An Agile Way to Select Places to Visit for Vacation

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Introduction

What is Vacation?

- Vacation involves spending time away from home. It may involve local or international travel. It could be for a few days or more.
- Regardless of the length of time, vacation should be built to serve its purpose: relax or do nothing, learn something new, experience a new location, or take a holiday job.
- Proper planning helps to make vacation worthwhile, irrespective of the purpose of the vacation. Therefore, the plan should be drawn before commencing the holiday.
- So, while it is fun to go somewhere, it is more important to make plans for an enjoyable holiday to create memorable experiences.

Introduction – Vacation Planning

Planning a Vacation

- Proper planning helps to increase the possibility of having an exciting and worthwhile vacation.
- However, the process of planning a vacation can be exhausting, leading to unfulfilled vacations.
- A common problem with planning a vacation is how to choose the places to visit since the advertised options are as varied as they are many
- This problem causes anxieties because there are many uncertainties for which the answers are not readily available.
- For a vacation that is supposed to be recreational and fun, planning it may be its doom because the vacation may eventually be postponed, cancelled, or poorly planned

Introduction – Scenario

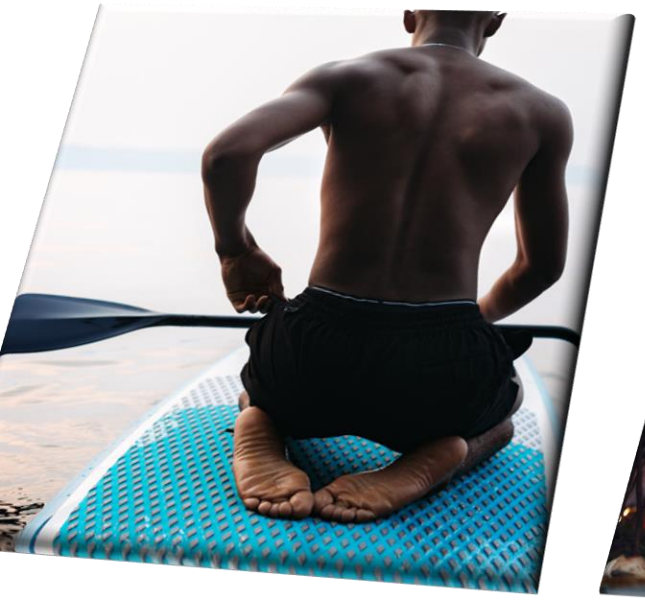
Scenario

- Jones, a staff of an organisation, was exceptional in delivering services during the past 12 months amidst the pandemic.
- The company rewarded him with a 14-day family vacation from Leeds in the UK to Winnipeg in Canada.
- The vacation is scheduled for August 15 to August 29 at Holiday Inn.
- Jones excitedly announced the trip to his family (partner and two children). Everyone was ecstatic about the summer trip to Canada – a country they had hoped to visit as a family.
- The discussion each day was about the recreational activities to engage in and places to visit.

Introduction – Problem

Problem

- Jones noticed that divergence in the preferences and needed a way to harmonise all their different choices.
- He approached his friend, Keitha - a data scientist, who offered to help with planning the recreational activities and places to visit.
- Jones supplied Keitha with a combined list of recreational activities and exciting places liked by each family member.
- Keitha intends to write a programme that would juxtapose all the individual preferences with the venues and activities available around the Holiday Inn.



Objectives

To design a programme that will

- streamline the process of searching for available venues at a particular location and produce a list of preferred venues with acceptable attributes
- increase the ease and speed of getting required venue information, thereby reducing turnaround times in creating a plan for visiting different holiday venues
- make it easy to modify the itinerary for a vacation in the event of an unexpected occurrence

Target

The target of this programme are

Target Market

- Trip/Vacation Planners
- Tourism Industry

Target Audience

- Holidaymakers
- Protocol Officers
- Travel Agencies

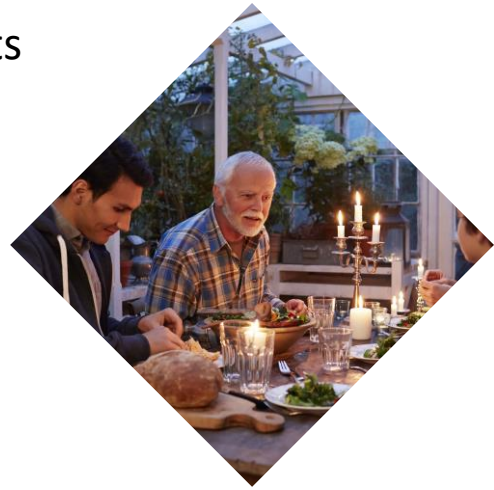
Application

This programme can be used in two broad ways to provide sensational experiences during vacations and tours.

- **General Application**
  - It provides information on locations and venues
  - It provides specific information for use when creating an itinerary for a vacation or trip
- **Specialised Application**
  - Its deployment gives insight into locations and venues of interest in real-time
  - Improves marketing value for venues and tour packages
  - It increases efficiency and effectiveness when responding to clients' trip-planning requests

General Application

- To get information about a location before visiting the place
- To obtain information required to create a shortlist of venues of particular interest
- To get information about the facilities available at a venue
- To get details about venues and locations that would influence activities to engage in
- To compare sites to improve decision-making when choosing a place to visit
- To identify venues on a map in real-time
- To identify popular venues in a location
- To get recommendations about different venues that will aid decision-making about places to visit
- To assess locations to confirm that places that are personally of interest are available
- To get information to use to plan recreational activities of interest by determining venues that offer the recreational activities
- To plan an itinerary for the vacation by determining the distance between venues, parking availability, etc
- To be able to interact knowledgeably with others using the information garnered about a location before visiting the place
- To plan a trip that is flexible and can accommodate unscheduled activities or events



Specialised Purpose – Data and Response Time

Real-time Information

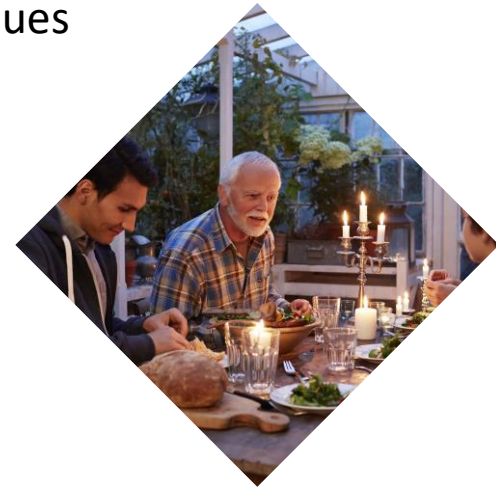
- To obtain recent photos of venues
- To get recent recommendations about venues
- To get current venue ratings
- To get the current address of venues
- To get real-time information to aid the research of venues at a location or multiple locations

Response Time

- To improve the time-to-response of each client's requests, thereby creating a positive effect on the rating of the trip planner or travel agency
- To increase the turnaround time for each client's request making it possible to attend to more clients' requests within the same time frame with a resultant positive effect in the revenue generated within a specific timeframe
- To get recent data that will give clients vivid insight about venues which improves client's time-to-response to options provided

Comparison using Current Data

- To compare exciting places of attraction in different locations to increase venues options and aid decision-making
- To compare venues within the same category to streamline venue options and create itinerary
- To obtain user-generated content about venues



Specialised Purpose – Packages and Itinerary

Custom-built Packages

- To create special vacation packages that will incorporate places of interest for a tour group or vacationers
- To create custom-built vacation to meet the unique needs of clients by specifying client's preferences and requirements
- To discover interesting venues that are near a particular reference point
- To identify attributes of venues that will be used to select venues to visit when planning trips and tours

Itinerary Creation

- To aid in creating a fit-for-purpose itinerary for each client
- To create an itinerary for group tours such as students' excursions, cultural heritage tours, etc
- To identify different itinerary possibilities to clients

Itinerary Modification

- To increase flexibility in the itinerary service provided to clients to accommodate changes in the client's circumstance by using real-time information and recommendations about venues

Marketing Tour Services

- To create add-on services that can be delivered to clients considering customised packages

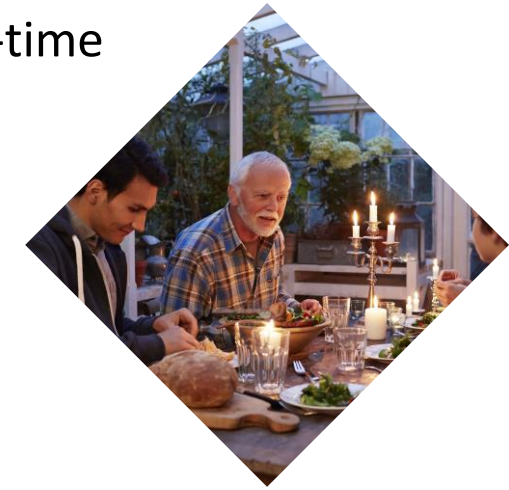
Application – Broad Usage

This programme can be used to

- plan family outings
- arrange reunion getaway activities for friends and alumni
- identify venues for corporate team building activities
- create itineraries for excursions
- design general and specialised tour packages

The stated applications are possible by using the programme to

- obtain data about venues in a locality
- search for places of interest (POI) around a location
- get venue ratings and recommendations
- get the distance between venues
- identify venues of personal interest that are within a vicinity
- identify venues on a map in real-time



Featured Case: Jones' Family Vacation – Solution

Information supplied

- the accommodation is Holiday Inn, Winnipeg, Canada
- aggregated list of venues of individual interest are 'Gym', 'Food Court', 'Restaurant', 'Pizza Place', 'Art Gallery', 'Coffee Shop', 'Theater', 'Juice Bar'

The programme

- Install/import libraires
- request for a list of all venues close to Holiday Inn, Winnipeg from Foursquare
- visualise the venues on a map
- filter the venue data using the list supplied by Jones
- obtain the venue ratings and recommendations
- segment the venues that are near each other and identify the popular venues
- Create venue clusters and determine the most common venues within each venue segment
- obtain trending venues in real-time and display them on a map

Note

The programme's runtime is expected to be less than two minutes

Featured Case – Advantages of the Solution

Agile

- It makes it easy for the parameters of the programme to be modified in response to new or additional supplied by Jones.
- The entire programme will not have to be rewritten to accommodate changes

Current Data Supply

- The venue data from Foursquare is recent and independently supplied by users

Multiple Preferences

- Multiple venues options used to shortlist preferred venues

Visualization

- A map of the location can be generated in real-time

Short Runtime

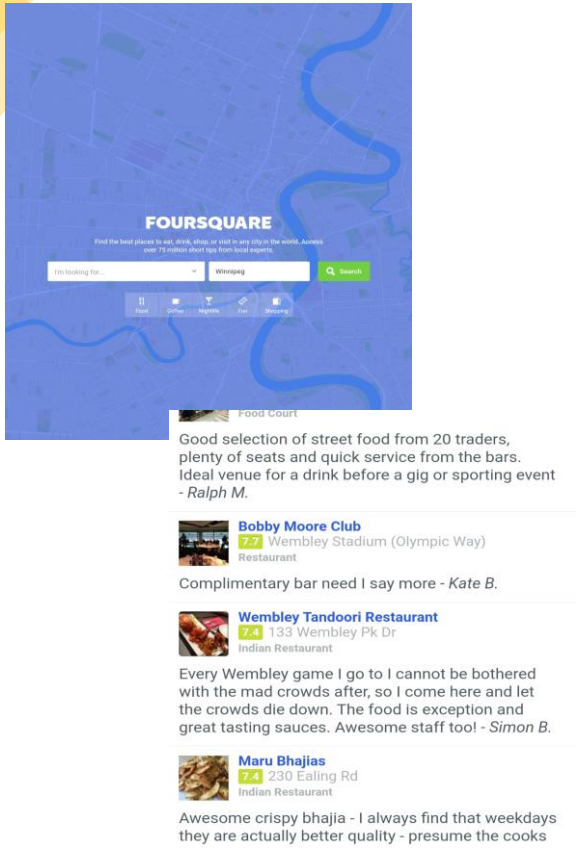
- Quick making it easy to check for multiple venue search requests within a short time

Note

The programme provides venue data, venue tips and recommendations, popular venues, and most common venues in real-time.

Data Source

The data is sourced from Foursquare.



Foursquare

- It is a technology company with a massive dataset of location-data
- The location data is available for use by anyone
- It is used by many companies (such as twitter, Airbnb, Samsung and Uber) whose services are driven by location data
- The dataset is crowd-sourced - individuals connect to Foursquare using either the Foursquare App or Website to add venues or update data about venues

Source:
https://foursquare.com
https://foursquare.com/products/places/

Data Source - Data

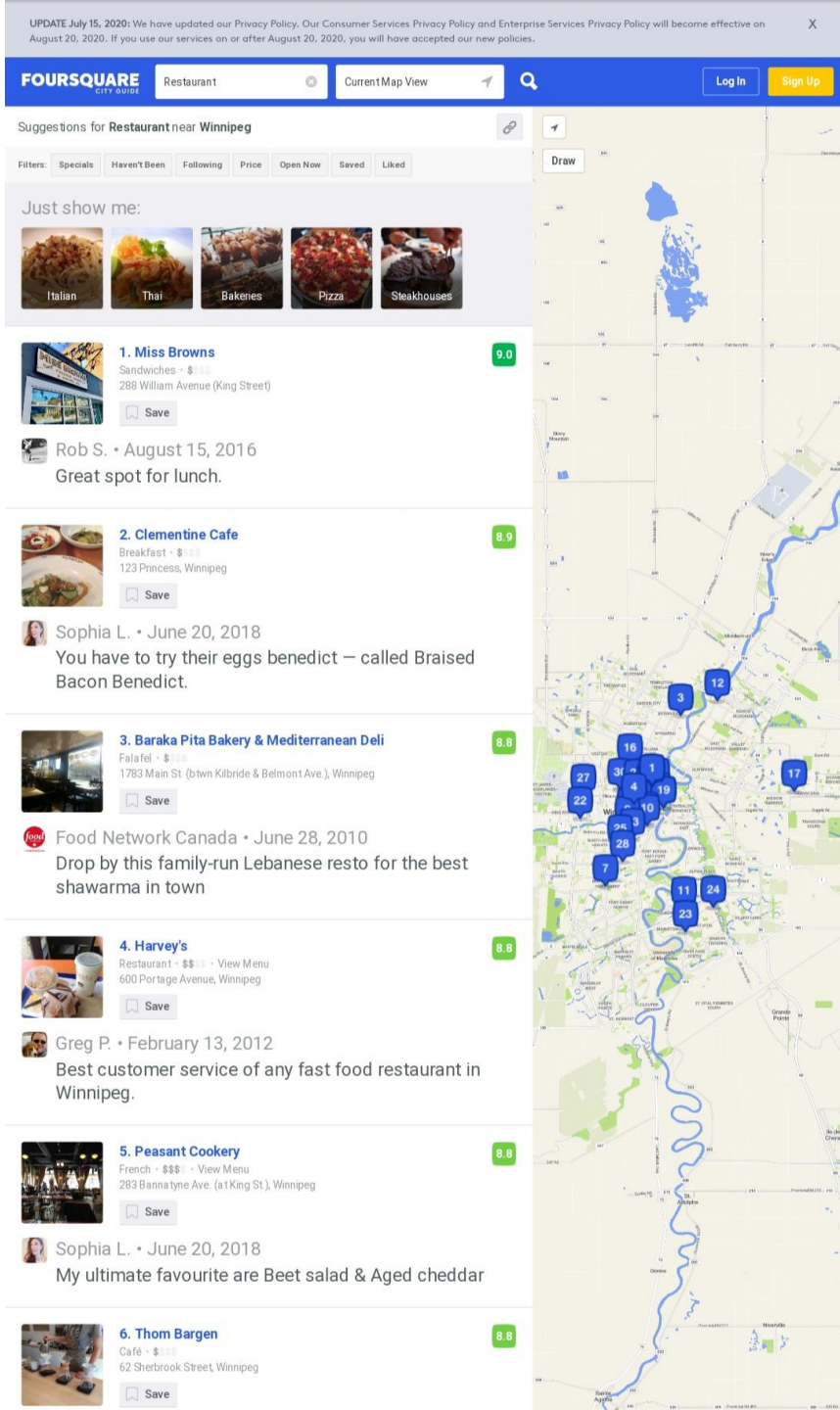
Foursquare Places - Data

Offers real-time access to a global database of rich venue data and user content used to drive location-based experiences on apps and websites.

The data from Foursquare Places

- represents 100M+ commercial points-of-interest (POI)
- covers 248+ countries and territories
- contains 80+ extended attributes
- is trusted by top enterprises their location-based services
- is updated regularly by the Foursquare Consumer App Superuser Community
- is accessible via Foursquare API (Application Programming Interface) or as a Flat File

Source: https://docs.foursquare.com/docs/places-data-overview



Data Source – Data Features

Foursquare Places – Data Features

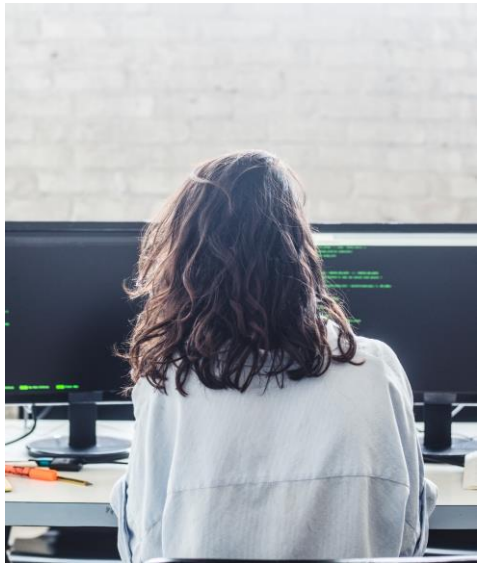
The venue data features are available as a flat file in JSON or TSV format.

The features of the venue data provided in real-time by Foursquare Places are

- 60M+ commercial points-of-interest (POI)
- 941 Venue Categories
- 1M+ fresh Tips (added within the past six months)
- 18.5M fresh Photos (added within the past six months)
- 7.6M+ Venues with popular hours
- 23K+ Chains, including retailers, auto dealerships, etc.

Source: https://developer.foursquare.com/docs/places-database/details/

Data Source – Places (Access & Usage)



Foursquare Places API – Access and Usage

The following control access to and usage of Foursquare API.

- API Endpoint - this is the point where two applications connect
- Rate Limit – this specifies the maximum number of calls allowed within a specific time interval
- Authentication - used to recognize users and authorise access

Source: https://developer.foursquare.com/docs/places-api/getting-started/

Data Source – API Endpoint

Foursquare API Endpoint

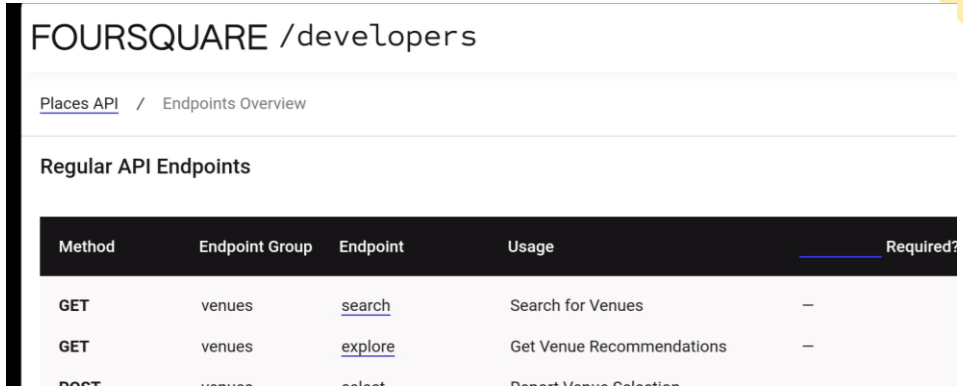
There are two types of API Endpoints

- Regular
  - Contains basic venue descriptive attributes such as data, category, and ID

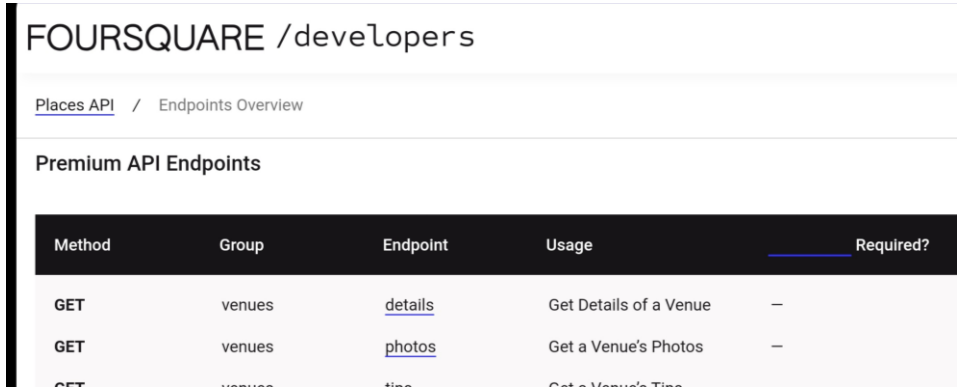
- Premium
  - Includes all basic attributes and other rich data such as ratings, URLs, photos, tips, menus, etc

Note:
Restrictions on endpoints are applied based on the type of account in use.

Regular Endpoint



Premium Endpoint



Source: https://developer.foursquare.com/docs/places-api/endpoints/

Data Source – Rate Limit

Foursquare Rate Limits

What is Rate Limit?
- It regulates the use of API
- It determines if a Regular or Premium API call will be made

Types of Rate Limit
- Daily Call Quota
- Hourly Rate Limit

Note:
- Rate limit acts per top-level endpoint, not per endpoint
- The limit that will be placed on the usage of the API will depend on whether hourly rate limit or daily call quota occurs first

Daily Call Quota

Account Tier	Sandbox	Personal	Start-up
Regular API Calls	950	99500	Call Foursquare for Upgrade
Premium API Calls	50	500	Call Foursquare for Upgrade

Call Quota
- represents the maximum number of API calls allowed in 24 hours
- resets daily at midnight UTC
- is dependent on the tier of the developer's account

Hourly Rate Limit

Type	Hourly Rate Limit
Userless requests to venues/* endpoints	5000
Userless requests to other endpoint groups	500

Source: https://developer.foursquare.com/docs/places-api/rate-limits/

Data Source – Authentication

Authentication
Refers to the codes that allow users to connect to Foursquare.

There are two types of authentications:
- userless auth
- user auth

Userless Auth

- a user's permission is not required
- requires Client ID and Client Secret

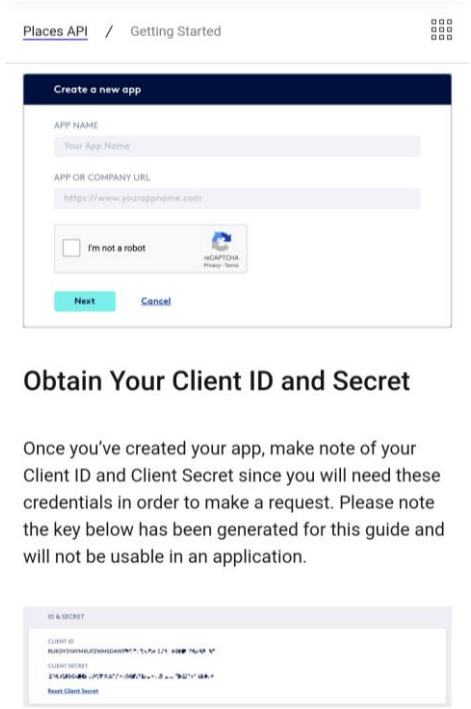
User Auth

- user's permission is required
- there are two types
  - iOS/Android (which uses native auth)
  - Web (which uses OAuth)

Note:
OAuth is a standard that allows applications and websites to access resources on other applications or websites on behalf of users.

Source: https://developer.foursquare.com/docs/places-api/authentication/

Data Source – Places API



Foursquare Places API – How to

To use Places API, the developer would

- create a developer's account
- create a Foursquare app and submit the URL for the host
- obtain app credentials – Client ID and Client Secret
- make an API call to get requests of Foursquare's servers
- use OAuth access to make authenticated calls

Note:

- A developer can choose from different account options.
- The type of account determines the amount of data obtainable at any point in time.

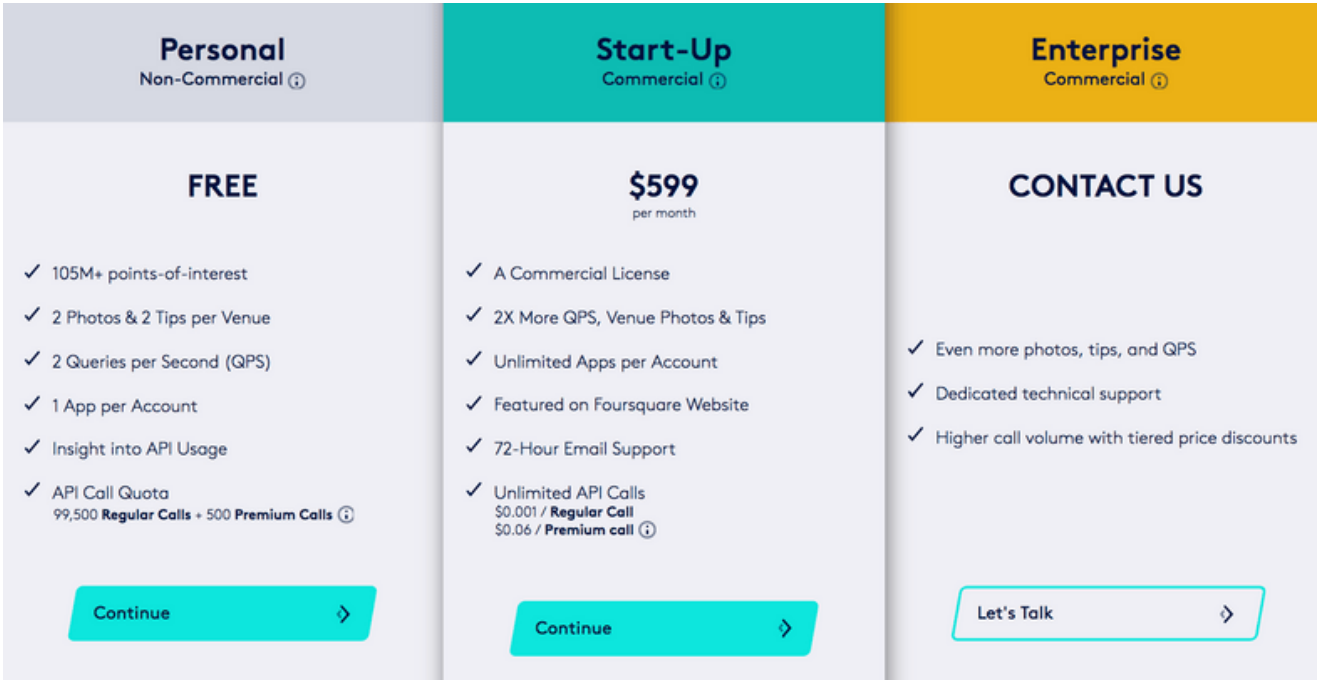
Source: https://developer.foursquare.com/docs/places-api/getting-started/

Data Source – Accounts

Foursquare Accounts

There are four account tiers:

- Sandbox (Initial Account Created)
- Personal account (Non-commercial)
- Start-up (Commercial)
- Enterprise (Commercial)



Note:

- Upgrade from Sandbox to Personal needs credit card verification.
- A personal account can be upgraded to a more suitable account as needed.

Source: https://developer.foursquare.com/docs/places-api/getting-started/

Foursquare Venue

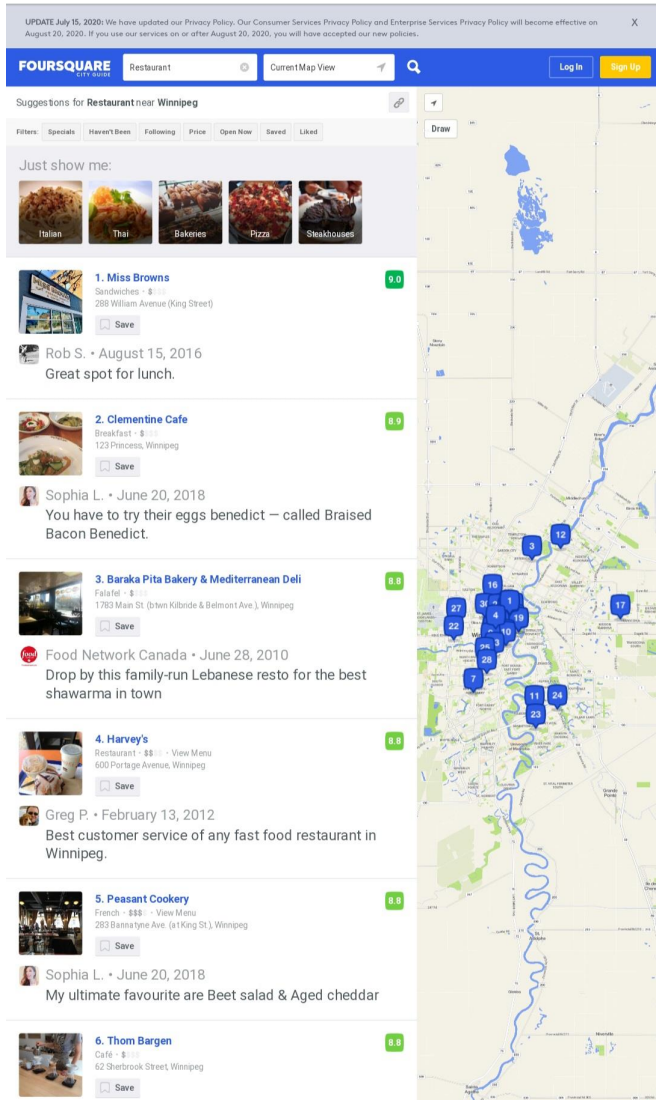
Foursquare Venue

- Is a real-world (physical) location, and real places where people can meet up or like to spend some time
- Has a name, geographical coordinates (latitude and longitude), and a primary category

Foursquare API – Venue Search

- Used to identify venues around a particular location.
- The endpoints used determines the results obtainable from a venue request.

  https://api.foursquare.com/v2/venues/search
  https://api.foursquare.com/v2/venues/explore



Restaurants around Winnipeg, Canada

Source: https://developer.foursquare.com/docs/listing-syndicators/venues/

Foursquare Venue Search

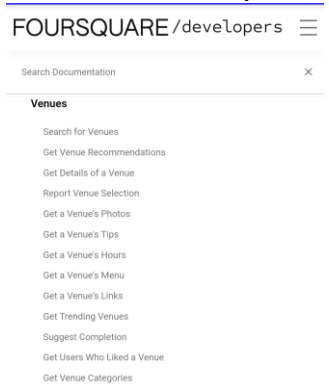
How to Find a Venue on Foursquare

- Get the ID of the venue
- Use the venues/search API endpoint to search for a venue using the venue's ID
- Indicate the name and geographical coordinates (latitude and longitude) of the venue
- Authenticate the connection using either a userless or user authentication
- Specify required parameters

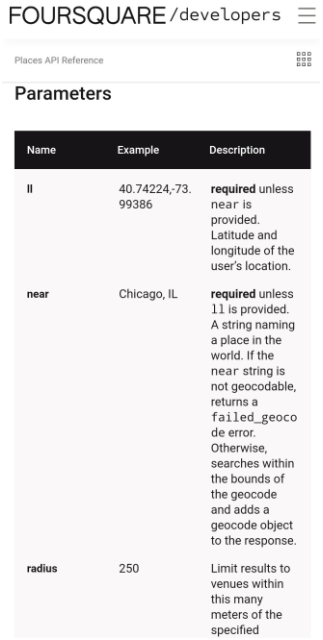
Note:

- Include street address, city, state, zip, phone number, or Twitter handle as additional attributes to improve the search outcomes

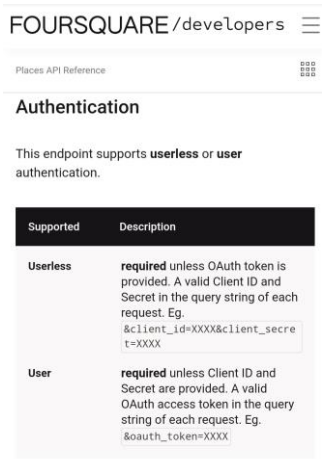
Venue Search/Explore



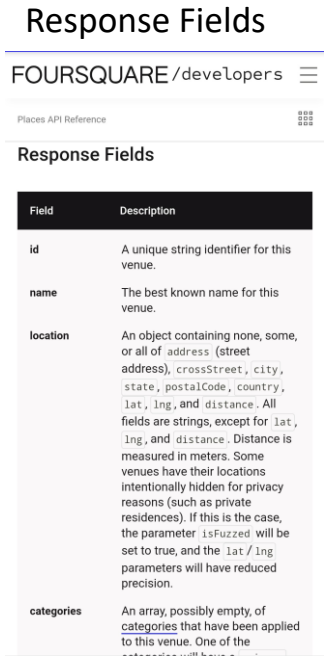
Search Parameters



Authentication



Response Fields



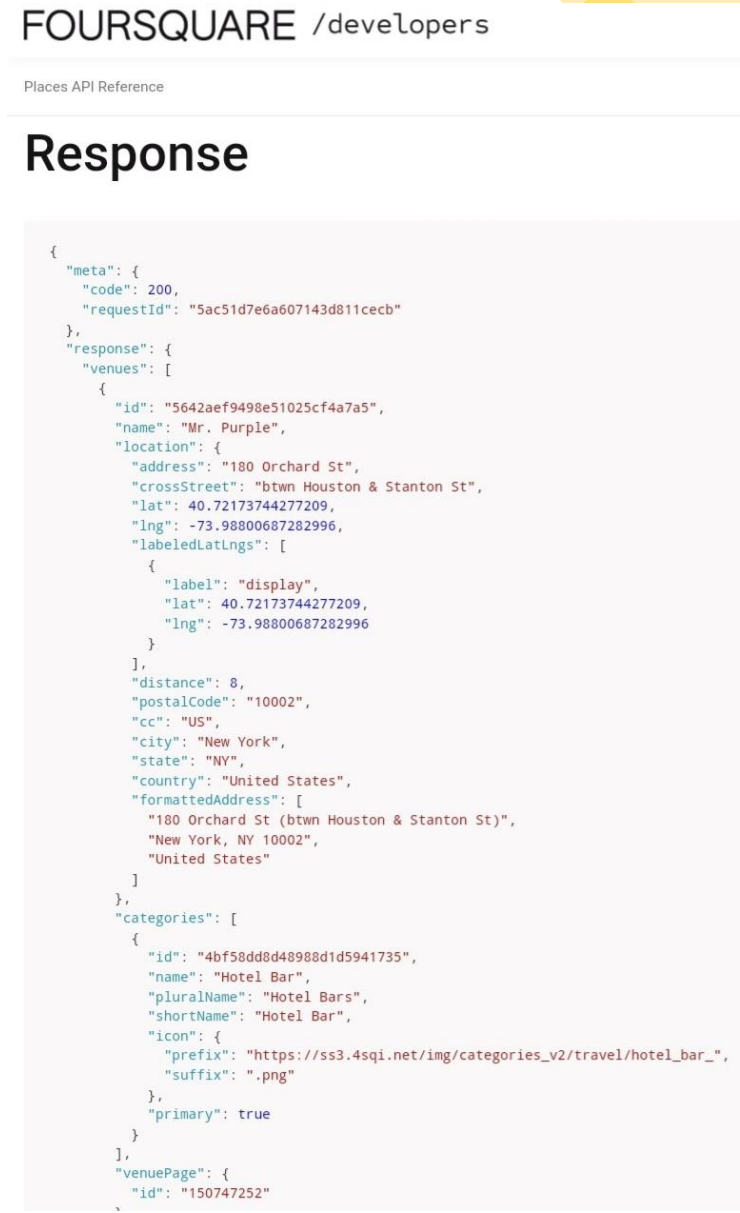
Source: https://developer.foursquare.com/docs/api-reference/venues/search/

Foursquare Response to Venue Search

The table and picture show some fields supplied in the response.

Field	Description
id	A unique string identifier for the venue
name	The best know name for the venue
location	An object containing none, some, or all of 'address', 'crossStreet', 'city', 'state', 'postalCode', 'country', 'lat', 'lng' and 'distance' Note: A venue's location may be hidden due to privacy reasons (e.g. private residencies)
categories	An array, possibly empty, of categories that have been applied to this venue

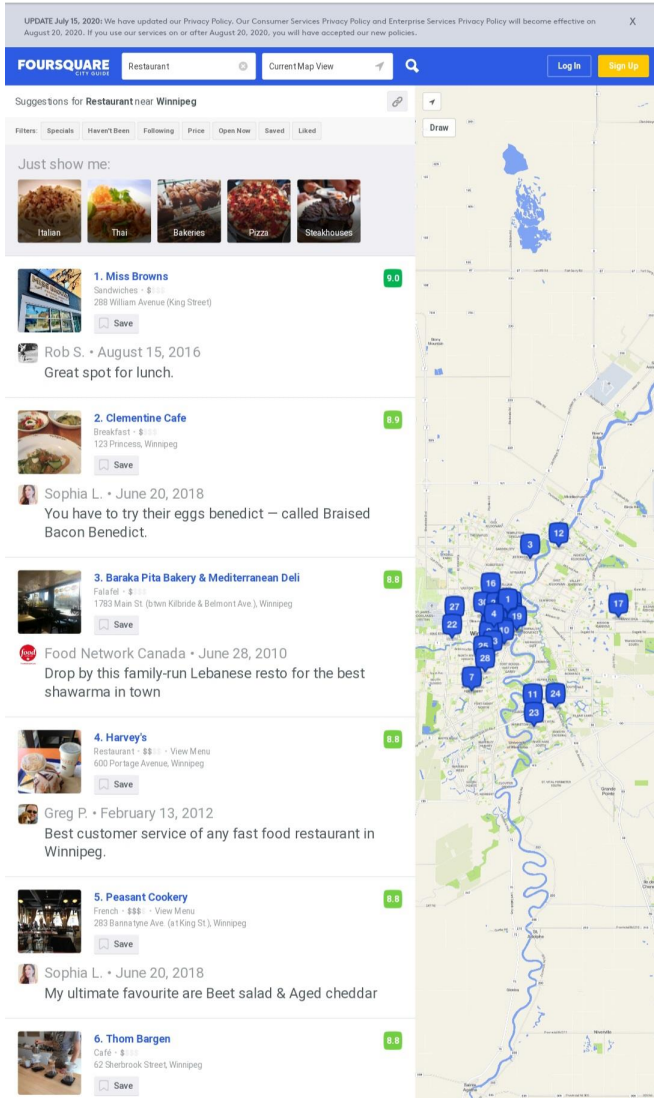
Source: https://developer.foursquare.com/docs/api-reference/venues/search/



Foursquare Response - Description

Venue Response is the data supplied in response to a successful API venue request.

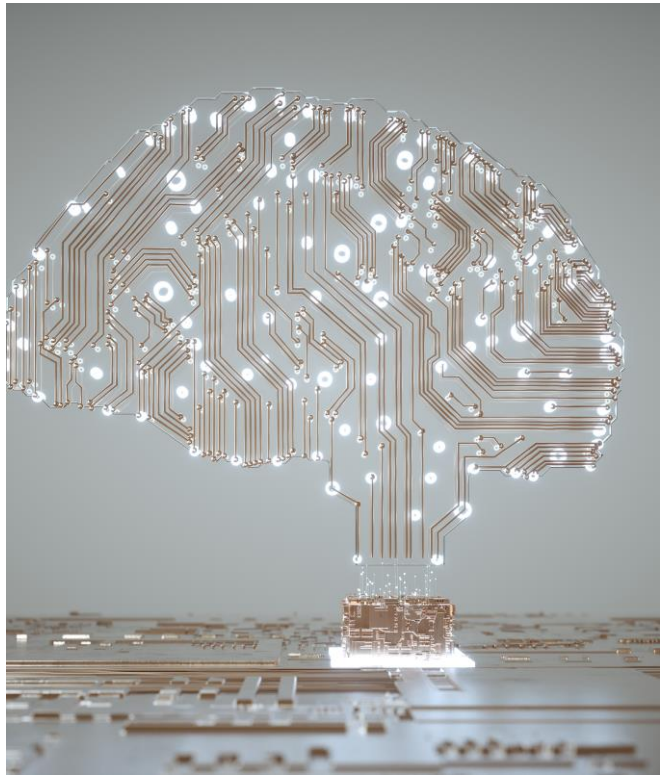
- It contains a list of recommended venues near a specified location
- Each venue returned will include attributes such as venue name, venue ID, venue category, venue location (address), venue latitude and venue longitude
- The result from Foursquare can be displayed on a map



Restaurants around Winnipeg, Canada

Data Skills

- Programming in Python
- Working with Foursquare API
- Data Wrangling
- Machine Learning
- Mathematical Operations
- Map Visualisation



Data Tools

Item	Description
Python	Programming language
Python Notebook	Application to write and share code
Foursquare API	Real-time location data from the Foursquare server
Github	Repository for programmers
Geopy	To get coordinates of an address or location
Nominatim	To convert any address to latitude and longitude values
Haversine Formula	To calculate the great-circle distance between two points on a sphere
Math	For mathematical calculations
JSON	To handle JSON files
Requests	To send HTPP requests

Item	Description
KMeans	To form clusters
IPython	An Interactive command line used to display images
Matplotlib	To create static, animated and interactive visualisations
Folium	To visualise data on an interactive leaflet map
Numpy	For scientific computing
Pandas	For data analysis and manipulation
Scipy	For numerical computation
Scikit-learn	For predictive data analysis
Imbalanced-learn	Resampling techniques for balancing datasets

Methodology

Preliminaries

- Create a developer account in Foursquare
- Obtain Foursquare application credentials (Client ID and Client Secret)
- In a Python notebook, use python programming language to install and import the required libraries

Get the Data

- Obtain data (venue's data) ,from Foursquare and visualize on a map

Investigate Venue Options

- Calculate the distance between the venues using Haversine formula to aid route planning
- Get venue ratings and tips for each venue
- Use the venue preferences to determine availability of venues of personal interest
- If required, modify the preferences to view a new set of available venue options
- Create clusters of most visited venues using KMeans
- Identify venues that are trending in that location

Methodology – Preparatory Details

The initial activities carried out include the following

- Foursquare
  - A developer account was created in Foursquare. Afterwards, Foursquare application credentials (Client ID and Client Secret) was obtained. Then, the foursquare application credentials were used to obtain the required data from Foursquare.

- IBM Watson Studio
  - An account was created on IBM Watson Studio, and then a notebook was created.

- Programming in Python
  - Python programming language was used to write the code.

- Preliminary Actions
  - Libraries and modules were required for the code to function, and these were installed and imported.
  - Functions were defined

Methodology – Data Requisition

The data used was wholly obtained from Foursquare.

Foursquare Credentials - The foursquare credentials' Client ID' and 'Client Secret' were defined. Foursquare gives each developer unique Foursquare credentials.

Point of Reference (Holiday Inn, Winnipeg Downtown, Canada)

- Required to obtain venue data
- It has a physical address, and longitude and latitude coordinates which are
- Using Nominatim tool - used to obtain the complete physical address and coordinates (longitude and latitude) were obtained.

```
The coordinates of Holiday Inn & Suites Winnipeg Downtown, 360, Colony Street, Colony, West End, Winnipeg, Manitoba, R3C 0E7, Canada are -97.15145373256972, 49.8911612.
```

- The latitude and longitude coordinates were converted to the physical address by using "geolocator".

```
49.8911612 -97.15145373256972
```

Methodology – Data Acquisition

Retrieval of Data

URL (Uniform Resource Locator) - Informal name for web address.

- It references the location of a resource on the internet.
- Location referenced by the URL is Holiday Inn.

GET Request - Request made to Foursquare.

- The URL was passed as a parameter within the GET function. JSON (JavaScript Object Notation) function was specified as the format of choice.
- Foursquare provided data of venues near Holiday Inn, Winnipeg, within the defined radius.

	name	categories	address	crossStreet	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country	formattedAddress	neighborhood	id
0	Winnipeg Art Gallery	Art Gallery	300 Memorial Blvd	St. Mary Ave	49.889459	-97.150708	[{'label': 'display', 'lat': 49.88945877797471...	196	R3C 1V1	CA	Winnipeg	MB	Canada	[300 Memorial Blvd (St. Mary Ave), Winnipeg MB...	NaN	4b5f6471f964a520b4b729e3
1	Harvey's	Restaurant	600 Portage Avenue	NaN	49.888922	-97.156059	[{'label': 'display', 'lat': 49.88892237017493...	413	R3C 3L7	CA	Winnipeg	MB	Canada	[600 Portage Avenue, Winnipeg MB R3C 3L7, Canada]	West Broadway	4edd1bb277c8274e005b3e73

Filtering the Data -

- Specific venue parameters that were required were specified and used to filter the data.
- A map of the filtered data was created and to visualise the venue locations relative to the Holiday Inn.

Venues around Holiday Inn

Methodology – Data Manipulation

Numerical Analysis

Count, Group and Sort - The number of venues and venues categories were counted. The dataframe was also grouped by the "categories" column. The values were counted and sorted by the "categories" and "name" columns, respectively.

Nearby Venues -"json_normalize“ (a pandas function) was used to flatten the data into a dataframe. Then, the dataframe was filtered, cleaned, and displayed. The resulting dataframe was grouped by the "categories" column, and the values were counted and sorted. Then, the columns were rearranged.

	name	categories	address	crossStreet	id	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country	formattedAddress	neighborhood
0	Winnipeg Art Gallery	Art Gallery	300 Memorial Blvd	St. Mary Ave	4b5f6471f964a520b4b729e3	49.889459	-97.150708	[{'label': 'display', 'lat': 49.88945877797471...	196	R3C 1V1	CA	Winnipeg	MB	Canada	[300 Memorial Blvd (St. Mary Ave), Winnipeg MB...	NaN
1	Harvey's	Restaurant	600 Portage Avenue	NaN	4edd1bb277c8274e005b3e73	49.888922	-97.156059	[{'label': 'display', 'lat': 49.88892237017493...	413	R3C 3L7	CA	Winnipeg	MB	Canada	[600 Portage Avenue, Winnipeg MB R3C 3L7, Canada]	West Broadway

Venue Distance - Haversine Distance formula was used to calculate the distance from the venues to Holiday Inn. The dataframe was then sorted and the columns of the new dataframe was rearranged to make the "DistanceFromHolidayInn" column more visible.

	name	categories	address	crossStreet	id	DistanceFromHolidayInn	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country	formattedAddress	neighborhood
0	Winnipeg Art Gallery	Art Gallery	300 Memorial Blvd	St. Mary Ave	4b5f6471f964a520b4b729e3	0.20	49.889459	-97.150708	[{'label': 'display', 'lat': 49.88945877797471...	196	R3C 1V1	CA	Winnipeg	MB	Canada	[300 Memorial Blvd (St. Mary Ave), Winnipeg MB...	NaN
43	Asia City	Asian Restaurant	519 Sargent Ave	NaN	4da753106a2364c7a33bbb06	0.64	49.896464	-97.154857	[{'label': 'display', 'lat': 49.89646350846065...	638	R3B 1W1	CA	Winnipeg	MB	Canada	[519 Sargent Ave, Winnipeg MB R3B 1W1, Canada]	NaN

Methodology – Trending Venues & Venues of Interest

Trending Venues

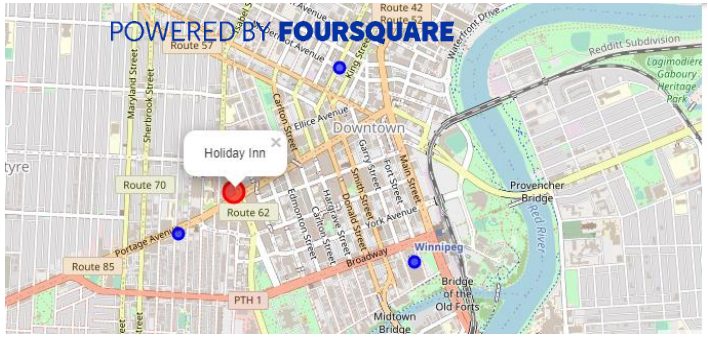
These are venues that have high foot traffic.

- A URL was created to check for trending venues in real-time.
- A GET request with the URL was sent to Foursquare.
- A conditional statement was created, and the result was filtered using the "get_category_type“ function.
- The dataframe and map would be displayed if trending venues are available.

Venues (Places) of Personal Interest

These are venues that an individual personally desires to visit.

- A list that contains all the places of personal interest was created
- The list was then used to filter the available data along the category column using the "isin" function.
- The result is a dataframe that contains all the venues that match the categories in the list.



Similar Venues around Holiday Inn

Methodology – Venue Ratings and Tips

Venue Rating is a score between 0 and 10, inclusive that a user ranks a venue while Venue Tips are observations about a venue that was made while a user was at the venue or recommendations about a venue visited by a user.

Venue Rating

- The "venue_id" was retrieved from the dataframe containing venues of personal interest.
- The URL for each venue was created.
- A request was made to Foursquare with the URL passed
- The venue rating for each venue was displayed and noted.

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Venue Tips

- The total number of tips for the venue was retrieved by passing the URL of the venue in the GET request.
- A number greater than the number of venue tips was passed as the "limit" parameter in the URL, along with the "venue_id".
- The result was delivered as a JSON file. The file was flattened, and the tips were filtered, then displayed.

	text	agreeCount	disagreeCount	id	user.firstName	user.lastName
0	Best customer service of any fast food restaurant in Winnipeg. (And better than many of the full-service restaurants too!)	0	0	4f39a37ae4b03d32dee3e2d7	Greg	P

Methodology – Clustering Venues

Group by Postal Code – The venues were grouped to determine the number of venues per postal code and counted.

One-Hot Encoding – Machine learning algorithms require numerical values for the optimal performance of the algorithm. One-hot encoding changed all the categorical values to either "0" or "1". "pandas.get_dummies" ("pd.get_dummies") method was used to encode the categorical values. The "postal code" column that was returned.

	Postal Code	Art Gallery	Coffee Shop	Gym	Juice Bar	Pizza Place	Restaurant	Theater
0	R3C 1V1	1	0	0	0	0	0	0
32	R3L 0C8	0	1	0	0	0	0	0

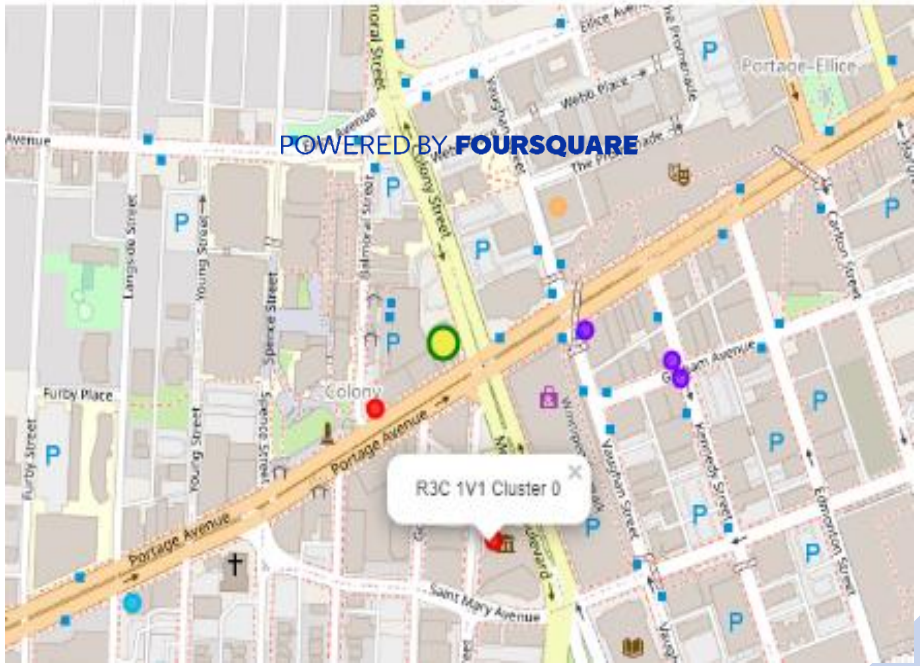
Mean – The dataframe was grouped according to postal code using "groupby“. The mean was calculated using the "mean" function and the index was reset using the "reset_index" function. A "for" loop was created to determine the postal code with the most common venues. A function to sort the top venues in descending order was defined. Then, the venues were defined as an array and sorted.

	Postal Code	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
0	R3A 1G7	Coffee Shop	Art Gallery	Gym	Juice Bar	Pizza Place	Restaurant	Theater
1	R3B 0P8	Theater	Art Gallery	Coffee Shop	Gym	Juice Bar	Pizza Place	Restaurant

Methodology – Creating Venue Clusters

K-means clustering is a machine learning algorithm. Clusters of venues were created using K-means clustering. It calculates the position of each venue relative to the others and groups the closest ones together. It also iteratively calculates these positions and continues to group and regroup the venues until no further regrouping can be done.

- The number of clusters was set at five (5).
- The columns required for the analysis were specified and merged to the dataframe containing the clustered venues, along the "postal code" column.



Venues Clusters around Holiday Inn

Methodology – Examining Venue Clusters

Five (5) clusters were created, and each cluster was studied individually.

The categories of restaurants are checked alongside the venues that make up each category.

The common venues for each cluster were identified for ease of reference and use in the itinerary.

The common values for one of the clusters is stated below.

```
The family may visit the following common venues "Restaurant" "Art Gallery" "Coffee Shop" "Gym" "Juice Bar" in this cluster.
```

Results – Basic Venue Information

Location Parameters of a Venue - The physical address, coordinates of the point of reference (in this instance, Holiday Inn) was provided by Foursquare. Similar data for any other venue could be obtained if required.

```
The coordinates of Holiday Inn & Suites Winnipeg Downtown, 360, Colony Street, Colony, West End, Winnipeg, Manitoba, R3C 0E7, Canada are -97.15145373256972, 49.8911612.
```

Information about Venues around a Point of Reference - The data of venues around a specific point of reference was obtained. The parameters of Holiday Inn was passed in the URL. This provided the data for all the venues that were within the radius specified in the URL.

	name	categories	address	crossStreet	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country	formattedAddress	neighborhood	id
0	Winnipeg Art Gallery	Art Gallery	300 Memorial Blvd	St. Mary Ave	49.889459	-97.150708	[{'label': 'display', 'lat': 49.88945877797471...	196	R3C 1V1	CA	Winnipeg	MB	Canada	[300 Memorial Blvd (St. Mary Ave), Winnipeg MB...	NaN	4b5f6471f964a520b4b729e3
1	Harvey's	Restaurant	600 Portage Avenue	NaN	49.888922	-97.156059	[{'label': 'display', 'lat': 49.88892237017493...	413	R3C 3L7	CA	Winnipeg	MB	Canada	[600 Portage Avenue, Winnipeg MB R3C 3L7, Canada]	West Broadway	4edd1bb277c8274e005b3e73

Coordinates of the Point of Reference (Holiday Inn) - The latitude and longitude of the point of reference was obtained.

```
49.8911612 -97.15145373256972
```

Results – Venue ID and Distances

Obtain the Venue ID from Foursquare

- Venue ID was important to obtaining more information from Foursquare about the venues in review.
- The new dataframe for the venues was manipulated to obtain the venue IDs.

	name	categories	address	crossStreet	id	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country	formattedAddress	neighborhood
0	Winnipeg Art Gallery	Art Gallery	300 Memorial Blvd	St. Mary Ave	4b5f6471f964a520b4b729e3	49.889459	-97.150708	[{'label': 'display', 'lat': 49.88945877797471...	196	R3C 1V1	CA	Winnipeg	MB	Canada	[300 Memorial Blvd (St. Mary Ave), Winnipeg MB...	NaN
1	Harvey's	Restaurant	600 Portage Avenue	NaN	4edd1bb277c8274e005b3e73	49.888922	-97.156059	[{'label': 'display', 'lat': 49.88892237017493...	413	R3C 3L7	CA	Winnipeg	MB	Canada	[600 Portage Avenue, Winnipeg MB R3C 3L7, Canada]	West Broadway

Venue Distances

This is useful for planning the itinerary or choosing venues to visit based on distance to or from a particular location.

- The coordinates of the point of reference (Holiday Inn) and that of any other location of interest are needed.
- The distance between each venue and the point of reference was calculated and added to the dataframe.

	name	categories	address	crossStreet	id	DistanceFromHolidayInn	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country	formattedAddress	neighborhood
0	Winnipeg Art Gallery	Art Gallery	300 Memorial Blvd	St. Mary Ave	4b5f6471f964a520b4b729e3	0.20	49.889459	-97.150708	[{'label': 'display', 'lat': 49.88945877797471...	196	R3C 1V1	CA	Winnipeg	MB	Canada	[300 Memorial Blvd (St. Mary Ave), Winnipeg MB...	NaN
43	Asia City	Asian Restaurant	519 Sargent Ave	NaN	4da753106a2364c7a33bbb06	0.64	49.896464	-97.154857	[{'label': 'display', 'lat': 49.89646350846065...	638	R3B 1W1	CA	Winnipeg	MB	Canada	[519 Sargent Ave, Winnipeg MB R3B 1W1, Canada]	NaN

Results – Trending Venues & Places of Interest

Trending Venues

The URL was defined and a GET Request was made. At the time of making the request, there were no trending venues. This is because trending venues request prompts a real-time response from Foursquare.

Venues (Places) of Personal Interest

Preferred Venues were used to filter the venue data, and this yielded a dataframe containing places of personal interest. This made it possible to search for different venue categories at the same time. The result can be used to decide it the location has interesting places that can be included in the itinerary for the vacation.

Results – Similar Venues, Ratings and Tips

Details of Venues of Similar Categories

A specific category of venues (Restaurant) was selected from the database of places of personal interest. Venues in the category were reviewed and the result displayed.

	name	categories	address	crossStreet	id	DistanceFromHolidayInn	lat	lng	labeledLatLngs	distance	postalCode	cc	city	state	country	formattedAddress	neighborhood
1	Harvey's	Restaurant	600 Portage Avenue	NaN	4edd1bb277c8274e005b3e73	0.41	49.888922	-97.156059	[{'label': 'display', 'lat': 49.88892237017493...	413	R3C 3L7	CA	Winnipeg	MB	Canada	[600 Portage Avenue, Winnipeg MB R3C 3L7, Canada]	West Broadway
61	Prairie 360	Restaurant	83 Garry Street	NaN	5203fd442fc63a7e19f4f4cb	1.16	49.887467	-97.136342	[{'label': 'display', 'lat': 49.8874673755844,...	1159	R3C 0R3	CA	Winnipeg	MB	Canada	[83 Garry Street, Winnipeg MB R3C 0R3, Canada]	NaN

Venue Ratings and Venue Tips

These are based on experiences, observations and recommendations of users that have visited a venue.

- The venue ratings and tips for three (3) restaurants were considered.

The result for a restaurant is as shown.

Venue Rating

	text	agreeCount	disagreeCount	id	user.firstName	user.lastName
0	Best customer service of any fast food restaurant in Winnipeg. (And better than many of the full-service restaurants too!)	0	0	4f39a37ae4b03d32dee3e2d7	Greg	P

Venue Tip

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Results – Common Venues & Clusters Analysis

Most Common Venues

The dataframe with most common venues was merged with the dataframe that contained other columns of interest to form a new dataframe that contained all columns that were required take an informed decision.

	postalCode	name	categories	lat	lng	id	DistanceFromHolidayInn	Cluster Labels	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
0	R3C 1V1	Winnipeg Art Gallery	Art Gallery	49.889459	-97.150708	4b5f6471f964a520b4b729e3	0.20	0.0	Art Gallery	Coffee Shop	Gym	Juice Bar	Pizza Place	Restaurant	Theater
32	R3L 0C8	Little Sister Coffee Maker	Coffee Shop	49.878993	-97.146772	5227ba6011d28632966c43a0	1.39	1.0	Coffee Shop	Art Gallery	Gym	Juice Bar	Pizza Place	Restaurant	Theater

Examination of Venue Clusters

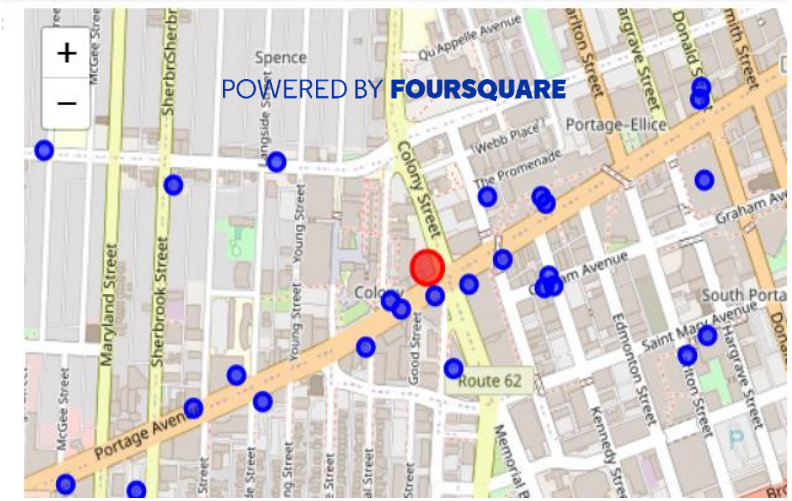
Each of the clusters were examined and venues that were most occurring in each cluster were considered for inclusion in the itinerary for the vacation. The result of the assessment of one of the clusters is as shown below.

```
The family may visit the following common venues "Restaurant" "Art Gallery" "Coffee Shop" "Gym" "Juice Bar" in this cluster.
```

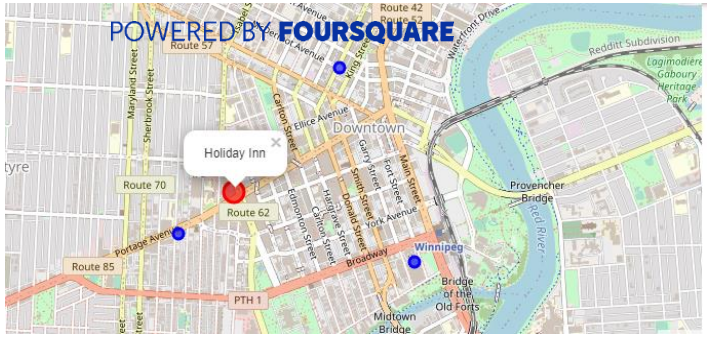
Results – Visualisation of Venues

The programme harnessed the capabilities of Foursquare to provide visual representations of venues relative to other venues or a particular location. Some of the maps displayed were

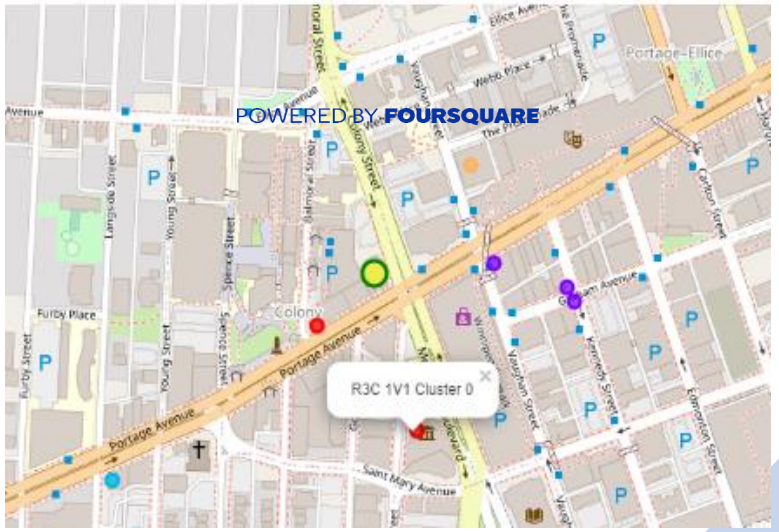
- All venues around the point of reference that are within a specified radius
- Only venues of a particular category that are within a specified radius
- Display of venue clusters relative to the point of reference



Venues around Holiday Inn



Similar Venues around Holiday Inn



Venues Clusters around Holiday Inn

Discussion – Modifiable Parameter Values

It was observed the parameters could be adjusted as required and the result would correspond to the new parameters used. For instance, if the radius of search is reduced or decreased, the results offered by Foursquare responds accordingly.

Significance:

- This gives credence to the wealth of information regarding venues that Foursquare collects, maintains and provides.
- The information is readily available and can be easily obtained given the appropriate parameter.
- This programme makes it easy to modify search parameters when exploring venues. Fourthly, the point of reference, in this case, was Holiday Inn, Winnipeg. If this is changed to any other location, the venue data that Foursquare would provide will differ.

The parameters can be altered to suit different locations, span different areas, or fine-tune to get more focused results.

Therefore, the programme is agile – the parameters are easy to modify and reuse and will conveniently serve other purposes.

Discussion – Search Outcome Changes with Time

It was observed that the result collated from Foursquare is dependent on when the search was conducted. For instance, the information garnered in the morning may differ from the information provided in the evening, and data collated during the summer may differ from that of winter.

Significance:

- Foursquare provides real-time data. Therefore, the information provided is changes based on the data available at a given point in time. For instance, venues that only offers its services in the evening/nighttime , such a venue will not be supplied in the results provided by Foursquare if the search is conducted in the morning/afternoon.

This programme can be used to get new venue data. So, if the condition of the trip suddenly changes and the need arises.

This makes the programme very useful for holidaymakers and tourists. Also, travel agents and their agencies would find it helpful in providing personalised travel experiences to their clients.

Discussion – Ease of Changing Parameter Values

It was observed that the venue ratings and tips give information that is both vivid and essential. This is critical information for making decisions about venues.

Significance:

- This information is independently supplied to Foursquare by users who have visited the venue. The data is current and provides information that is considered very useful to potential visitors.

The process of selecting a venue from among many has been reduced to a few clicks. The choice reaction time is significantly reduced.

As a result,

- holidaymakers can take an informed decision about venues to visit by using the information supplied by visitors who previously visited the venue.
- it is beneficial to holidaymakers and travel agents alike.
- the turnaround times of travel agents can be maximised as more clients' requests can be attended to within a space of time.

Discussion – The Scenario (Jones' Vacation)

Results from Programme written by Keisha for Jones Family

- The categories of the preferred venues were given as the "options". Then, the programme filtered the desired venue categories from the venue data provided by Foursquare.
- The filtered dataframe was segregated into categories, and similar venues were reviewed to obtain the venue ratings and tips used to determine the venues to be visited.
- The resulting filtered dataframe was then sorted, and clusters of venues were created.
- The clusters provided a top-level view of the itinerary. The decisions made based on the information provided by the venue ratings and tips were used to populate the itinerary on an hourly basis.
- The runtime of the programme was less than two (2) minutes.

Conclusion and Summary

Conclusion

The programme

- streamlined the process of searching for available venues at a particular location and produced a list of preferred venues with acceptable attributes.
- increased the ease and speed of getting required venue information. It also reduced the turnaround times in creating a plan for visiting different holiday venues.
- made it easy to modify the itinerary for a vacation in the event of an unexpected occurrence.

Summary

The programme created an agile way of selecting venues to visit for vacation which finds application in individual and group travels.

Acknowledgement

Many thanks to Foursquare for making the data of venues easy to assess and utilise.

Gratitude to IBM for the comprehensive training in Data Science and the making IBM Watson Studio accessible throughout this course.

Many thanks to the Python community for making the journey to learn Python programming language easier.