



**Northeastern University**  
College of Engineering

**Project:**  
**Data Analysis of Trip Advisor Website**



Collect, Store, Retrieve Data  
Data Analytics DA5020

**Master of Science in Data Analytics**

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Under the guidance of Prof. Kathleen Durant



### **Introduction:**

Travelling is an integral part of life, especially for people who have travelling as a passion. Not only they provide the experience, but they also give a quick view on the culture and the food they consume. Travelling also provide a break from the rat race that everyone runs. The most important player in this field is tripadvisor.com - the website which helps you make plan from the flight to the restaurant that you want to stay in.

Tripadvisor.com is one of the most reliable website that provides services like finding restaurants, booking hotels and flight booking. The website gives us suggestions while we search for the hotels, restaurants and flights which have the best deals in each of the service. It is the largest travel site in the world, with more than 315 million members and over 500 million reviews and opinions of hotels, restaurants, attractions and other travel-related businesses. The website services are free to users, who provide most of the content, and the website is supported by a hotel booking facility and an advertising business model.

**The idea of the project is to create a bird's eye view of a locality showing Hotels, Restaurants and Tourist Spots in the locality. Trip advisor does not have a consolidated view of all the services it offers. We plan to achieve that with this project. For this Project, we have selected one of the most popular tourist spots, Paris.**

The objective of the proposed project is to scrape data from tripadvisor.com about the restaurants, hotels and popular tourist spots and visualize the data using R packages such as ggmap() and ggplot(). For this project we will consider one particular city and perform Analysis on the data which we get from TripAdvisor. The database will be created in SQLite.

Web Scraping will be done on the TripAdvisor Website to gather the information. After the data scraping we perform multiple analysis of data in various forms such as sentimental analysis and analysis based on location of the best services provided. These analyses are done to ease the selection of restaurants, hotels and tourist spots for the tourists.

## Step 1: Data Collection

We planned on using the TripAdvisor API for our project but when we tried to sign-up as a developer, we were faced with this issue.

**Request TripAdvisor API Access**

TripAdvisor grants a limited number of API keys to official tourism organizations and select other websites. It does not grant access for purposes of data analysis, research, testing, or similar uses.

Due to the high volume of requests, we are unable to respond to all applications. Please make sure that all fields are filled out completely and accurately, that your request includes a working URL, and that your intended use of TripAdvisor ratings is fully explained.

First Name

Last Name

Company

Company Location

Business Type

E-mail address

Phone number (if outside US & Canada)

On which website or app do you propose to use the API?  
Name of website or app

URL (must be a working URL specific to your website and/or app, not your company)

Platform Check all that apply.  
☐ Desktop ☐ Mobile

### Determine Content API Eligibility

Thank you for your interest in the TripAdvisor Content API. Please note that this product is for the use of official tourism organizations and a very limited number of other partners only. Due to the volume of requests we cannot respond to all applications; if your request is approved you will be notified by email. Please select the boxes that apply to your proposed use of the Content API. You must select one, and may select multiple boxes.

- ☐ Official Tourism Organization/DMO/CVB
- ☐ Consumer-facing (B2C)
- ☒ Primarily used for data analysis and/or research
- ☐ Primarily used for B2B purpose

OK

### Determine Content API Eligibility

**TripAdvisor does not grant access to the Content API for purposes of data analysis, academic research, or any other use not associated with a consumer-facing (B2C) travel website or application.**

So, after discussing the issue with the professor, we decided to scrape the data using Google Chrome Extensions namely **'Instant Data Scraper'** and **'Web Scraper'**

Collection of data from the tripadvisor.com website on the **Hotels** in Paris. The data collected from the website are,

- Hotel Name
- Hotel web link
- Cheapest provider
- Price
- Reviews
- Review count
- Distance
- Amenities

Screenshot showing the data scraping

Instant Data Scraper

Try another table

Locate "Next" button

Min delay 1 sec

Max delay 20 sec

Download data or locate "Next" to crawl multiple pages

property_title	href	provider	price	vendor	vendor 2	price 2	vendor 3	price 3	viewAll	vendor 4	price 4	vendor 5	price 5	viewAll
vw.tripadvisor.com/Hotel_Review-g187	Expedia.com	\$173	Orbitz.com	Booking.com	\$173	Traveloc								
vw.tripadvisor.com/Hotel_Review-g187	Expedia.com	\$213	Official Site	Orbitz.com	\$223	Priceline								
vw.tripadvisor.com/Hotel_Review-g187	Expedia.com	\$142	Booking.com	Orbitz.com	\$142	Hotwire								
vw.tripadvisor.com/Hotel_Review-g187	Expedia.com	\$175	Hotels.com	Orbitz.com	\$175	Traveloc								
vw.tripadvisor.com/Hotel_Review-g187	Expedia.com	\$107	Booking.com	Hotels.com	\$107	Traveloc								
vw.tripadvisor.com/Hotel_Review-g187	Booking.com	\$116	Agoda.com	Hotwire.com	\$116	Priceline								
vw.tripadvisor.com/Hotel_Review-g187	Ctrip.com	\$169	Orbitz.com	Agoda.com	\$203	Booking								
vw.tripadvisor.com/Hotel_Review-g187	Ctrip.com	\$139	Priceline	AMOMA	\$139	Expedia								
vw.tripadvisor.com/Hotel_Review-g187	Expedia.com	\$230	Travelocity	Hotels.com	\$230	Priceline								
vw.tripadvisor.com/Hotel_Review-g187	Ctrip.com	\$139	AMOMA	getaroom.com		Expedia								
vw.tripadvisor.com/Hotel_Review-g187	Agoda.com	\$228	Travelocity	Orbitz.com	\$228	Cancelo								
vw.tripadvisor.com/Hotel_Review-g187	Agoda.com	\$215	Booking.com	Expedia.com	\$222	Traveloc								
vw.tripadvisor.com/Hotel_Review-g187	Priceline	\$256	Novotel	Expedia.com	\$283	Ctrip.co								

Amenities

Any

☐ Free Wifi

☐ Breakfast included

☐ Pool

☐ Free Parking

More +

Special offers

Any

☐ Properties with special offers

Paris Hotels

Dec 23 - Dec 30

1 room, 1 adult, 0 children

Update

Traveler Ranked

Best Value

Lowest price

Distance

saving money?

We search up to 200 sites to help you save up to 30%

X

Hotel Andrea

SAVE \$74

Official Site

\$103

View Deal

Booking.com

Expedia.com

Hotels.com

View all 8 deals from \$103

268 reviews

0.1 miles from Paris center

Free Wifi

Hotel Victoria Chatelet

Booking.com

\$166

View Deal

Expedia.com

Travelocity

Orbitz.com

View all 9 deals from \$166

220 reviews

0.1 miles from Paris center

Free Wifi

Scraped Data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	prw_rup	h1	image src	property_tisave	xthrough	provider	text	vendor	price	vendor 2	price 2	vendor 3	price 3	viewAll	vendor 4	price 4	vendor 5	price 5	v
2	https://ww	https://me-La Clef Lou	SAVE \$37	\$384	Orbitz.com	\$347	Expedia.coi	\$347	Hotels.com	\$347	getaroom.c	\$384	View all 12	Orbitz.com	\$347	Expedia.coi	\$347	H	
3	https://ww	https://me-Hotel d'Aul	SAVE \$33	\$344	Expedia.coi	\$311	Travelocity	\$311	Agoda.com	\$312	Cancelon	\$344	View all 11	Expedia.coi	\$311	Travelocity	\$311	A	
4	https://ww	https://me-Saint Jame	SAVE \$88	\$500	Booking.co	\$412	Official Site	\$413	Expedia.coi	\$413	Cancelon	\$500	View all 13	Booking.co	\$412	Official Site	\$413	E	
5	https://ww	https://me-Novotel Pa	SAVE \$125	\$313	Novotel	\$188	Orbitz.com	\$188	Expedia.coi	\$188	Elvoline	\$313	View all 16	Novotel	\$188	Orbitz.com	\$188	E	
6	https://ww	https://me-Left Bank Saint Germain			Booking.co	\$161	Agoda.com	\$161	Expedia.coi	\$161	Travelocity	\$161	View all 12	Booking.co	\$161	Agoda.com	\$161	E	
7	https://ww	https://me-Hotel Malti	SAVE \$21	\$167	Official Site	\$146	Orbitz.com	\$167	Splittr Trav	\$167	getaroom.c	\$146	View all 12	Official Site	\$167	Orbitz.com	\$167	S	
8	https://ww	https://me-Le 123 Seb	SAVE \$33	\$188	Official Site	\$155	Booking.co	\$179	Agoda.com	\$179	Cancelon	\$188	View all 15	Official Site	\$155	Booking.co	\$179	A	
9	https://ww	https://me-Hotel Atmc	SAVE \$20	\$174	Official Site	\$154	Booking.co	\$174	Agoda.com	\$174	Hotwire.co	\$174	View all 11	Official Site	\$154	Booking.co	\$174	A	
10	https://ww	https://me-Crowne Pla	SAVE \$33	\$168	CrownePla	\$135	Expedia.coi	\$137	Booking.co	\$137	Cancelon	\$168	View all 12	CrownePla	\$135	Expedia.coi	\$137	B	
11	https://ww	https://me-Hotel Eiffel	SAVE \$16	\$122	Booking.co	\$106	Travelocity	\$106	Hotels.com	\$106	Cancelon	\$122	View all 12	Booking.co	\$106	Travelocity	\$106	H	
12	https://ww	https://me-Mercure Pe	SAVE \$28	\$200	Mercure	\$172	Expedia.coi	\$172	Booking.co	\$171	HotelQuick	\$200	View all 15	Mercure	\$172	Expedia.coi	\$172	B	
13	https://ww	https://me-Relais Chris	SAVE \$109	\$454	Travelocity	\$345	Agoda.com	\$345	Orbitz.com	\$345	getaroom.c	\$454	View all 15	Travelocity	\$345	Agoda.com	\$345	C	
14	https://ww	https://me-Hotel Mont	SAVE \$107	\$430	Hotel Mont	\$323	Travelocity	\$355	Orbitz.com	\$355	Cancelon	\$430	View all 13	Hotel Mont	\$323	Travelocity	\$355	C	
15	https://ww	https://me-Hotel Le Si	SAVE \$46	\$267	Le Six	\$221	Expedia.coi	\$250	Travelocity	\$250	Booking.co	\$267	View all 14	Le Six	\$221	Expedia.coi	\$250	T	
16	https://ww	https://me-Hotel Regir	SAVE \$233	\$672	Hotels.com	\$439	Booking.co	\$496	Agoda.com	\$497	Elvoline	\$672	View all 14	Hotels.com	\$439	Booking.co	\$496	A	
17	https://ww	https://me-La Maison I	SAVE \$27	\$241	Official Hot	\$214	Booking.co	\$241	Orbitz.com	\$241	Hotwire.co	\$241	View all 11	Official Hot	\$214	Booking.co	\$241	C	
18	https://ww	https://me-Hotel du C	SAVE \$52	\$188	Hotels.com	\$136	Travelocity	\$136	Expedia.coi	\$155	Booking.co	\$188	View all 15	Hotels.com	\$136	Travelocity	\$136	E	
19	https://ww	https://me-The Westin	SAVE \$111	\$390	Expedia.coi	\$279	Agoda.com	\$279	Booking.co	\$278	Elvoline	\$390	View all 13	Expedia.coi	\$279	Agoda.com	\$279	B	
20	https://ww	https://me-Hotel Eiffel	SAVE \$4	\$139	Expedia.coi	\$135	Booking.co	\$135	Hotels.com	\$135	Travelocity	\$139	View all 11	Expedia.coi	\$135	Booking.co	\$135	H	
21	https://ww	https://me-Hotel Brigh	SAVE \$69	\$267	Travelocity	\$198	Booking.co	\$204	Agoda.com	\$204	HotelQuick	\$267	View all 12	Travelocity	\$198	Booking.co	\$204	A	
22	https://ww	https://me-Hotel Kepp	SAVE \$14	\$225	Hotels.com	\$211	Agoda.com	\$221	Booking.co	\$221	HotelQuick	\$225	View all 15	Hotels.com	\$211	Agoda.com	\$221	B	
23	https://ww	https://me-Shangri-La	SAVE \$77	\$1,148	Orbitz.com	\$1,071	Booking.co	\$1,071	Agoda.com	\$1,073	Elvoline	\$1,148	View all 12	Orbitz.com	\$1,071	Booking.co	\$1,071	A	
24	https://ww	https://me-Hotel Saint	SAVE \$26	\$176	Official Site	\$150	Expedia.coi	\$176	Hotels.com	\$176	CheapTicke	\$176	View all 13	Official Site	\$150	Expedia.coi	\$176	H	
25	https://ww	https://me-Pullman Pa	SAVE \$32	\$303	Pullman	\$271	Expedia.coi	\$271	Travelocity	\$271	HotelQuick	\$303	View all 16	Pullman	\$271	Expedia.coi	\$271	T	

However, these data scrapers have their limitations. It was unable to scrape the address of the hotels because it was not readily available on the front page. (seen in screenshot)

We had to get the link of each Hotel and fetch the address data from that hyperlink. We wrote the code in R to do that.

We got the web link from the scraped data. Using that web link for each hotel, we ran a ‘for’ loop to fetch the address of the Hotels using html nodes.

Here is the code.

```
{r}
hotel$Hotel_Web_Link <- as.character(hotel$Hotel_Web_Link)
class(hotel$Hotel_Web_Link)
hotel$Hotel_address <- rep(NA,nrow(hotel))
for(i in 1:nrow(hotel)){
  htm <- read_html(hotel$Hotel_Web_Link[[i]])
  add1 <- htm %>% html_node(css="span.street-address") %>% html_text()
  add2 <- htm %>% html_node(css="span.extended-address") %>% html_text()
  add3 <- htm %>% html_node(css="span.locality") %>% html_text()
  add4 <- htm %>% html_node(css="span.country-name") %>% html_text()
  hotel$Hotel_address[[i]] <- paste(add1,add2,add3,add4,collapse=',')
}

print(hotel)
...
```

	Cheapest_Provider	Price	Review_Count	Distance	Amenities_1	Amenities_2	Hotel_address	hotel_id
eL_Review-g187147-d472...	Expedia.com	146	205	0.2	Free Wifi	Room Service	1 Place du Parvis Notre Dame 04 Arr. 75004 Paris, France	472020
eL_Review-g187147-d302...	Official Site	161	934	0.3	Free Wifi	Bar/Lounge	1 quai Saint-Michel 5th Arr. 75005 Paris, France	302993
eL_Review-g187147-d219...	Orbitz.com	145	358	0.4	Free Wifi		65 rue Saint Louis en L Ile 75004 Paris, France	219994
eL_Review-g187147-d319...	Booking.com	201	1,230	0.4	Free Wifi	Breakfast included	18 rue de la Harpe 75005 Paris, France	319955
eL_Review-g187147-d194...	Agoda.com	151	210	0.4	Free Wifi	Room Service	59 rue Saint Louis en L Ile 75004 Paris, France	194270
eL_Review-g187147-d194...	Expedia.com	225	484	0.5	Free Wifi	Bar/Lounge	54 rue Saint Louis en L Ile 75004 Paris, France	194304
eL_Review-g187147-d774...	Booking.com	291	263	0.5	Free Wifi	Pool	7 rue du Bourg L Abbe 75003 Paris, France	7740508
eL_Review-g187147-d568...	Official Site	116	257	0.5	Free Wifi		2 rue Malher 75004 Paris, France	568921
eL_Review-g187147-d506...	Booking.com	97	178	0.6	Free Wifi		39 rue de Turbigo 03 Arr. 75003 Paris, France	506359
eL_Review-g187147-d243...	Travelocity	199	367	0.6	Free Wifi	Room Service	11 rue des Gravilliers between Place des Vosges and Cent...	2432527
eL_Review-g187147-d506...	Booking.com	75	649	0.6	Free Wifi		6 rue Greneta 75003 Paris, France	506893
eL_Review-g187147-d565...	Booking.com	89	264	0.6	Free Wifi		9 rue d Ormesson 75004 Paris, France	565827
eL_Review-g187147-d218...	Booking.com	174	51	0.6	Free Wifi		7 rue des Vertus 75003 Paris, France	2186989
eL_Review-g187147-d124...	Hotels.com	226	61	0.6			243 rue saint Martin 75003 Paris, France	12456055
eL_Review-g187147-d548...	Orbitz.com	228	453	0.7	Free Wifi	Room Service	29 rue de Poitou 75003 Paris, France	548458
eL_Review-g187147-d248...	Booking.com	161	186	0.7	Free Wifi		16 rue de Saintonge 75003 Paris, France	248398
eL_Review-g187147-d399...	Orbitz.com	118	156	0.7	Free Wifi	Restaurant	31 rue d Alexandrie 75002 Paris, France	3998722
eL_Review-g187147-d275...	Hotels.com	131	130	0.7	Free Wifi	Room Service	94 rue des Archives 75003 Paris, France	275021
eL_Review-g187147-d219...	Hotwire.com	156	245	0.7	Free Wifi	Bar/Lounge	30 rue de Turenne 75003 Paris, France	219989
eL_Review-g187147-d296...	Orbitz.com	126	377	0.7	Free Wifi		6 rue Montgolfier 3rd Arr. 75003 Paris, France	296785
eL_Review-g187147-d103...	Official Site	157	225	0.7	Free Wifi	Room Service	87 rue des Archives 75003 Paris, France	10319445
eL_Review-g187147-d228...	Agoda.com	134	248	0.7	Free Wifi	Bar/Lounge	4 rue Salomon de Caus 75003 Paris, France	228719
eL_Review-g187147-d188...	Expedia.com	470	832	0.8	Free Wifi	Room Service	28 Place des Vosges 75003 Paris, France	188738
eL_Review-g187147-d620...	Booking.com	73	50	0.8			183 rue du Temple 75003 Paris, France	620131
eL_Review-g187147-d616...	Expedia.com	67	136	0.8	Free Wifi		26 rue de Picardie 3rd Arr. 75003 Paris, France	616466
eL_Review-g187147-d276...	Expedia.com	102	236	0.8	Free Wifi		76 rue de Turbigo 75003 Paris, France	276938
eL_Review-g187147-d248...	Hotels.com	74	403	0.8	Free Wifi		69 rue Meslay 3rd Arr. 75003 Paris, France	248396
eL_Review-g187147-d233...	Official Site	92	291	0.9	Free Wifi	Room Service	3 rue Meslay 75003 Paris, France	233760
eL_Review-g187147-d233...	Expedia.com	91	117	0.9	Free Wifi		2 B boulevard Saint Martin 75010 Paris, France	233761

Collection of data from the tripadvisor.com website on **Restaurants** in Paris. The data collected from the website are,

- Restaurant name
- Restaurant web link
- Price range
- Cuisines offered
- Reviews
- Review date
- 

Screenshot of the data collected,

The image shows a screenshot of the Instant Data Scraper application overlaid on a web browser displaying the TripAdvisor 'Restaurants in Paris' page. The scraper window is in the foreground, showing a table of collected data with columns for popIndex, item 2, and item href. The data includes restaurant names like 'Le Capiello', 'La Meduse', and 'Les Apotres de Pigalle', along with their respective URLs. The background browser window shows the TripAdvisor search results for 'Restaurants in Paris', listing the same three restaurants with their ratings, reviews, and price ranges.

popIndex	item 2	item href
urant_Review #1 of 7.621 Results	French	https://www.tripadvisor.com/Restaurants-g18711-Eur
urant_Review #2 of 7.621 Results	Vegetarian Friendly	https://www.tripadvisor.com/Restaurants-g18711-Vegetarian-Friendly
urant_Review #3 of 7.621 Results	South American	https://www.tripadvisor.com/Restaurants-g18711-South-American
urant_Review #4 of 7.621 Results	French	https://www.tripadvisor.com/Restaurants-g18711-French
urant_Review #5 of 7.621 Results	Asian	https://www.tripadvisor.com/Restaurants-g18711-Asian
urant_Review #6 of 7.621 Results	Barbecue	https://www.tripadvisor.com/Restaurants-g18711-Barbecue
urant_Review #7 of 7.621 Results	French	https://www.tripadvisor.com/Restaurants-g18711-French
urant_Review #8 of 7.621 Results	French	https://www.tripadvisor.com/Restaurants-g18711-French
urant_Review #9 of 7.621 Results	French	https://www.tripadvisor.com/Restaurants-g18711-French
urant_Review #10 of 7.621 Results	Italian	https://www.tripadvisor.com/Restaurants-g18711-Italian
urant_Review #11 of 7.621 Results	Lebanese	https://www.tripadvisor.com/Restaurants-g18711-Lebanese
urant_Review #12 of 7.621 Results	Indian	https://www.tripadvisor.com/Restaurants-g18711-Indian
urant_Review #13 of 7.621 Results	French	https://www.tripadvisor.com/Restaurants-g18711-French

**Restaurants in Paris**

12/10/2017 8:00 PM 2 guests Find a restaurant Clear search

Availability Relevance Ranking Name

**Le Capiello**  
175 reviews  
#1 of 7.621 Results  
\$\$ - \$\$\$ French, European, Contemporary, Vegetarian Friendly, Vegan Options, G...  
"Highly recommended" 12/07/2017  
"Charming, Delicious and Great Service!" 12/05/2017

**La Meduse**  
151 reviews  
#2 of 7.621 Results  
\$\$ - \$\$\$ Vegetarian Friendly, Vegan Options  
"Best part of Paris" 11/29/2017  
"So good!" 11/17/2017

**Les Apotres de Pigalle**  
1,108 reviews  
#3 of 7.621 Results  
\$\$ - \$\$\$ South American, Brew Pub, European, Vegetarian Friendly, Vegan Options.  
"Great find, excellent service, tasty foo..." 12/07/2017  
"Highlight meal of the trip" 11/26/2017

- Name
- Web link
- Number of reviews
- Ranking
- Number of booking options

**Instant Data Scraper**

Try another table

Locate "Next" button

Start crawling

Min delay: 1 sec

Max delay: 20 sec

Download data or locate "Next" to crawl multiple pages

Download CSV

Download XLSX

Pages scraped: 1  
Rows collected: 30  
Rows from last page: 30  
Working time: 0s

Help/Feedback

more href x popRanking x photo\_image src

tripadvisor.com/Attraction_Review-#1 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#2 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#3 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#6 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#7 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#8 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#14 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#15 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#18 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#19 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#20 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#22 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com
tripadvisor.com/Attraction_Review-#25 of 577 Sights & Landmarks in Paris	https://media-cdn.tripadvisor.com

☐ Historic Sites (60)  
☐ Architectural Buildings (59)  
☐ Sacred & Religious Sites (43)  
 More >

**Neighborhoods**

☐ Le Marais (25)  
☐ ...

Things to Do in Paris, France - Paris Attractions

## Landmarks in Paris

Line

**Eiffel Tower**

112,802 reviews

77 Sights & Landmarks in Paris

Points of Interest & Landmarks

187 booking options

**More Info**

**Louvre Museum**

80,495 reviews

77 Sights & Landmarks in Paris

Points of Interest & Landmarks

182 booking options

**More Info**

**Notre Dame Cathedral**

58,184 reviews

#3 of 577 Sights & Landmarks in Paris

Match: Points of Interest & Landmarks

155 booking options

**More Info**

We got a lot of irrelevant and unnecessary data which was not needed for our Analysis. Hence we cleaned up the data as per our requirements.

- We removed the unwanted columns.
- We changed the Column Names
- Combined the cuisines offered into one column.
- Retrieved ID and Address using the Web Link.
- Removed unnecessary commas, words and Null Values from the dataset



Cleaned Data – Restaurants

Filter						
Restaurant Name	Restaurant Web Link	Review Count	Price Range	Cuisine	Review 1	
eduse	https://www.tripadvisor.com/Restaurant_Review-g187147-...	148	\$ - \$\$\$	Vegetarian Friendly,Vegan Options	Best part of Paris	
ppiello	https://www.tripadvisor.com/Restaurant_Review-g187147-...	167	\$ - \$\$\$	French,European,Vegetarian Friendly,Vegan Options,Glut...	Absolutely Amazi	
potres de Pigalle	https://www.tripadvisor.com/Restaurant_Review-g187147-...	1,098	\$ - \$\$\$	South American,European,Vegetarian Friendly,Vegan Opt...	Highlight meal of	
it Un Square	https://www.tripadvisor.com/Restaurant_Review-g187147-...	1,547	\$ - \$\$\$	French,Steakhouse,Vegetarian Friendly	Great Burgers	
strot d'Indochine	https://www.tripadvisor.com/Restaurant_Review-g187147-...	301	\$ - \$\$\$	Asian,Vietnamese,Vegetarian Friendly,Vegan Options	Just fantastic!	
Restaurant et Canal Saint Martin	https://www.tripadvisor.com/Restaurant_Review-g187147-...	176	\$ - \$\$\$	Barbecue,French,Steakhouse,European,Gluten Free Options	Perfect Steak, Sid	
neur Affine	https://www.tripadvisor.com/Restaurant_Review-g187147-...	738	\$ - \$\$\$	French,European,Vegetarian Friendly	AMAZING CHEES	
strot d'Yves	https://www.tripadvisor.com/Restaurant_Review-g187147-...	270	\$ - \$\$\$	French,European,Vegetarian Friendly	Popular neighbor	
Italia Brasserie	https://www.tripadvisor.com/Restaurant_Review-g187147-...	898	\$ - \$\$\$	Italian,Vegetarian Friendly,Vegan Options	Glad we found th	
re fleur	https://www.tripadvisor.com/Restaurant_Review-g187147-...	2,410	\$ - \$\$\$	French,Steakhouse,European	NOT TO BE MISSE	
am	https://www.tripadvisor.com/Restaurant_Review-g187147-...	528	\$ - \$\$\$	Lebanese,Mediterranean,Middle Eastern,Vegetarian Frien...	Best Lebanese for	
Jawad Longchamp	https://www.tripadvisor.com/Restaurant_Review-g187147-...	235	\$ - \$\$\$	Indian,Pakistani,Vegetarian Friendly,Vegan Options	Awesome is the v	
agerie Danard	https://www.tripadvisor.com/Restaurant_Review-g187147-...	548	\$ - \$\$\$	French,European,Vegetarian Friendly	Dinner at Paris	
Picnic	https://www.tripadvisor.com/Restaurant_Review-g187147-...	451	\$ - \$\$\$	French,European,Street Food,Vegetarian Friendly,Gluten F...	Perfect for a large	
rante Lo Spaghettino	https://www.tripadvisor.com/Restaurant_Review-g187147-...	449	\$ - \$\$\$	Italian,Mediterranean,European,Vegetarian Friendly,Vega...	Very good	
ssue	https://www.tripadvisor.com/Restaurant_Review-g187147-...	244	\$ - \$\$\$	French,Cafe,European,Vegetarian Friendly,Vegan Options	Nice environmen	
ie du jour	https://www.tripadvisor.com/Restaurant_Review-g187147-...	359	\$ - \$\$\$	French,European,Vegetarian Friendly,Vegan Options	Totally enjoyable	
	https://www.tripadvisor.com/Restaurant_Review-g187147-...	243	\$ - \$\$\$	French,European,Vegetarian Friendly,Vegan Options,Glut...	Excellent dinner i	
ouille	https://www.tripadvisor.com/Restaurant_Review-g187147-...	282	\$ - \$\$\$	French,European	Great food / Orig	
i	https://www.tripadvisor.com/Restaurant_Review-g187147-...	206	\$ - \$\$\$	Italian,French,Pizza,European,Vegetarian Friendly	Pavilla	
attoria Dell'isola	https://www.tripadvisor.com/Restaurant_Review-g187147-...	447	\$ - \$\$\$	Italian,Pizza,Seafood,Vegetarian Friendly	Nice place	
on	https://www.tripadvisor.com/Restaurant_Review-g187147-...	928	\$ - \$\$\$	French,European	Dinner	
ite aux lettres	https://www.tripadvisor.com/Restaurant_Review-g187147-...	487	\$ - \$\$\$	French,European,Vegetarian Friendly,Vegan Options	Excellent food an	
Imogene	https://www.tripadvisor.com/Restaurant_Review-g187147-...	400	\$ - \$\$\$	French,Vegetarian Friendly,Vegan Options,Gluten Free Op...	Wonderful!	
olio e pomodoro	https://www.tripadvisor.com/Restaurant_Review-g187147-...	295	\$ - \$\$\$	Italian,Mediterranean,European,Vegetarian Friendly,Vega...	delicious food,frie	
York a Paris	https://www.tripadvisor.com/Restaurant_Review-g187147-...	461	\$ - \$\$\$	French,American,European,Vegetarian Friendly,Gluten Fre...	Would defiantly n	
cini	https://www.tripadvisor.com/Restaurant_Review-g187147-...	493	\$ - \$\$\$	Italian,Pizza,European,Vegetarian Friendly	Cute, small, Italia	
tus	https://www.tripadvisor.com/Restaurant_Review-g187147-...	458	\$ - \$\$\$	French,European,Vegetarian Friendly,Gluten Free Options	Delicious	
ache et Le Cuisinier	https://www.tripadvisor.com/Restaurant_Review-g187147-...	751	\$ - \$\$\$	French,European,Vegetarian Friendly	My kind of French	
anailles	https://www.tripadvisor.com/Restaurant_Review-g187147-...	480	\$ - \$\$\$	French,European	Fantastic place	
pacionu	https://www.tripadvisor.com/Restaurant_Review-g187147-...	419	\$ - \$\$\$	Italian,Pizza,Vegetarian Friendly,Vegan Options	Very popular pizz	
ora Cebicheria	https://www.tripadvisor.com/Restaurant_Review-g187147-...	316	\$ - \$\$\$	Peruvian,Seafood,South American,Vegetarian Friendly,Ve...	Excellent food	
<						>

We performed the same steps for Hotels and Tourist spots.



### Step 3: Storing the Data

For storing the data, we used the RSQLite package to use SQLite as our database.

We created a database called **TripAdvisorDB**.

After the collection of data from the website, we created three Tables namely

- **RestaurantTable**
- **HotelTable**
- **POI\_Table**

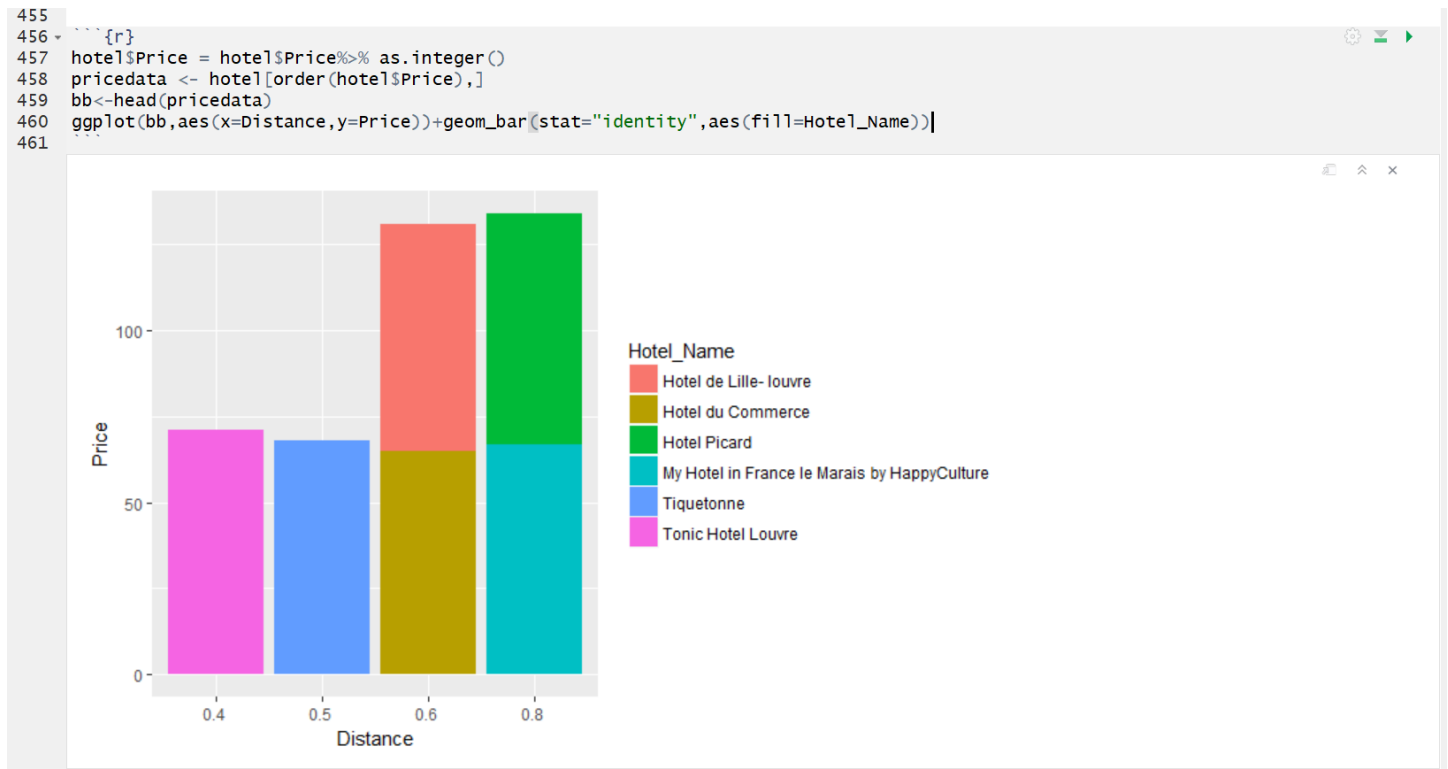
While creating the tables we needed a primary key for each Table, so, we used the weblink to get a unique ID for each entity and assigned it as the primary key for each table.

```
188
189 {r}
190 db<- dbConnect(SQLite(), dbname = 'TripAdvisorDB')
191
192
193
194
195 {r}
196
197 str(restaurant)
198 dbSendQuery(conn = db, "CREATE TABLE RestaurantTable (
199     Restaurant_Name TEXT,
200     Restaurant_web_Link TEXT,
201     Review_Count TEXT,
202     Price.Range TEXT,
203     Cuisine TEXT,
204     Review_1 TEXT,
205     Review_1_date TEXT,
206     Review_2 TEXT,
207     Review_2_date TEXT,
208     Category TEXT,
209     Restaurant_address TEXT,
210     Restaurant_ID numeric,
211     PRIMARY KEY(Restaurant_ID)
212 )
213 WITHOUT ROWID")
214 dbwriteTable(conn = db, name = "restaurant", value = restaurant, row.names=FALSE, append = TRUE)
215
216
217
218
219
220 {r}
221 str(hotel)
222 dbSendQuery(conn = db, "CREATE TABLE HotelTable (
223     Hotel_Name TEXT,
224     Hotel_web_Link text,
225     Cheapest_Provider TEXT,
226     Price num,
227     Review_Count text,
228     Distance num,
229     Amenities_1 TEXT,
230     Amenities_2 TEXT,
231     Hotel_address TEXT,
232     hotel_id num,
233     PRIMARY KEY(hotel_id)
234 )
235 WITHOUT ROWID")
236
237 dbwriteTable(conn = db, name = "hotel", value = hotel, row.names=FALSE, append = TRUE)
238
239
59:1 (Top Level) ↕ R Markdown
```

## Step 4: Data Analysis

We did various types of analysis with the data that we collected.

1. Sentimental Analysis of the reviews.
2. Analysis of Hotels – How Price varies with distance from Paris center.
3. Highest Reviews, Highest bookings, Cheapest Hotels etc
4. Plotting location of hotel, restaurant and tourist spots on a map.
5. A bird's eye view of the location showing the hotels, restaurants and tourist spots in the area for ease of planning for the tourist.



Price in dollars vs Distance in miles

Hotels Ranked according to highest reviews.

```
462
463
464 {r}
465 hotel$Review_Count = hotel$Review_Count%>% as.numeric()
466 rwdata <- hotel[order(hotel$Review_Count, decreasing=TRUE),]
467 print(rwdata)
468
```

Cheapest_Provider <fctr>	Price <int>	Review_Count <dbl>	Distance <chr>	Amenities_1 <fctr>	Amenities_2 <fctr>
Agoda.com	177	967	0.7	Free Wifi	Room Service
Booking.com	106	964	0.5	Free Wifi	
Travelocity	108	959	0.6	Free Wifi	
Melia.com	155	945	0.4	Free Wifi	Room Service
Official Site	161	934	0.3	Free Wifi	Bar/Lounge
Agoda.com	336	900	0.5	Free Wifi	Room Service
Official Site	112	900	0.5	Free Wifi	Bar/Lounge
Booking.com	107	888	0.6	Free Wifi	Room Service
Agoda.com	146	865	0.6	Free Wifi	
Booking.com	135	852	0.5	Free Wifi	Bar/Lounge

1-10 of 180 rows | 4-9 of 10 columns

Previous 1 2 3 4 5 6 ... 18 Next

```
469
470
```

We performed sentimental analysis on the reviews by the travelers for each of the three entities.

For example, here is the sentimental analysis of the reviews of each restaurant.

We decided to create a wordcloud of the words picked up during sentimental analysis:

```
320
321 {r}
322 library("tm")
323 library("SnowballC")
324 library("wordcloud")
325 library("RColorBrewer")
326 text <- restaurant$Review_1
327 docs <- Corpus(VectorSource(text))
328
329
330 toSpace <- content_transformer(function (x , pattern ) gsub(pattern, " ", x))
331 docs <- tm_map(docs, toSpace, "/")
332 docs <- tm_map(docs, toSpace, "@")
333 docs <- tm_map(docs, toSpace, "\\|")
334
335
336 dtm <- TermDocumentMatrix(docs)
337 m <- as.matrix(dtm)
338 v <- sort(rowSums(m),decreasing=TRUE)
339 d <- data.frame(word = names(v),freq=v)
340 head(d, 10)
341
342
343 set.seed(1234)
344 wordcloud(words = d$word, freq = d$freq, min.freq = 1,
345           max.words=200, random.order=FALSE, rot.per=0.35,
346           colors=brewer.pal(8, "Dark2"))
347
```

## WordCloud

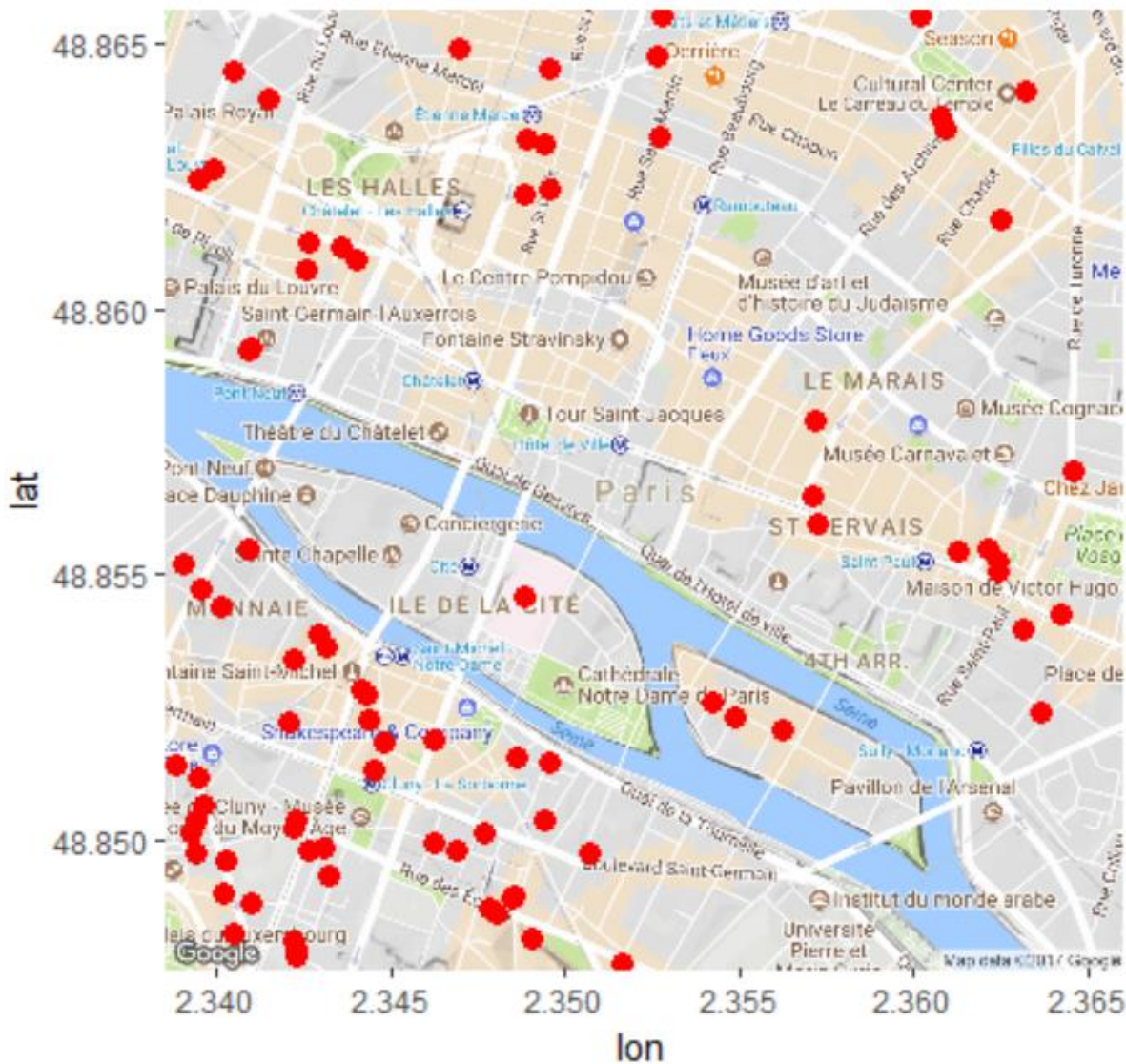


- Plotting the Location of the Hotels on the map.

```

319
320
321 {r}
322 # GEOCODE
323 geo.paris_locations <- geocode(as.character(hotel$Hotel_Name))#gets all lat and long
324 # COMBINE DATA
325 hotel.df <- cbind(hotel,geo.paris_locations )
326
327
328 # USE WITH GG PLOT pointing each n every hotel
329 get_map("Paris", zoom = 15) %>% ggmap() +
330   geom_point(data = hotel.df, aes(x = lon, y = lat), color = "red", size = 3)
331

```



- Bird's Eye View of all the Restaurants, Hotels and Tourist Spots in the area.

```

{r}
# geocode
geo.hotel_locations <- geocode(as.character(hotel$Hotel_Name))#gets all lat and long of hotels
geo.restaurant_locations <- geocode(as.character(restaurant$Restaurant_Name))#gets all lat and long of restaurants
geo.poi_locations <- geocode(as.character(Points_of_interest$Name))#gets all lat and long of POI

{r}
# location coordinates
hotel.df <- cbind(hotel,geo.hotel_locations)
restaurant.df <- cbind(restaurant,geo.restaurant_locations )
poi.df <- cbind(Points_of_interest,geo.poi_locations )

# Plotting on the map
get_map("Paris", zoom = 16, maptype = "terrain") %>% ggmap() +
  geom_point(data = hotel.df, aes(x = lon, y = lat), color = "red", size = 3)+
  geom_point(data = restaurant.df, aes(x = lon, y = lat), color = "green", size = 3)+
  geom_point(data = poi.df, aes(x = lon, y = lat), color = "purple", size = 3)

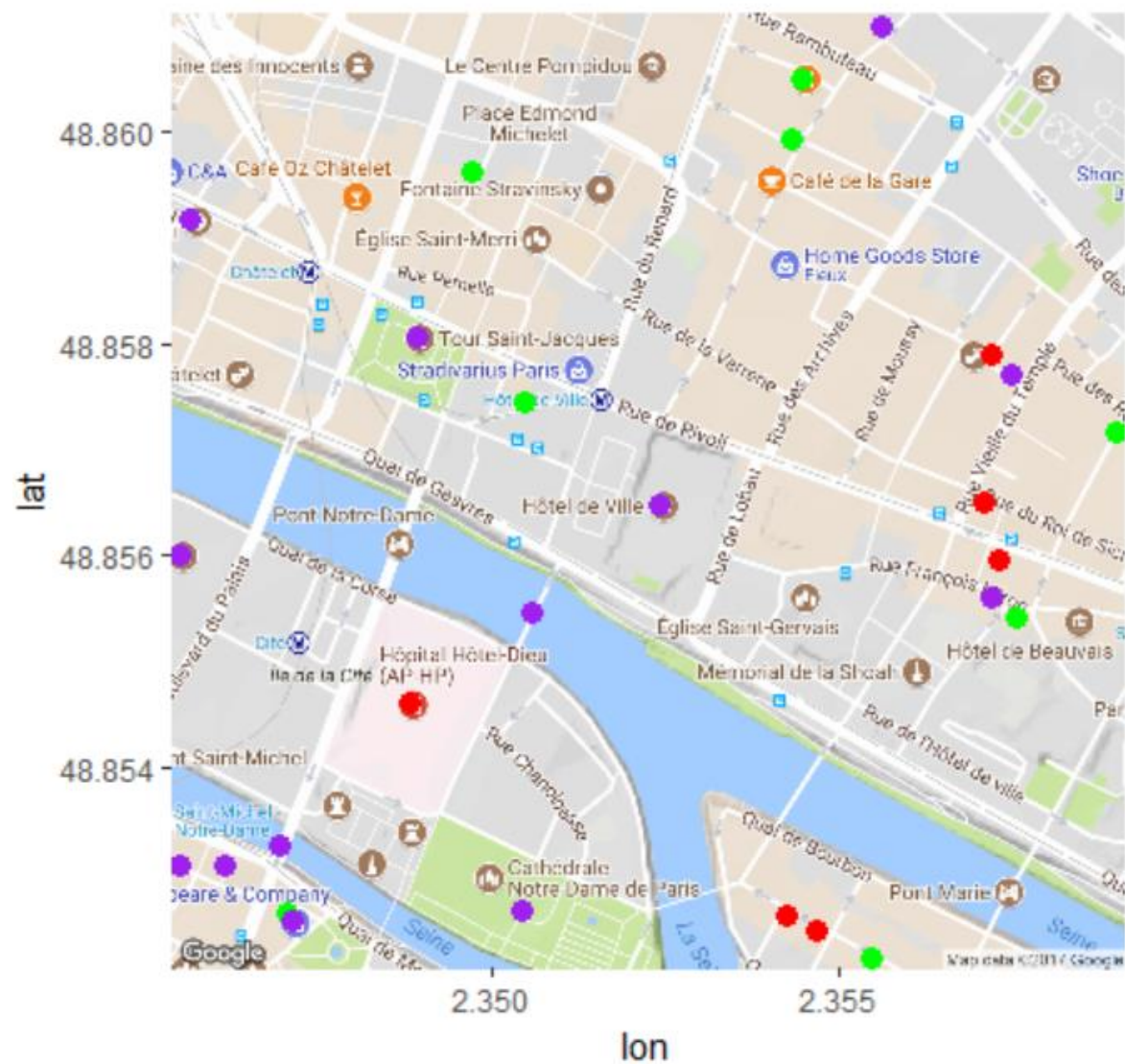
```



## Red- Hotels

### Green – Restaurants

### Purple – Tourist Spots



## Insights

### Learning Outcomes:

We chose to do Analysis on TripAdvisor.com because the data offered for a search is very elaborate and often very confusing for the user. With this project, we aimed to give a very concise and straightforward response to a user's query.

During the course of this project, we learnt a lot of new techniques for analysis and visualization.

- We learnt to effectively use ggmap function.
- How to use HTML nodes to our advantage while scraping the data.
- How to assign primary keys to a database.
- Text analysis – Sentiment Analysis, Wordcloud.

We had difficulty to get the address of the hotel as it was inside a follow-up link. To overcome this problem, we tried using a variety of web scrapers and Chrome Extensions. We even tried to build our own web scraper using BeautifulSoup in Python.

Finally, we figured out that we could use the hyperlink extracted during our initial web scraping to get to the web page of each hotel and individually scrape the address.

### Future Possibilities:

- We could further enhance the project by building a 'Shiny' app.
- We could use the location specified by the user to get the Hotels, Restaurants and Tourist spots in the locality.
- We can extend our project to include flight details and form a tour package for the specified budget.

### References:

1. TripAdvisor.com
2. Wikipedia.com
3. R for Data Science – Hadley Wickham