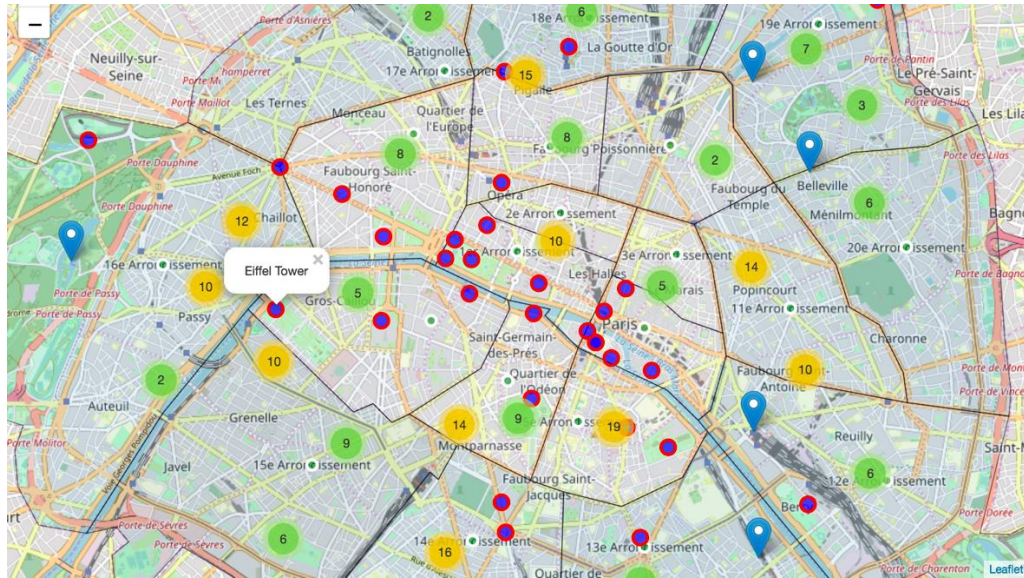
4.1 Hotel Accommodations

The first thing people purchase after their plane ticket to Paris is likely hotel accommodations. Below is a map that features the lodging options along the famous boulevard, the Champs-Élysées. Want an up-close view of the Eiffel Tower and the Seine River? How about checking into the luxurious Shangri-La Hotel Paris or the Hotel Passy Eiffel?



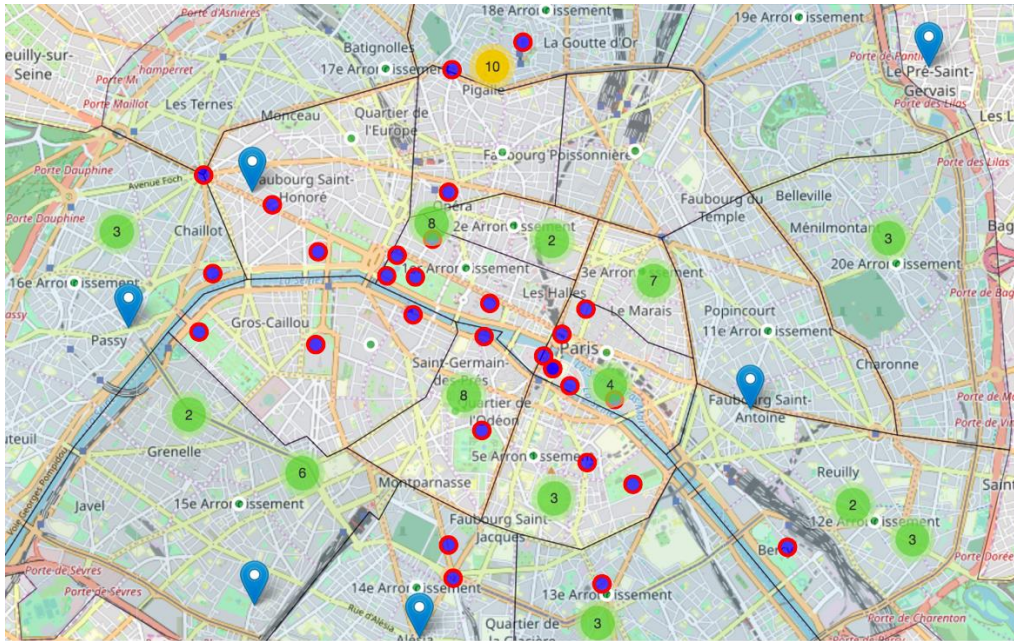
4.2 French Food

If you were near the Eiffel Tower and are in the mood for French food, you have over 30 options around you within a short walk of the Tower. Besides the two restaurants that are within the Eiffel Tower complex, you can also head over to Le Casse Noix or Pottoka.



4.3 Dessert

No trip to Paris is complete without a visit(s) to a local dessert shop for a crepe, a soufflé, or another delish treat. Fortunately, Paris has no shortage of sweet shops all around the city, perfect for a short pitstop before exploring the next museum or public plaza.



4.4 Drinks and Nightlife

The Latin Quarter in the 6th Arrondissement is famous for its nightlife and bars. If you're hoping to participate in a Paris bar crawl, this is the place to be.



4.5 Museums

For museum lovers, Paris is the mecca. The hardest part is deciding which museum to visit and for how long. Museums featured in our data gathering range from art museums, galleries, and exhibits to history and science museums. Below is a map featuring some museums in blue pin/clusters among other famous landmarks in blue/red dots.



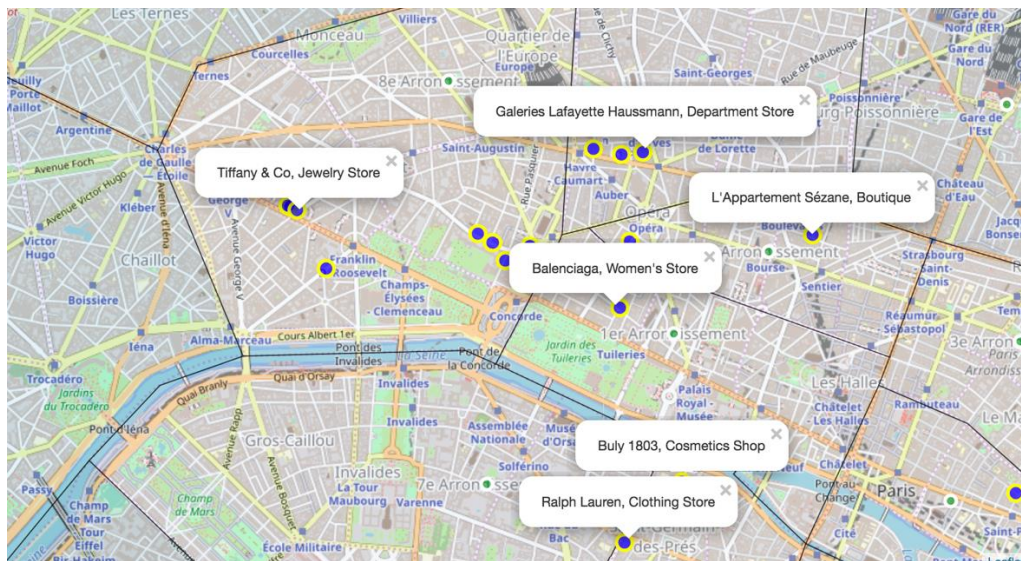
4.6 Outdoor Sights

Paris is well known for its city planning, featuring green spaces and lookouts around the city, including beautiful gardens, parks, and public plazas. Below is a detailed look in the areas surrounding the famous Luxembourg Gardens, in the 5th, 6th, and 7th Arrondissements.



4.7 Shopping

Paris is the fashion capital of the world and there is no shortage of boutiques, malls, and specialty shops for even the most prolific shopaholic. The 8th Arrondissement features many designer brands and other luxury stores selling clothes, handbags, watches, and jewelry.



5. Results: Itineraries

Day 1 - Eiffel Tower

- Depending on your lodging area, you can use the café map to find a local café or bistro for a French breakfast to start off the day.
- Head over to the 7th Arrondissement for a full day of exploring! Up first, the famous **Eiffel Tower**, along the River Seine. You can choose to make your way to the top or take pictures around the surrounding garden and plaza.
- Have yourself a picnic on the green gardens surrounding the Eiffel Tower. You can visit the nearby **Marché de Saxe Farmers Market** to pick up farm grown picnic food.
- Sit down for some afternoon tea at the nearby **Aux Cerises Tea Room**.
- Learn more about France's military history by visiting **Les Invalides** complex, which features museums and monuments.
- There are many local French restaurants to try out, including more than 30 within walking distance from the Eiffel Tower. Some of the closest restaurants include **Le Jules Verne** and **Restaurant 58 Tour Eiffel**.
- After dinner, stroll around the Seine as you wait for the Eiffel Tower to light up in the night sky. Perhaps stop by for dessert at **Boulangerie Desgranges** across the river.

Day 2 - Walking on the Champs-Élysées

- Start your day at the west end of the Champs-Élysées at the famous landmark, the **Arc de Triomphe**. Built 1836 to honor those who died during the French Revolution and the Napoleonic Wars, this is perhaps Paris's most well-known landmark after the Eiffel Tower.
- Stroll down the most famous street in the world, the Champs-Élysées. Browse the many boutiques and luxury stores that line its sides as you head east.

- Make a stop at the **The Grand Palais** and admire its architecture.
- Stop by the **Ladurée Paris Royale** bakery for a quick lunch or picnic items. Looking for something more substantial? **Le Dalí** is a nearby French restaurant.
- Enjoy the weather and the slow Parisian lifestyle by grabbing a bench at the **Tuileries Garden** for some people watching.
- Cross the river to the **Musée d'Orsay**, where you can spend the late afternoon among famous French artworks.
- For dinner, the French restaurants **L'Atelier de Joël Robuchon** or **Guy Savoy** are close by. The bistro **L'Avant-Comptoir des Cochons** is also close by.
- For a nightcap, **Prescription Cocktail Club** and **Chez Nous** wine bar are not too far away.

Day 3 - Museum Time, then Party Time

- Go early to **Le Louvre** to beat the crowds and get the museum to yourself. Be sure to say hi to the Mona Lisa.
- Sample some French cheese at **Fromagerie Barthélemy** and pick up some items for a picnic lunch at the **Palais du Luxembourg** and its surrounding gardens.
- The **Pantheon** is a short walk away from the Garden and is a mausoleum containing the remains of distinguished French citizens.
- Craving some seafood? **L'Avant Comptoir de la Mer** has you covered. How about some Italian? Head over to **Oenosteria**.
- End the night by visiting the Latin Quarters for some drinks at a local bar. Crowd favorites include **Castor Club** or wine bar **L'Avant Comptoir**.
- Alternatively, enjoy an indie film at **La Filmothèque du Quartier Latin** or a performance at the **Odéon - Théâtre de l'Europe**.

Day 4 - History and Culture Tour

- Begin the day along the Seine at **Cathédrale Notre-Dame de Paris**, the famous cathedral known for its architecture.
- If you're still not tired of museums, the **Centre Pompidou** is a modern museum with interesting architecture.
- Other close by landmarks include the small islands, **Île Saint-Louis** and **Île de la Cité**, as well as **La Conciergerie** and **Saint-Jacques Tower**
- Ready for another picnic by the Seine? Visit **Fromagerie Laurent Dubois** for food. Nearby restaurants include **Le Petit Châtelet**, **Comme chai Toi**, or **Anahuacalli**.
- Make the trek across the Seine to catch a performance in the Bastille neighborhood. Venues include **Opéra Bastille** for opera or **Café de la Danse** for modern music.
- Food options near the venue include **Gaspard de la Nuit** (French), **Nove** (Italian), and **Café Ginger** (Asian fusion/Vegan) for dinner.
- **La Moustache Blanche** and **Berliner Wunderbar** are good options for drinks.

Day 5 - Day Trips Away

- Make a day trip trek out to the Palace of Versailles and explore its grand architecture and lush gardens.
- Disneyland Paris is another option to the far east of the city

6. Discussion

The itinerary I created was meant to be a starting point for planning a trip to France. I used the maps I created from the Foursquare data to map out where points of interests (such as historical landmarks, museums, food, etc.) were located and created a day to day itinerary that attempted to cover as many famous landmarks as well as feature local French restaurants, shops, bars, and performance venues.

I found that most of the historical landmarks were located within the center-most arrondissements (1st - 8th). My itinerary tried to separate each day based on the local area being explored and making sure each destination was fairly close to get to by foot or public transportation.

I also created the itinerary based off of my own interest in French food, culture, landmarks, and museums. Given the individual preference of each visitor, an itinerary may differ based on different interests as well as other constraints such as time, money, and whether someone is a new visitor or a returnee. Despite different preferences, anyone can use the maps I created to form his or her own plans for where to go and what to do in Paris.

Given more time, I would like to explore other ways to create Folium maps, including different ways to map data, different labels, and incorporating information such as distance or venue rating. I would also like to incorporate explore each venue in depth and access Foursquare reviews, photos, and tips so that I can have input from other users who have been to Paris. This capstone project did not include an in-depth machine learning section - perhaps there could be used for algorithms to predict crowd size, best times to visit a particular venue, and other problems that can be solved using predictive models.

7. Conclusion

From this capstone project, I realized just how vast Paris is and how difficult it is to plan a visit to a city with so many options to see, eat, drink, and experience. The itinerary I created made many assumptions on time, money, and duration of stay. I assumed good weather conditions, lack of other plans (meeting with friends, tour appointments, classes etc.), and a willingness to be on foot and spend days out exploring. However, I want to emphasize that itineraries are just general guide lines and travelers can choose to deviate if, say, they find the Louvre

to be only an hour visit or that reading in the Jardin de Luxembourg should be an all-day activity accompanied by French cheese and wine. I learned a lot about scraping data, visualizing it, and making maps that can provide guidance for creating a travel plan. I can't wait for my first trip to Paris!