

# MongoDB Fundamentos

Módulo 3

# **Geospatial Queries:**

## **Buscar restaurantes**

## Geospatial Queries: Buscar restaurantes

La **indexación geoespacial de MongoDB** permite ejecutar de manera eficiente consultas espaciales **en una colección que contiene formas y puntos geoespaciales**. En las siguientes diapositivas, se estudiará el proceso de redacción de consultas para una **aplicación geoespacial simple**. De esta manera, se podrán apreciar las capacidades de las **funciones geoespaciales** y comparar diferentes enfoques.

Se presentarán los conceptos de **índices geoespaciales** y luego se demostrará su uso con **\$geoWithin**, **\$geoIntersects** y **\$nearSphere**.

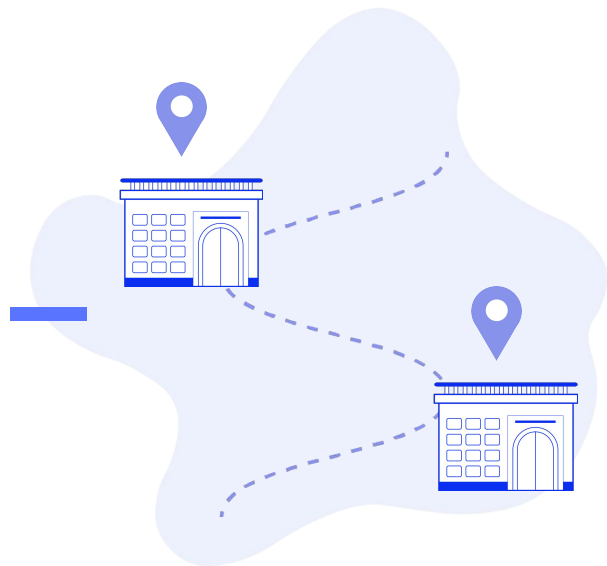


## Ejemplo práctico

Se diseña una aplicación móvil para ayudar a los usuarios a encontrar restaurantes en la ciudad de Nueva York.

La aplicación debe:

- Determinar el vecindario actual del usuario utilizando **\$geoIntersects**.
- Mostrar la cantidad de restaurantes que hay en ese vecindario utilizando **\$geoWithin**.
- Encontrar restaurantes dentro de una distancia específica del usuario utilizando: **\$nearSphere**.

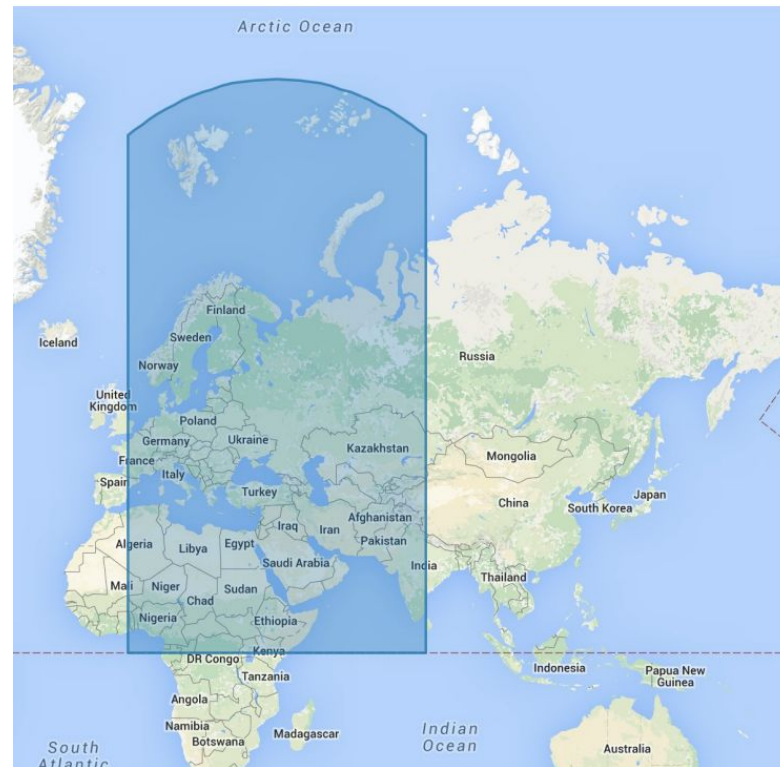


Este ejemplo utilizará un índice **2dsphere** para consultar estos datos sobre geometría esférica.

## Distorsión

Cuando se visualice en un mapa, la geometría esférica aparecerá distorsionada. Esto ocurre porque se está proyectando una esfera tridimensional, como la Tierra, sobre un plano.

Se toma la especificación del cuadrado esférico definido por los puntos de latitud de longitud (0,0), (80,0), (80,80) y (0,80). La figura de la derecha muestra el área cubierta por esta región.



# Buscar Restaurantes

## Requisitos previos

Descargar los conjuntos de datos de ejemplo de:

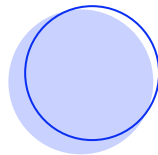
<https://raw.githubusercontent.com/mongodb/docs-assets/geospatial/neighborhoods.json>

<https://raw.githubusercontent.com/mongodb/docs-assets/geospatial/restaurants.json>

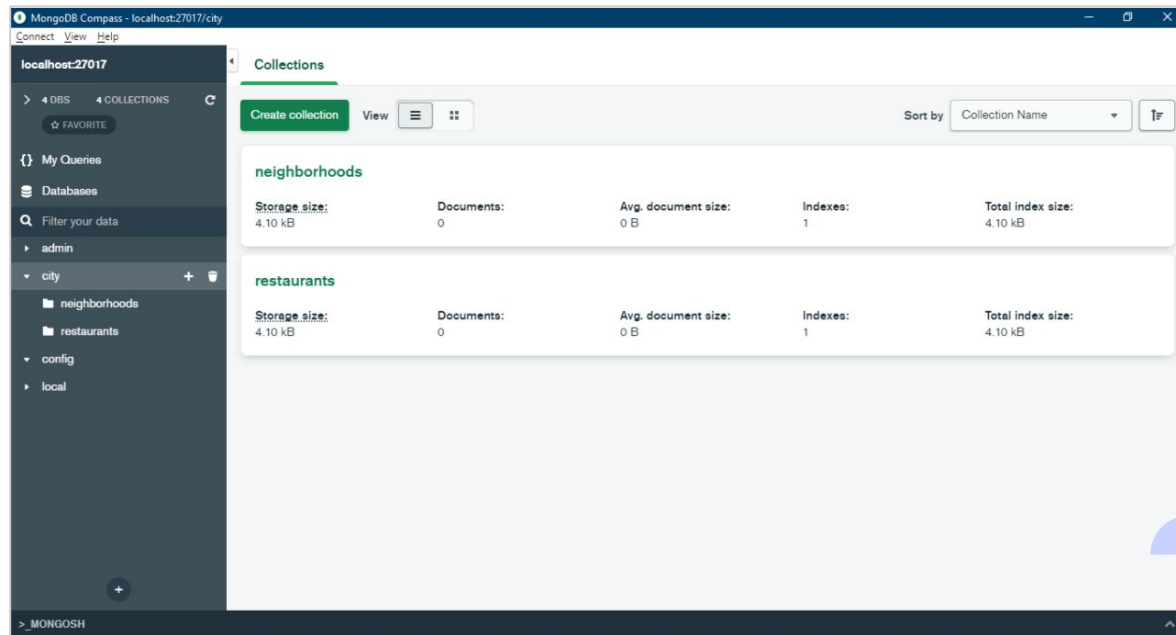
*(Hacer click derecho en cada enlace y Guardar como...)*

Estos conjuntos contienen las colecciones **restaurants** y **neighborhoods** respectivamente.

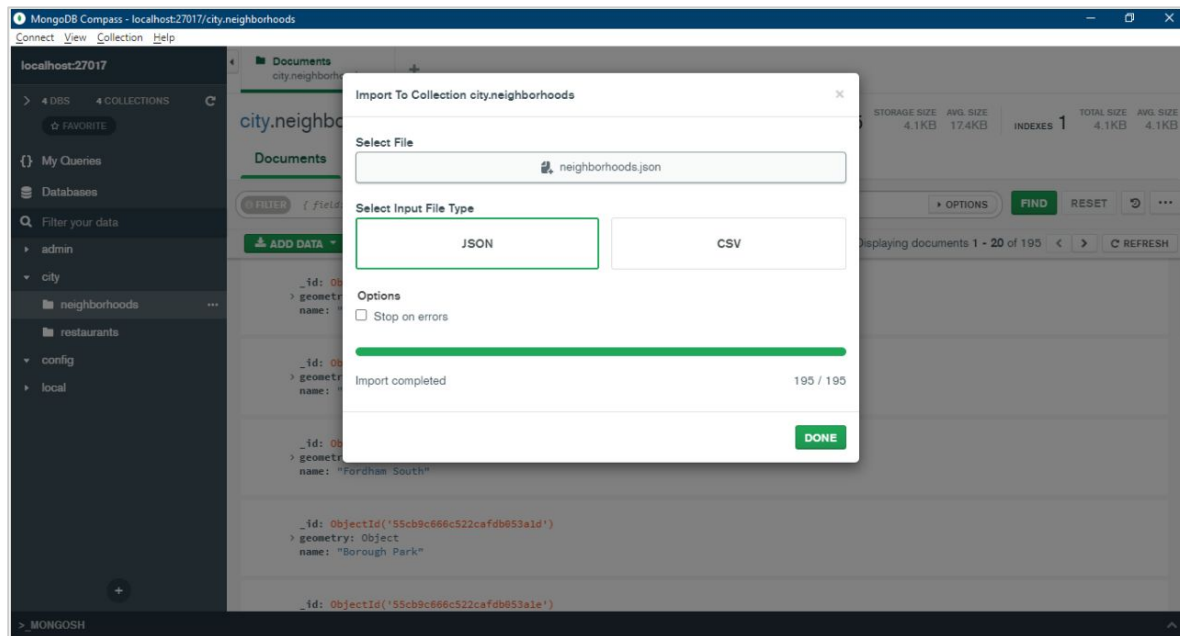
Después de descargar los conjuntos de datos en archivos **JSON**, levantar el servidor de base de datos e importar a través de **mongoCompass**.



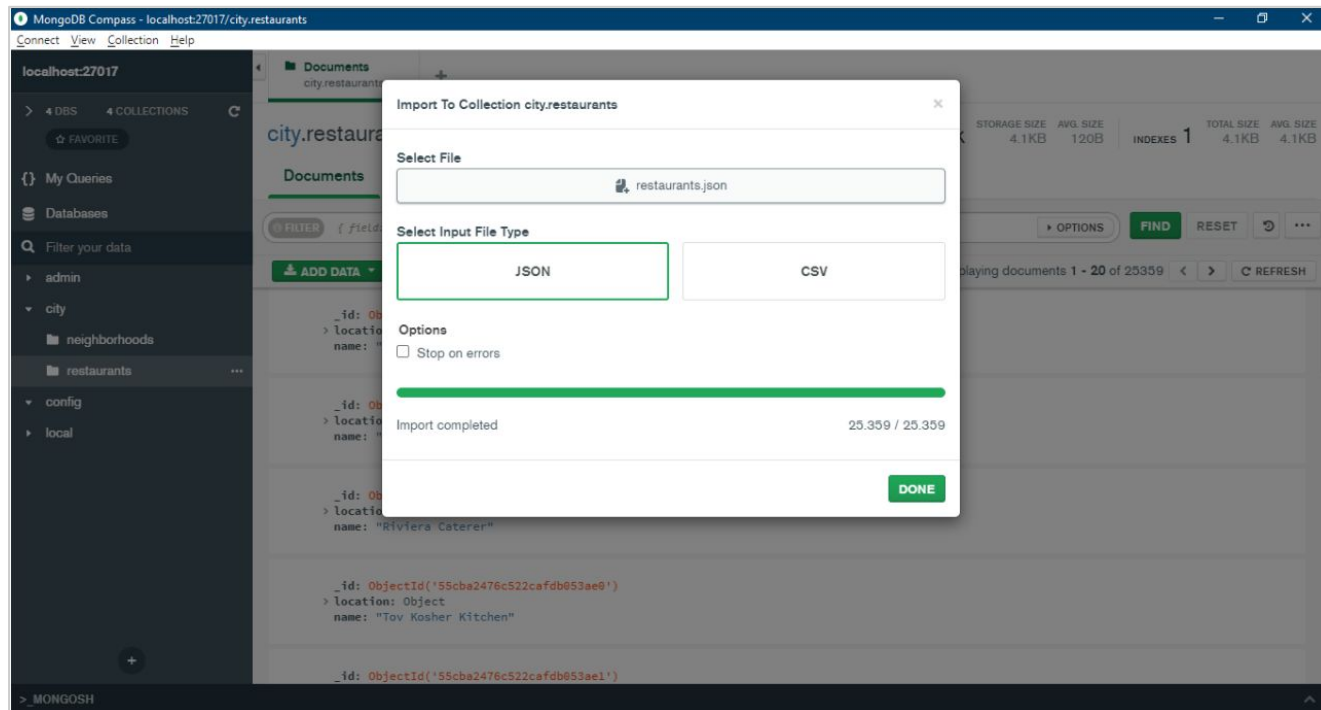
Previamente, crear la base de datos **city** y, dentro de ella, las colecciones **restaurants** y **neighborhoods**.



Luego, importar en cada una de las colecciones los archivos **JSON** correspondientes.







Un índice geoespacial mejora el rendimiento de las consultas con **\$geoWithin** y **\$geoIntersects**.

Debido a que estos datos son geográficos, crear un índice **2dsphere** en cada colección. Utilizar Mongo Shell (se puede hacer desde **Mongo Compass** ó **Mongo Shell**).

Veamos el ejemplo de la siguiente pantalla.



```
> show dbs
admin 0.000GB
city 0.004GB
config 0.000GB
local 0.000GB
> use city
switched to db city
> show collections
neighborhoods
restaurants

> db.restaurants.createIndex({ location: "2dsphere" })
{
  "numIndexesBefore" : 2,
  "numIndexesAfter" : 2,
  "note" : "all indexes already exist",
  "ok" : 1
}
> db.neighborhoods.createIndex({ geometry: "2dsphere" })
{
  "numIndexesBefore" : 2,
  "numIndexesAfter" : 2,
  "note" : "all indexes already exist",
  "ok" : 1
}
```

## Explorar los datos

Inspeccionar una entrada en la colección **restaurants** recién creada en Mongo Shell:

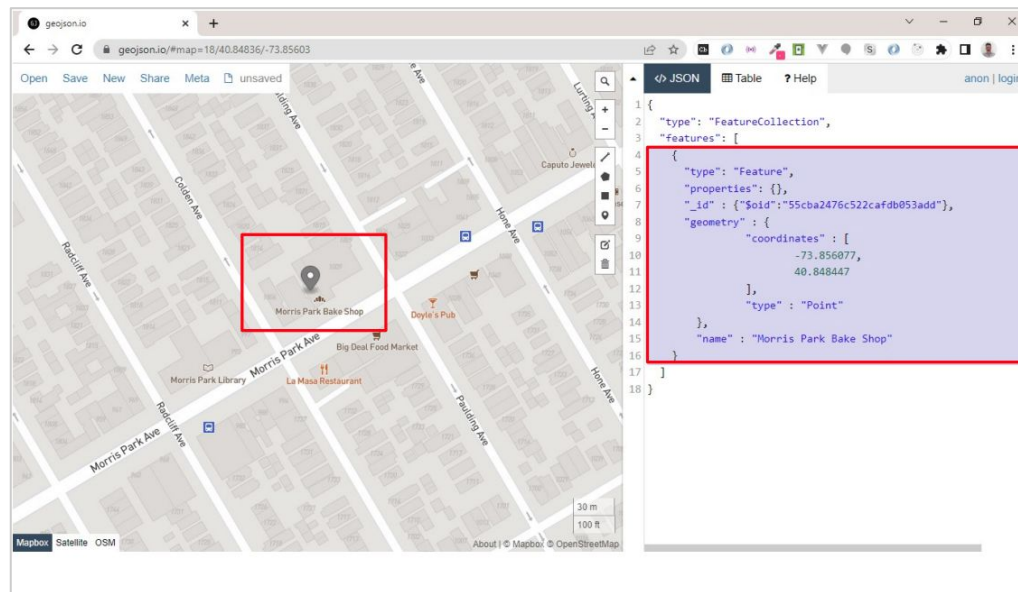
```
db.restaurants.findOne()
```



Esta consulta devuelve un documento como el que vemos aquí:

```
> db.restaurants.findOne()
{
  "_id" : ObjectId("55cba2476c522cafdb053add"),
  "location" : {
    "coordinates" : [
      -73.856077,
      40.848447
    ],
    "type" : "Point"
  },
  "name" : "Morris Park Bake Shop"
}
```

Este documento de restaurante contiene en la clave **“location”** un objeto **GeoJSON “Point”** que corresponde a la ubicación que se muestra en el siguiente mapa:



Para ver esta localización se utiliza el sitio <https://geojson.io/> y en el panel derecho, dentro de la clave features se incorpora el documento asociado a este restaurant y se le agregan las claves **"type": "Feature"** y **"properties": {}**, además de reemplazar el **ObjectId** por la clave **"\$oid"** y cambiar la clave **"location"** por **"geometry"**.

Los datos totales quedarán de la siguiente forma:

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {},
      "_id" : {"$oid": "55cba2476c522cafdb053add"},
      "geometry" : {
        "coordinates" : [
          -73.856077,
          40.848447
        ],
        "type" : "Point"
      },
      "name" : "Morris Park Bake Shop"
    }
  ]
}
```

Inspeccionar una entrada en la colección **neighborhoods** recién creada en Mongo Shell:

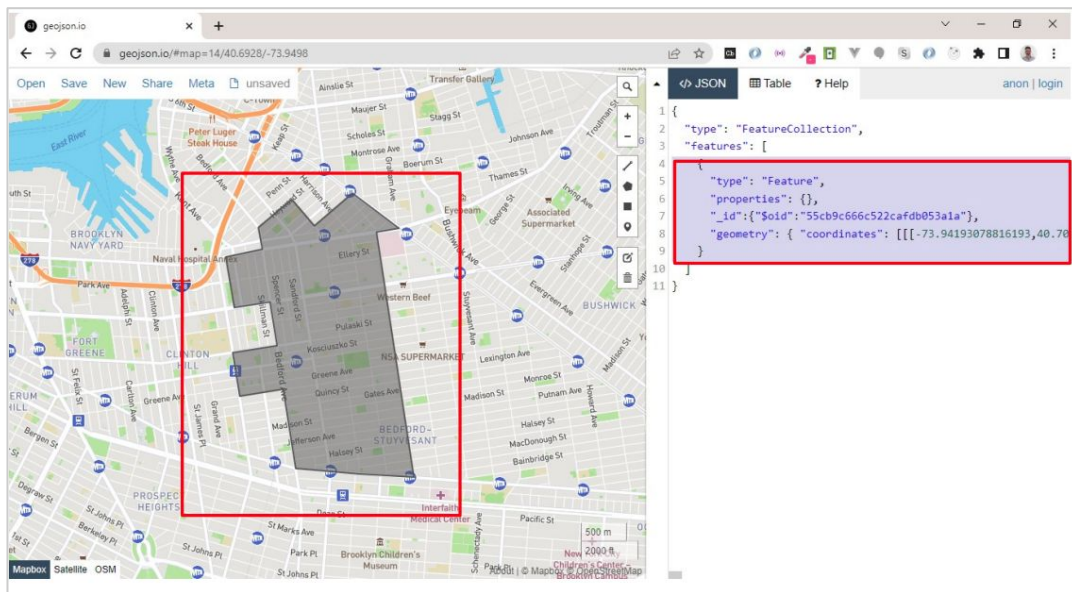
```
db.neighborhoods.findOne()
```

Esta consulta devuelve un documento como el que vemos a la derecha:



```
> db.neighborhoods.findOne()
{
  "_id" : ObjectId("55cb9c666c522cafdb053a1a"),
  "geometry" : {
    "coordinates" : [
      [
        [
          -73.94193078816193,
          40.70072523469547
        ],
        ...
        ...
        ...
        [
          -73.94193078816193,
          40.70072523469547
        ],
        ]
      ],
      "type" : "Polygon"
    },
    "name" : "Bedford"
  }
```

Este documento de barrio contiene, en la clave “**geometry**”, un objeto **GeoJSON** “**Polygon**” que corresponde a un área que se muestra en el siguiente mapa:





Para ver esta localización se utiliza el sitio <https://geojson.io/> y en el panel derecho, dentro de la clave **features** incorporamos el documento asociado a este barrio agregandole las claves **"type": "Feature"** y **"properties": {}** además de reemplazar el **ObjectId** por la clave **"\$oid"**.

En las siguientes pantallas veremos cómo quedarían los datos totales.



```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {},
      "_id": {"$oid": "55cb9c666c522cafdb053a1a"},
      "geometry": {"coordinates": [[[-73.94193078816193, 40.70072523469547],
        [-73.9443878859649, 40.70042452378256], [-73.94424286147482, 40.69969927964773],
        [-73.94409591260093, 40.69897295461309], [-73.94394947271304, 40.69822127983908],
        [-73.94391750192877, 40.69805620211356], [-73.94380383211836, 40.697469265449826],
        [-73.94378455587042, 40.6973697290538], [-73.94374306706803, 40.69715549995503],
        [-73.9437245356891, 40.697059812179496], [-73.94368427322361, 40.696851909818065],
        [-73.9436842703752, 40.69685189440415], [-73.94363806934868, 40.69661331854307],
        [-73.94362121369004, 40.696526279661654], [-73.9435563415296, 40.69619128295102],
        [-73.94354024149403, 40.6961081421151], [-73.94352527471477, 40.69603085523812],
        [-73.94338802084431, 40.69528899051899], [-73.943242490861, 40.694557485733355],
        [-73.94312826743185, 40.693967038330925], [-73.94311427813774, 40.693894720557466],
        [-73.94310040895432, 40.69382302905847], [-73.94295136131598, 40.69309078423585],
        [-73.94280765181726, 40.692357794128945], [-73.94266181801652, 40.69162434435983],
        [-73.94251587928605, 40.69089200097073], [-73.94236932748694, 40.690159944665304],
        [-73.94222203471806, 40.68942797886745], [-73.94207684924385, 40.68869720298344],
        [-73.9419324508184, 40.687962958755094], [-73.94178527584324, 40.687228372121126],
```

...

```
[ -73.94163933150469,40.68649727009258 ], [ -73.94149491757346,40.68576452882908 ],  
[ -73.94134827184915,40.685031202512505 ], [ -73.94120399291621,40.68429983923358 ],  
[ -73.94105783787931,40.68356687284592 ], [ -73.9409133427312,40.682833617234294 ],  
[ -73.94076893329961,40.68210083903887 ], [ -73.94062005382186,40.68137013010259 ],  
[ -73.94047635005941,40.680635695422964 ], [ -73.94032793962053,40.67988997506463 ],  
[ -73.94120864299748,40.67993835375214 ], [ -73.94326176928655,40.68005060712657 ],  
[ -73.94397347805013,40.680088128426995 ], [ -73.94627470970092,40.68021332692951 ],  
[ -73.94674915979888,40.680239661363046 ], [ -73.9477302355664,40.680291846282316 ],  
[ -73.9495568871113,40.68039040292329 ], [ -73.95115828512961,40.68047861480679 ],  
[ -73.95155682676496,40.680498847575564 ], [ -73.95337017508861,40.68064050844431 ],  
[ -73.95351616791015,40.68138260047889 ], [ -73.95366256227194,40.68211490361348 ],  
[ -73.95380893530668,40.68284800827331 ], [ -73.95395453033524,40.68358077882069 ],  
[ -73.95410042574005,40.684313107633436 ], [ -73.95424647696164,40.68504624826183 ],  
[ -73.95439296867414,40.685779720013606 ], [ -73.95453798607406,40.68651117540455 ],  
[ -73.95468418850508,40.68724485443714 ], [ -73.95684165193596,40.68699607883792 ],  
[ -73.95956770121337,40.68668255592727 ], [ -73.95971374756459,40.6874156340909 ],  
[ -73.95985939425704,40.688147451217226 ], [ -73.96000519802635,40.688881033718204 ],  
[ -73.96009714565346,40.689345210097464 ], [ -73.96012172912181,40.68946930706387 ],  
[ -73.96017256138677,40.68972986156118 ], [ -73.96018691858275,40.689803455988546 ],  
[ -73.96022304539724,40.689988627383755 ], [ -73.96023740336433,40.69006222280781 ],  
[ -73.96029281668112,40.690346249915414 ], [ -73.96013760800457,40.69036438035883 ],  
[ -73.96008336800442,40.6903707157072 ], [ -73.95957591847137,40.69042998753855 ],
```

...

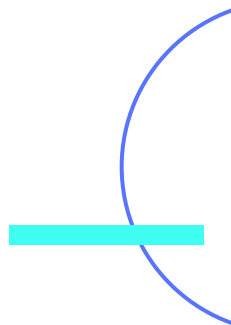
...

```
[-73.95942791320554,40.69044727471387],[ -73.95934862389824,40.6904564609108],  
[-73.95928133730644,40.69046425696955],[ -73.95899330491858,40.69049762936284],  
[-73.95886713625437,40.69051224801476],[ -73.95857844775936,40.690545694857576],  
[-73.9581804874994,40.69059073040573],[ -73.95808563435828,40.69060146372528],  
[-73.95727249112613,40.69069347835403],[ -73.95635602958276,40.69079978191732],  
[-73.95541057949602,40.690908291885876],[ -73.95582662769675,40.69299238288233],  
[-73.95614239268207,40.69457901857237],[ -73.9570870194244,40.694470440162995],  
[-73.95799732979468,40.694365838684114],[ -73.95931047927598,40.69421508783189],  
[-73.96015854658333,40.69411730915604],[ -73.96062056531659,40.6963201401926],  
[-73.96092543804184,40.69773650701631],[ -73.96105100700007,40.698326078819065],  
[-73.96019688857467,40.698462727438596],[ -73.95885874627406,40.6986773264162],  
[-73.95795938220984,40.69882000321581],[ -73.95701993123406,40.698973914349565],  
[-73.957167301054,40.69970786791901],[ -73.95722517405626,40.69999935002626],  
[-73.95745736372834,40.70082260318457],[ -73.95572361014881,40.70194576955721],  
[-73.9538119690652,40.70318097979544],[ -73.95318085172319,40.70261690547745],  
[-73.95255052777945,40.7020516665144],[ -73.951920189279,40.70148754916077],  
[-73.95128819434734,40.70092236548591],[ -73.95027424109588,40.70157924195056],  
[-73.9493787354337,40.70215888982628],[ -73.94753858146478,40.703350650664795],  
[-73.94705205297524,40.70366394934019],[ -73.94625107780892,40.70320874745355],  
[-73.9458549904679,40.70298720677488],[ -73.94544988192177,40.702760635974364],  
[-73.94463910154856,40.70231369467456],[ -73.94431460096804,40.70213334535181],  
[-73.94400504048726,40.70196179219718],[ -73.9438247374114,40.701862007878276],
```

...

...

```
[ -73.94322686012315,40.701520709145726],[ -73.94306406845838,40.7014244350918],  
[ -73.94220058705264,40.700890667467746],[ -73.94193078816193,40.70072523469547]]],  
"type": "Polygon"},  
  "name": "Bedford"  
}  
]  
}
```



## Encontrar el vecindario actual

Suponiendo que el dispositivo móvil del usuario puede proporcionar su ubicación con precisión razonable, resulta sencillo encontrar su vecindario actual con

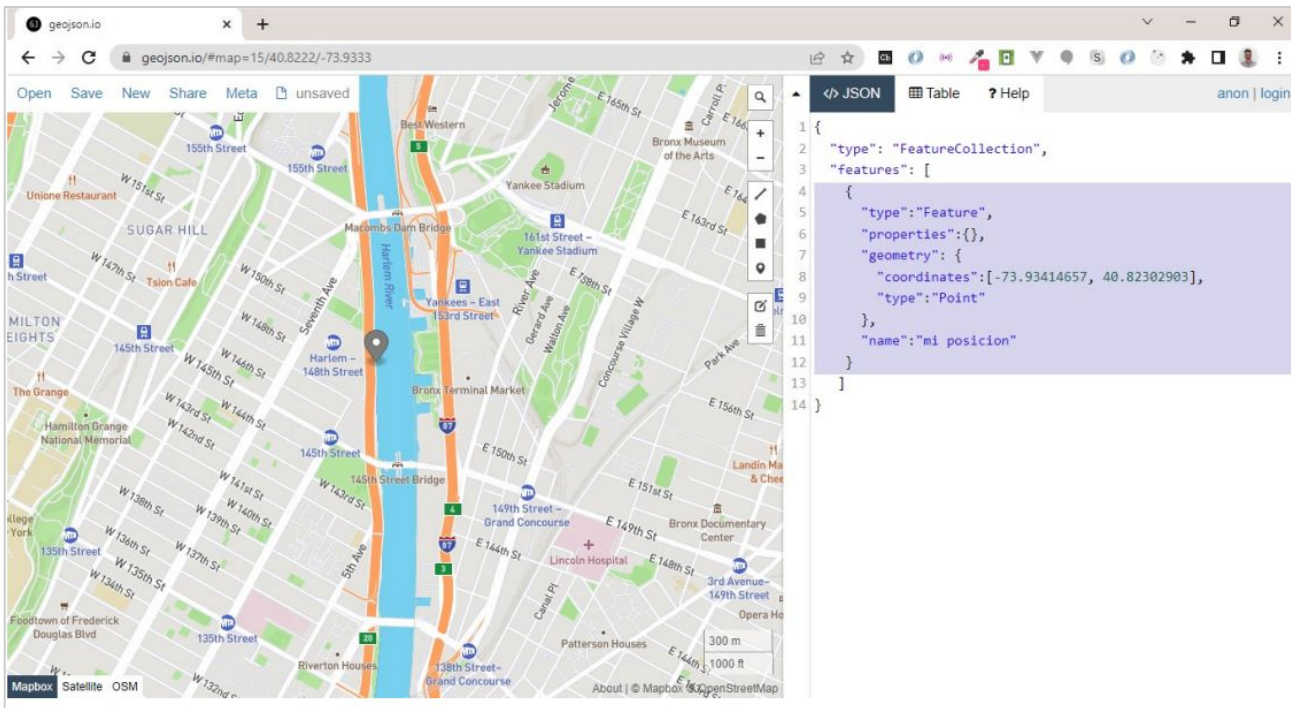
```
$geoIntersects
```

Si el usuario se encuentra en -73.93414657 de longitud y 40.82302903 de latitud.

Representar en el mapa **geojson**:

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {},
      "geometry": {
        "coordinates": [-73.93414657, 40.82302903],
        "type": "Point"
      },
      "name": "mi posicion"
    }
  ]
}
```





The screenshot shows the geojson.io web application. The left pane displays a map of Harlem, New York, with a point marker placed on the map. The right pane shows the JSON representation of the map data, which is a FeatureCollection containing a single Feature representing the point.

```
1 {  
2   "type": "FeatureCollection",  
3   "features": [  
4     {  
5       "type": "Feature",  
6       "properties": {},  
7       "geometry": {  
8         "coordinates": [-73.93414657, 40.82302903],  
9         "type": "Point"  
10      },  
11      "name": "mi posicion"  
12    }  
13  ]  
14 }
```

Para encontrar el vecindario actual, se especificará un punto usando el campo especial **\$geometry** en formato **GeoJSON**:

```
var db = db.getSiblingDB("city");
/* En que vecindario estoy parado (Según mis coordenadas GPS:
-73.93414657, 40.82302903 ) */
var neighborhood = db.neighborhoods.findOne({
  geometry: {
    $geoIntersects: {
      $geometry: { type: "Point", coordinates: [ -73.93414657,
40.82302903 ] } }
  }
})
//printjson(neighborhood)
print('\nVecindario en el que estoy ahora: ' + neighborhood.name + '')
```





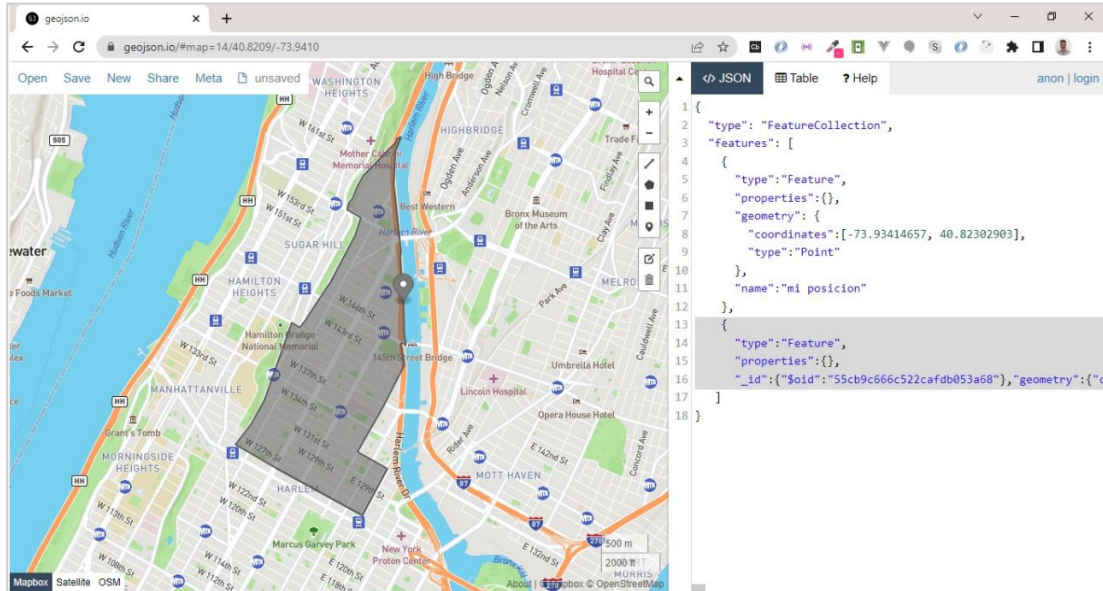
Luego de ejecutar el script, se obtiene en consola:

```
C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indices Geospatial\base
λ mongod --dbpath="."
{"t":{"$date":"2022-05-01T10:04:32.581-03:00"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"main","msg":"Initialized wire specification","attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":13},"incomingInternalClient":{"minWireVersion":0,"maxWireVersion":13},"outgoing":{"minWireVersion":0,"maxWireVersion":13},"isInternal":false},"isSharding":false}}}
> load('scripts/geoIntersects.js')

Vecindario en el que estoy ahora: "Central Harlem North-Polo Grounds"
true
>
```

[illegible]

Si se representa este vecindario en el mapa **geojson**:



Encuentra todos los Restaurantes en el Vecindario.

También se puede consultar con **\$geoWithin** para encontrar todos los restaurantes contenidos en un vecindario determinado. Ejecutar el siguiente script para encontrar el vecindario que contiene al usuario y obtener los restaurantes dentro de esa zona:

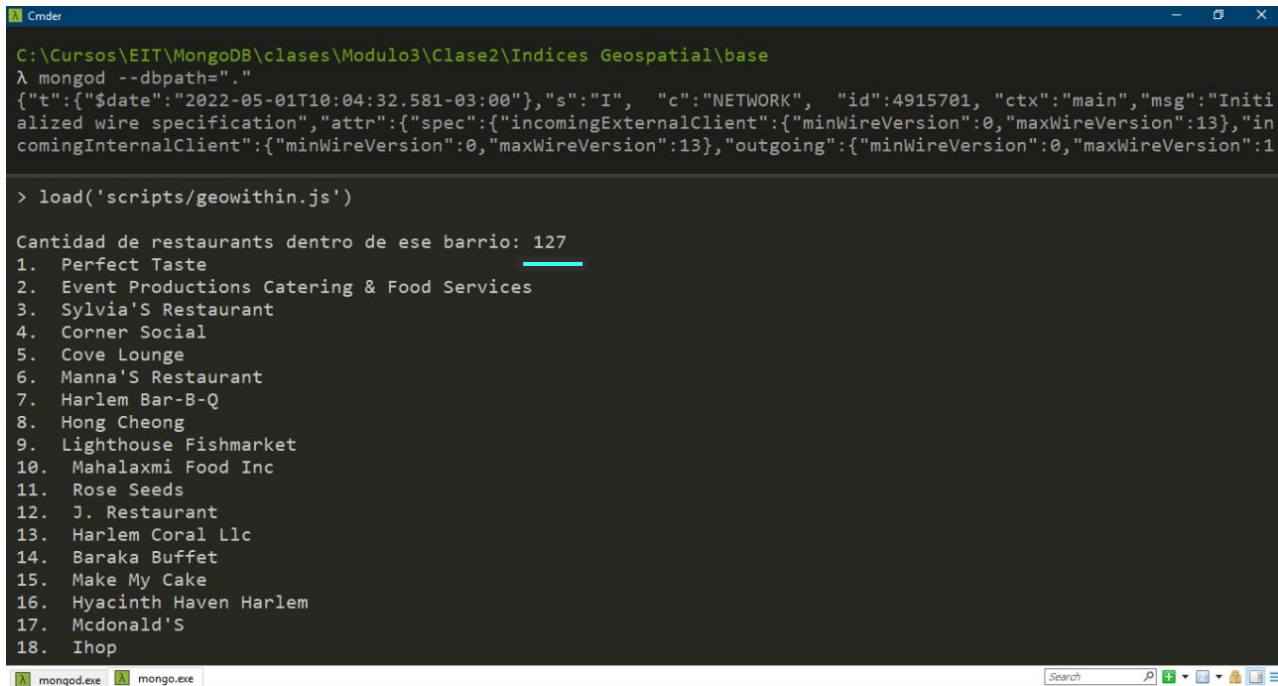
```
var db = db.getSiblingDB("city");

/* En que vecindario estoy parado (Según mis coordenadas GPS: -73.93414657,
40.82302903 ) */
var neighborhood = db.neighborhoods.findOne({
  geometry: {
    $geoIntersects: {
      $geometry: { type: "Point", coordinates: [ -73.93414657, 40.82302903 ] }
    }
  }
})
```

...

```
/* Que cantidad de restaurants se encuentran dentro de ese barrio (Polígono) */  
var restaurants = db.restaurants.find(  
  { location: {  
    $geoWithin: {  
      $geometry: neighborhood.geometry  
    }  
  }  
})  
  
print('\nCantidad de restaurants dentro de ese barrio: ' + restaurants.count())  
var orden = 0  
while(restaurants.hasNext()) {  
  print(++orden, '. ', restaurants.next().name)  
}
```

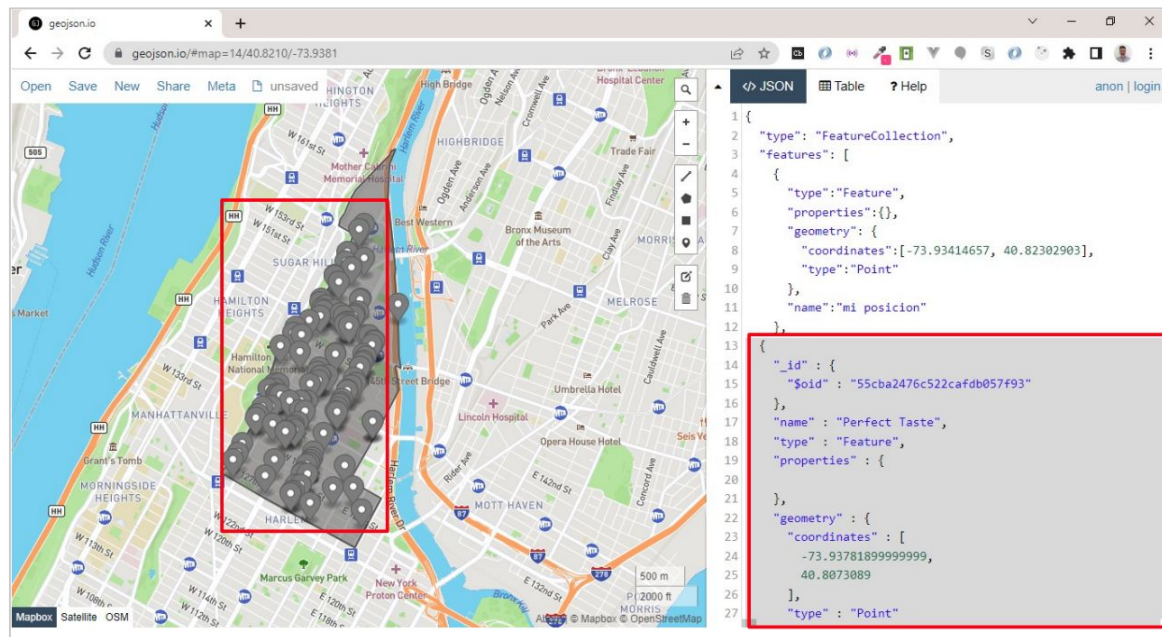
La salida en la consola será:



```
C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indices Geospatial\base
λ mongod --dbpath="."
{"t":{"$date":"2022-05-01T10:04:32.581-03:00"},"s":"I",  "c":"NETWORK",  "id":4915701, "ctx":"main","msg":"Initi
alized wire specification","attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":13},"in
comingInternalClient":{"minWireVersion":0,"maxWireVersion":13},"outgoing":{"minWireVersion":0,"maxWireVersion":1
> load('scripts/geowithin.js')

Cantidad de restaurants dentro de ese barrio: 127
1. Perfect Taste
2. Event Productions Catering & Food Services
3. Sylvia'S Restaurant
4. Corner Social
5. Cove Lounge
6. Manna'S Restaurant
7. Harlem Bar-B-Q
8. Hong Cheong
9. Lighthouse Fishmarket
10. Mahalaxmi Food Inc
11. Rose Seeds
12. J. Restaurant
13. Harlem Coral Llc
14. Baraka Buffet
15. Make My Cake
16. Hyacinth Haven Harlem
17. Mcdonald'S
18. Ihop
```

Esta consulta informará que hay 127 restaurantes en el barrio solicitado. Se visualizan en la siguiente figura:



## Procedimiento para representar estos restaurantes en el mapa

Con este script se buscan y adaptan los 127 restaurantes al formato que el mapa requiere:

```
var db = db.getSiblingDB("city");
var neighborhood = db.neighborhoods.findOne({
  geometry: {
    $geoIntersects: {
      $geometry: { type: "Point", coordinates: [ -73.93414657, 40.82302903 ] }
    }
  }
})
```





...

```
var restaurants = db.restaurants.find(
  { location: {
    $geoWithin: {
      $geometry: neighborhood.geometry
    }
  }
})
let output = []
while(restaurants.hasNext()) {
  let restaurant = restaurants.next()
  restaurant.type = "Feature"
  restaurant.properties = {}
  let id = restaurant._id.valueOf()
  restaurant._id = { "$oid" : id }
  restaurant.geometry = {...restaurant.location }
  delete restaurant.location
  output.push(restaurant)
}
printjson(output)
```



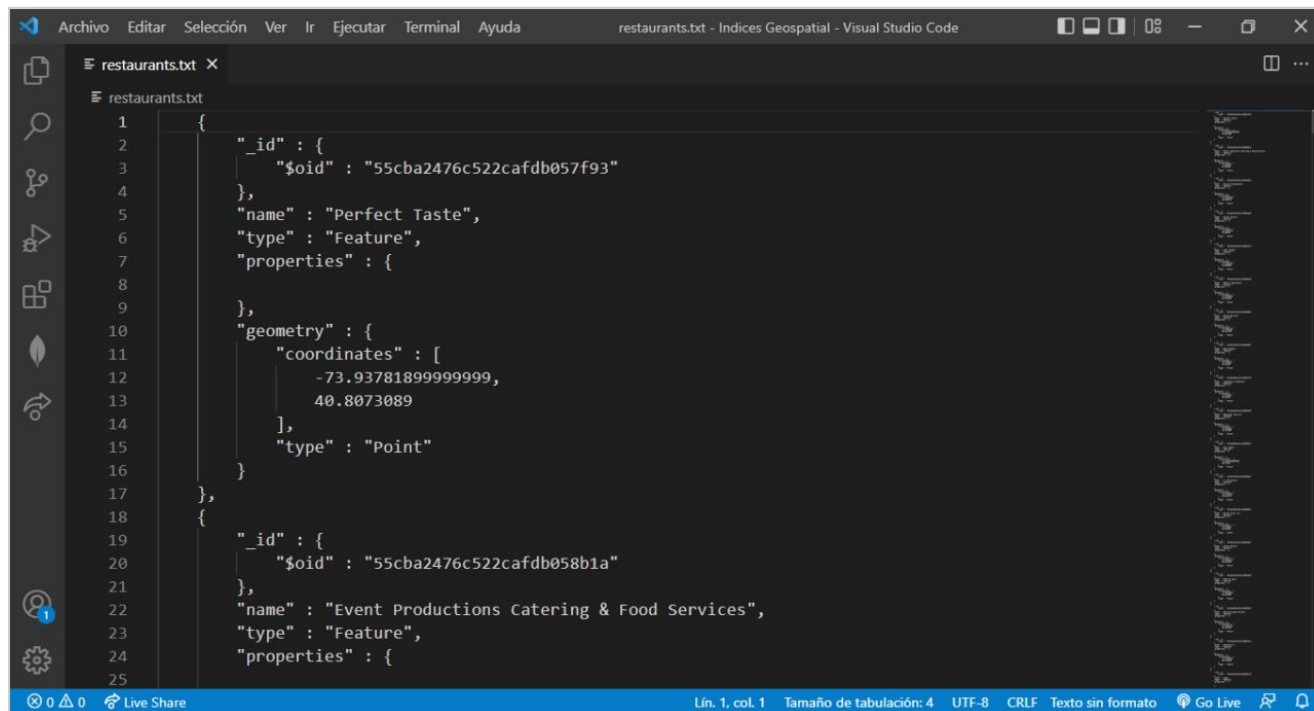
Se ejecuta en la consola del sistema operativo de la siguiente forma, guardando la salida a un archivo **txt**:

```
C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indice Geospacial
λ mongo ./scripts/getRestaurants.js > restaurants.txt

C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indice Geospacial
λ |
```

Luego, se extrae la información del **txt** para copiar en el array de “**features**” del mapa **geojson**. Veamos la imagen de la siguiente pantalla.





```
1 {
2   "_id" : {
3     "$oid" : "55cba2476c522cafdb057f93"
4   },
5   "name" : "Perfect Taste",
6   "type" : "Feature",
7   "properties" : {
8
9   },
10  "geometry" : {
11    "coordinates" : [
12      -73.93781899999999,
13      40.8073089
14    ],
15    "type" : "Point"
16  }
17 },
18 {
19   "_id" : {
20     "$oid" : "55cba2476c522cafdb058b1a"
21   },
22   "name" : "Event Productions Catering & Food Services",
23   "type" : "Feature",
24   "properties" : {
25
```

## Encuentra restaurantes a una distancia

Para buscar restaurantes dentro de una distancia específica de un punto, se puede usar **\$geoWithin** con **\$centerSphere** para devolver los resultados **en desorden**, o **\$nearSphere** con **\$maxDistance** si se necesitan resultados **ordenados por distancia**.



## Sin orden con \$geoWithin

Para buscar restaurantes dentro de una región circular, se utiliza **\$geoWithin** con **\$centerSphere**.

**\$centerSphere** es una sintaxis específica de MongoDB para denotar una región circular especificando el centro y el radio en radianes.

**\$geoWithin** no devuelve los documentos en ningún orden específico, por lo que puede mostrar, al usuario, primero los documentos más lejanos.



El siguiente código encontrará todos los restaurantes dentro de los 350 metros del usuario:

```
var db = db.getSiblingDB("city");

var distancia = 350 // en mts
var RADIO_TIERRA_MTS = 6371000

/* Que cantidad de restaurants se encuentran dentro del circulo con un radio
determinado en el que yo estoy parado en el centro */
var restaurants = db.restaurants.find({
  location: {
    $geoWithin: {
      $centerSphere: [ [ -73.93414657, 40.82302903 ], (distancia/RADIO_TIERRA_MTS) ]
    }
  }
})
```

...

```
print('\nCantidad de restaurants a ' + distancia + 'mts de distancia (desorden): '
+ restaurants.count())

var orden = 0
while(restaurants.hasNext()) {
  print(++orden+'. ', restaurants.next().name)
}
```

El segundo argumento de **\$centerSphere** acepta el radio en radianes, por lo que se debe dividir la distancia expresada en metros por el radio de la tierra en metros.

Consola:

```
C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indices Geospatial\base
λ mongod --dbpath="."
{"t":{"$date":"2022-05-01T10:04:32.581-03:00"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"main","msg":"Initi
alized wire specification","attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":13},"in
comingInternalClient":{"minWireVersion":0,"maxWireVersion":13},"outgoing":{"minWireVersion":0,"maxWireVersion":1
> load('scripts/desorden.js')

Cantidad de restaurants a 350mts de distancia (desorden): 5
1. Gotham Stadium Tennis Center Cafe
2. Chuck E. Cheese'S
3. Red Star Chinese Restaurant
4. Tia Melli'S Latin Kitchen
5. Domino'S Pizza
true
>
```



## Visualización de los resultados en el mapa

Para visualizar, nuevamente, estos resultados en el mapa se realiza el mismo procedimiento anterior: se crea el script, se ejecuta y se extraen los datos del archivo de salida. Se vuelcan al mapa **geojson**:

```
var db = db.getSiblingDB("city");

var distancia = 350 // en mts
var RADIO_TIERRA_MTS = 6371000

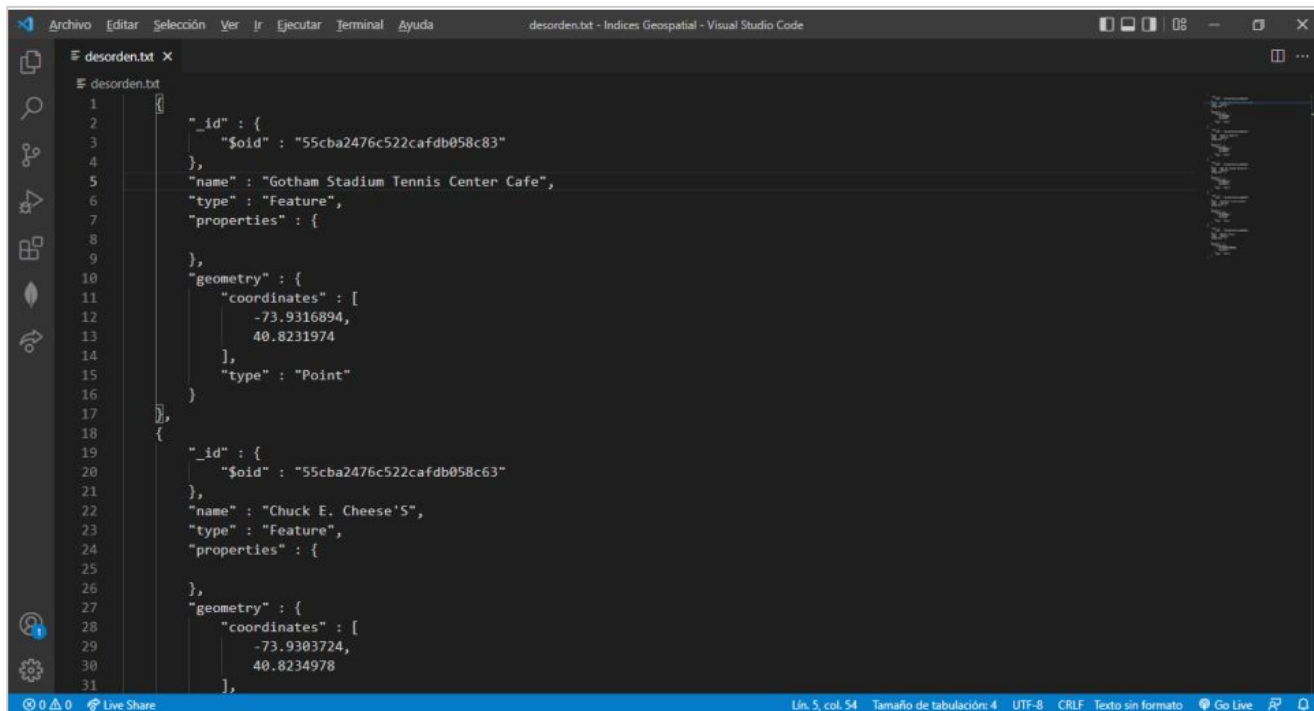
var restaurants = db.restaurants.find({
  location: {
    $geoWithin: {
      $centerSphere: [ [ -73.93414657, 40.82302903 ], (distancia/RADIO_TIERRA_MTS) ]
    }
  }
})
```

...

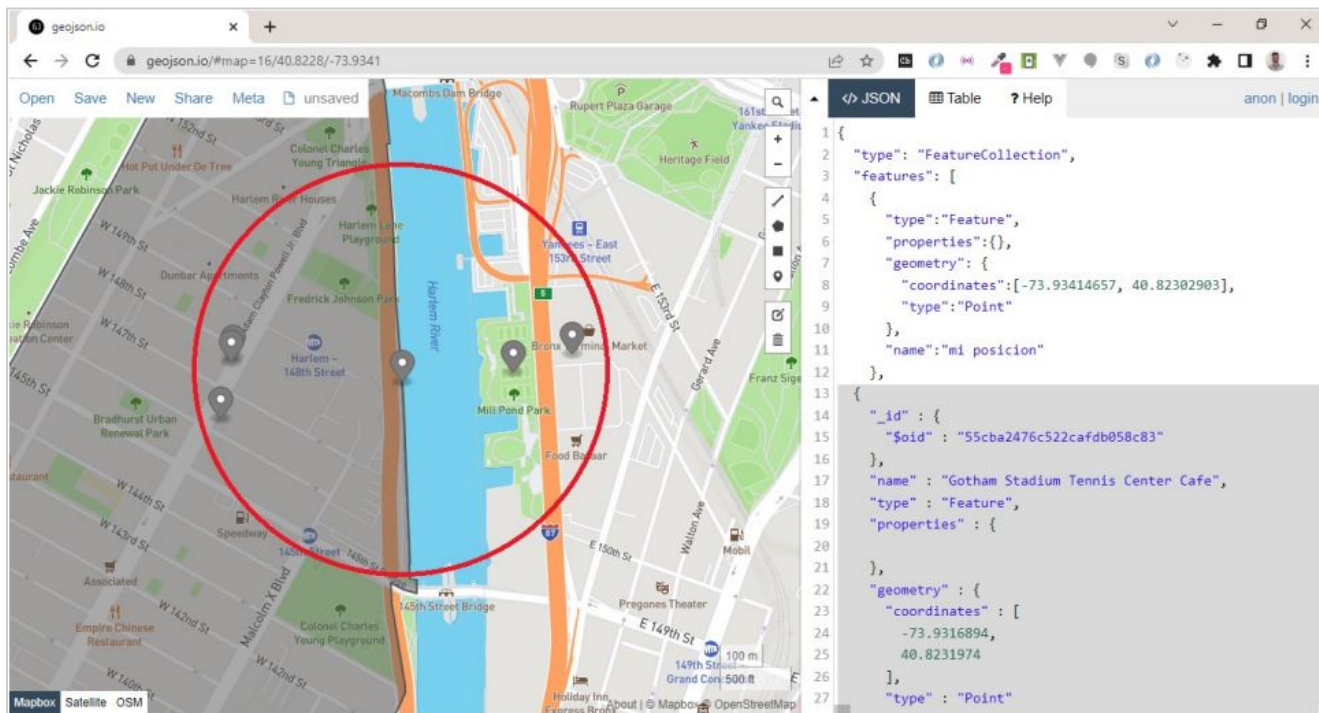
```
let output = []
while(restaurants.hasNext()) {
  let restaurant = restaurants.next()
  restaurant.type = "Feature"
  restaurant.properties = {}
  let id = restaurant._id.valueOf()
  restaurant._id = { "$oid" : id }
  restaurant.geometry = {...restaurant.location }
  delete restaurant.location
  output.push(restaurant)
}
printjson(output)
```

```
C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indices Geospatial
λ mongo ./scripts/getDesorden.js > desorden.txt

C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indices Geospatial
λ
```



```
1  {
2    "_id" : {
3      "$oid" : "55cba2476c522cafdb058c83"
4    },
5    "name" : "Gotham Stadium Tennis Center Cafe",
6    "type" : "Feature",
7    "properties" : {
8    },
9  },
10   "geometry" : {
11     "coordinates" : [
12       -73.9316894,
13       40.8231974
14     ],
15     "type" : "Point"
16   }
17 },
18 {
19   "_id" : {
20     "$oid" : "55cba2476c522cafdb058c63"
21   },
22   "name" : "Chuck E. Cheese'S",
23   "type" : "Feature",
24   "properties" : {
25   },
26 },
27 "geometry" : {
28   "coordinates" : [
29     -73.9303724,
30     40.8234978
31   ],
```



The screenshot shows the geojson.io web application. The map on the left displays a portion of Harlem, New York, with the Harlem River visible. A red circle highlights a specific location on the map. The right panel shows the JSON data for the selected point, which is a FeatureCollection containing a single Feature. The Feature has a geometry of a Point with coordinates [-73.93414657, 40.82302903] and a name of "mi posicion".

```
1 {
2   "type": "FeatureCollection",
3   "features": [
4     {
5       "type": "Feature",
6       "properties": {},
7       "geometry": {
8         "coordinates": [-73.93414657, 40.82302903],
9         "type": "Point"
10      },
11      "name": "mi posicion"
12    },
13  ],
14  {
15    "_id": {
16      "$oid": "55cba2476c522cafdb058c83"
17    },
18    "name": "Gotham Stadium Tennis Center Cafe",
19    "type": "Feature",
20    "properties": {
21    },
22    "geometry": {
23      "coordinates": [
24        -73.9316894,
25        40.8231974
26      ],
27      "type": "Point"
28    }
29  }
```

## Ordenado con \$nearSphere

También es posible usar **\$nearSphere** y especificar un término **\$maxDistance** en metros. Esto devolverá todos los restaurantes, dentro de los 350 metros alrededor del usuario, ordenado del más cercano al más lejano.

```
var db = db.getSiblingDB("city");  
  
var distancia = 350 // en mts  
  
/* Que cantidad de restaurants se encuentran dentro del circulo con un radio  
determinado en el que yo estoy parado en el centro */
```

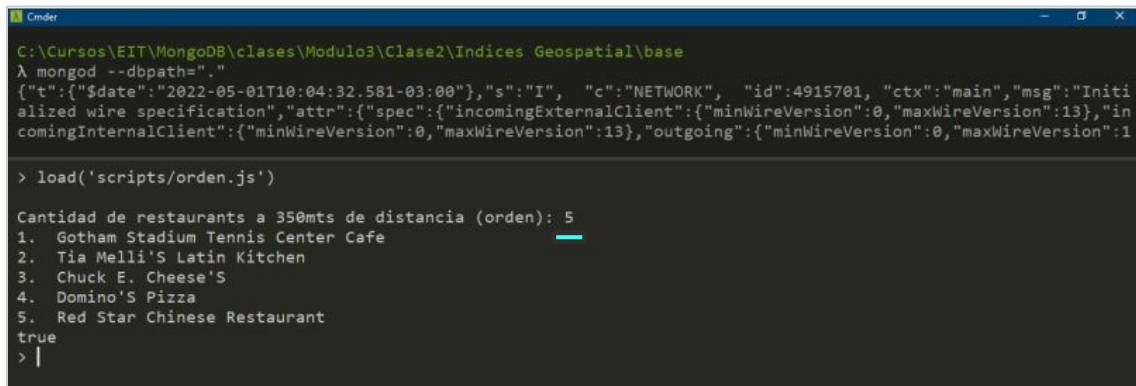
  


...

```
var restaurants = db.restaurants.find({
  location: {
    $nearSphere: {
      $geometry: {
        type: "Point", coordinates: [ -73.93414657, 40.82302903 ]
      },
      $maxDistance: distancia // en metros
    }
  }
})
print('\nCantidad de restaurants a ' + distancia + 'mts de distancia (orden): ' +
restaurants.count())

var orden = 0
while(restaurants.hasNext()) {
  print(++orden+'. ', restaurants.next().name)
}
```

Consola:



```
C:\Cursos\EIT\MongoDB\clases\Modulo3\Clase2\Indices Geospatial\base
λ mongod --dbpath= "."
{"t":{"$date":"2022-05-01T10:04:32.581-03:00"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"main","msg":"Initial
alized wire specification","attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":13},"in
comingInternalClient":{"minWireVersion":0,"maxWireVersion":13},"outgoing":{"minWireVersion":0,"maxWireVersion":1
> load('scripts/orden.js')

Cantidad de restaurants a 350mts de distancia (orden): 5
1. Gotham Stadium Tennis Center Cafe
2. Tia Melli'S Latin Kitchen
3. Chuck E. Cheese'S
4. Domino'S Pizza
5. Red Star Chinese Restaurant
true
> |
```

## Visualización de los resultados en el mapa

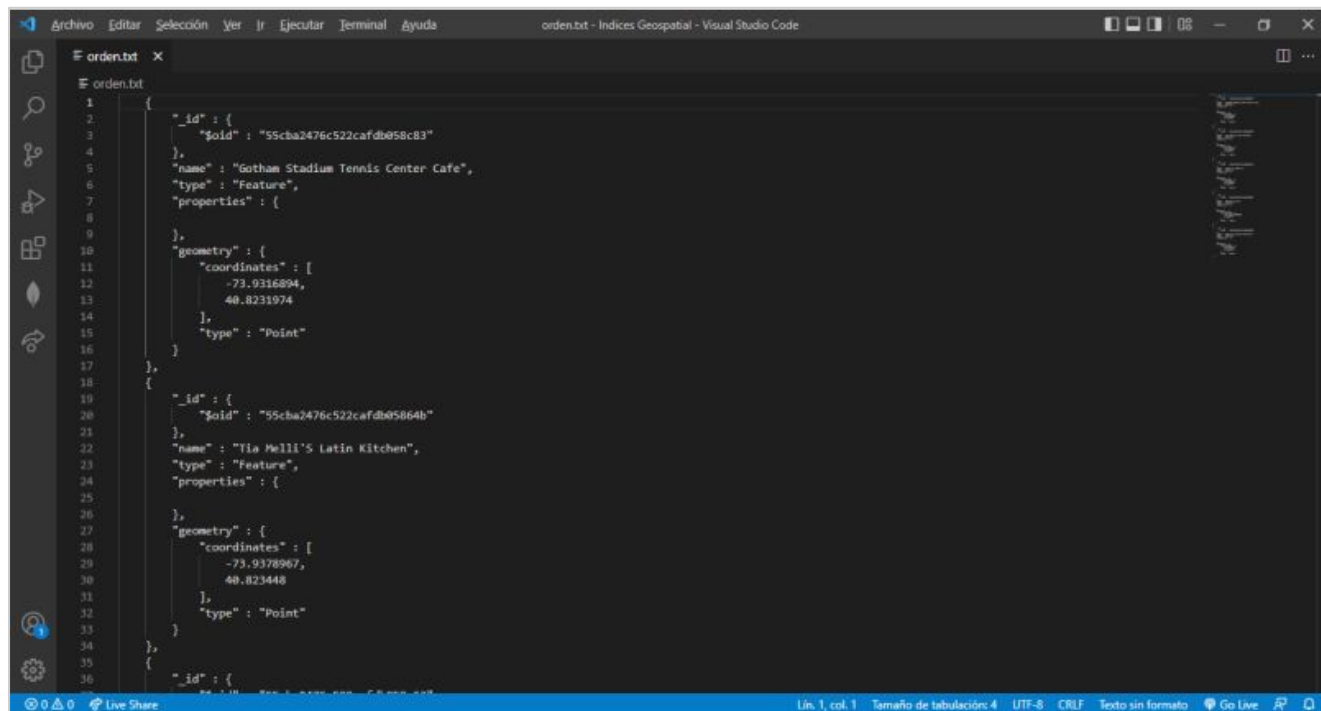
Para visualizar, nuevamente, estos resultados en el mapa se realiza el mismo procedimiento anterior: se crea el script, se ejecuta y se extraen los datos del archivo de salida. Se vuelcan en el mapa **geojson**:

```
var db = db.getSiblingDB("city");
var distancia = 350 // en mts
var restaurants = db.restaurants.find({
  location: {
    $nearSphere: {
      $geometry: {
        type: "Point", coordinates: [ -73.93414657, 40.82302903 ]
      },
      $maxDistance: distancia // en metros
    }
  }
})
```

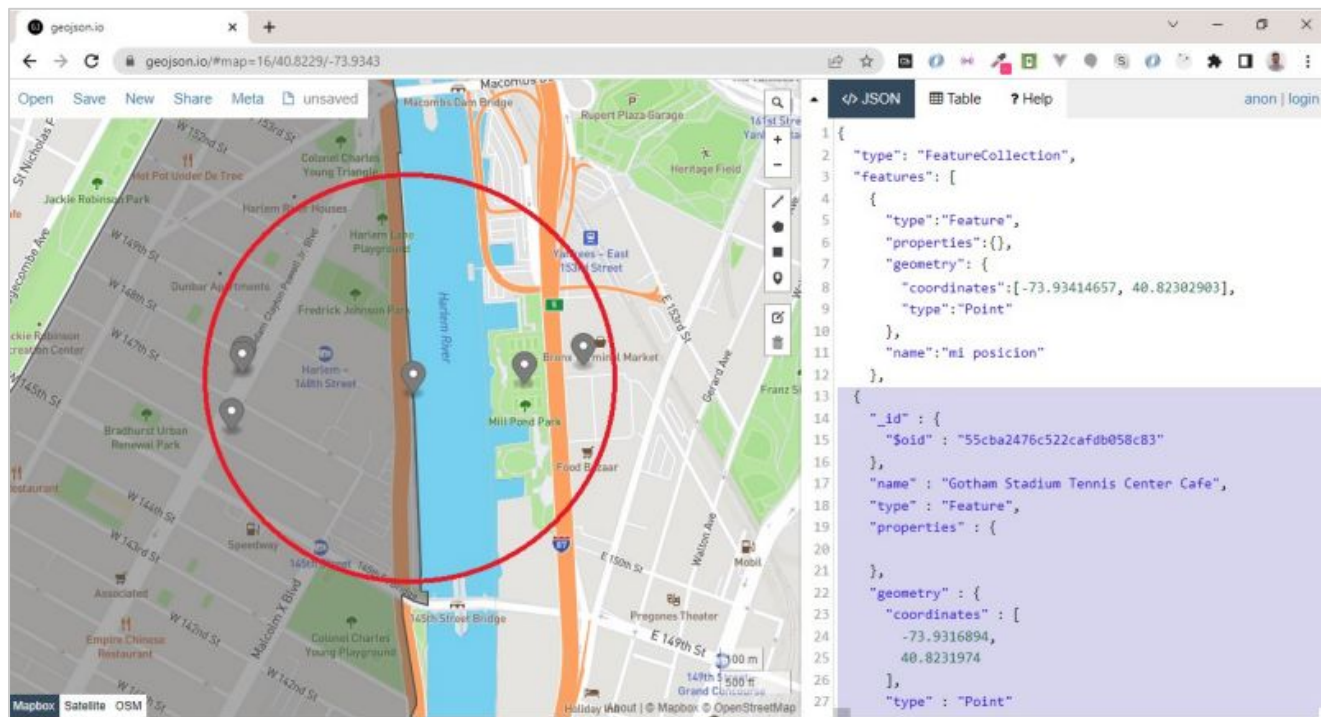


...

```
let output = []
while(restaurants.hasNext()) {
  let restaurant = restaurants.next()
  restaurant.type = "Feature"
  restaurant.properties = {}
  let id = restaurant._id.valueOf()
  restaurant._id = { "$oid" : id }
  restaurant.geometry = {...restaurant.location }
  delete restaurant.location
  output.push(restaurant)
}
printjson(output)
```



```
orden.txt
1 {
2   "_id" : {
3     "$oid" : "55cba2476c522cafdb058c83"
4   },
5   "name" : "Gotham Stadium Tennis Center Cafe",
6   "type" : "Feature",
7   "properties" : {
8   },
9   "geometry" : {
10    "coordinates" : [
11      -73.9316894,
12      40.8231974
13    ],
14    "type" : "Point"
15  }
16 },
17 {
18   "_id" : {
19     "$oid" : "55cba2476c522cafdb05864b"
20   },
21   "name" : "Tia Melili's Latin Kitchen",
22   "type" : "Feature",
23   "properties" : {
24   },
25   "geometry" : {
26    "coordinates" : [
27      -73.9378967,
28      40.823448
29    ],
30    "type" : "Point"
31  }
32 },
33 {
34   "_id" : {
35     "$oid" : "55cba2476c522cafdb05864b"
36   },
37   "name" : "Tia Melili's Latin Kitchen",
38   "type" : "Feature",
39   "properties" : {
40   },
41   "geometry" : {
42    "coordinates" : [
43      -73.9378967,
44      40.823448
45    ],
46    "type" : "Point"
47  }
48 },
49 {
50   "_id" : {
51     "$oid" : "55cba2476c522cafdb05864b"
52   },
53   "name" : "Tia Melili's Latin Kitchen",
54   "type" : "Feature",
55   "properties" : {
56   },
57   "geometry" : {
58    "coordinates" : [
59      -73.9378967,
60      40.823448
61    ],
62    "type" : "Point"
63  }
64 },
65 {
66   "_id" : {
67     "$oid" : "55cba2476c522cafdb05864b"
68   },
69   "name" : "Tia Melili's Latin Kitchen",
70   "type" : "Feature",
71   "properties" : {
72   },
73   "geometry" : {
74    "coordinates" : [
75      -73.9378967,
76      40.823448
77    ],
78    "type" : "Point"
79  }
80 },
81 {
82   "_id" : {
83     "$oid" : "55cba2476c522cafdb05864b"
84   },
85   "name" : "Tia Melili's Latin Kitchen",
86   "type" : "Feature",
87   "properties" : {
88   },
89   "geometry" : {
90    "coordinates" : [
91      -73.9378967,
92      40.823448
93    ],
94    "type" : "Point"
95  }
96 },
97 {
98   "_id" : {
99     "$oid" : "55cba2476c522cafdb05864b"
100  },
101  "name" : "Tia Melili's Latin Kitchen",
102  "type" : "Feature",
103  "properties" : {
104  },
105  "geometry" : {
106   "coordinates" : [
107     -73.9378967,
108     40.823448
109   ],
110   "type" : "Point"
111 }
112 },
113 {
114   "_id" : {
115     "$oid" : "55cba2476c522cafdb05864b"
116   },
117   "name" : "Tia Melili's Latin Kitchen",
118   "type" : "Feature",
119   "properties" : {
120   },
121   "geometry" : {
122    "coordinates" : [
123      -73.9378967,
124      40.823448
125    ],
126    "type" : "Point"
127  }
128 },
129 {
130   "_id" : {
131     "$oid" : "55cba2476c522cafdb05864b"
132   },
133   "name" : "Tia Melili's Latin Kitchen",
134   "type" : "Feature",
135   "properties" : {
136   },
137   "geometry" : {
138    "coordinates" : [
139      -73.9378967,
140      40.823448
141    ],
142    "type" : "Point"
143  }
144 },
145 {
146   "_id" : {
147     "$oid" : "55cba2476c522cafdb05864b"
148   },
149   "name" : "Tia Melili's Latin Kitchen",
150   "type" : "Feature",
151   "properties" : {
152   },
153   "geometry" : {
154    "coordinates" : [
155      -73.9378967,
156      40.823448
157    ],
158    "type" : "Point"
159  }
160 },
161 {
162   "_id" : {
163     "$oid" : "55cba2476c522cafdb05864b"
164   },
165   "name" : "Tia Melili's Latin Kitchen",
166   "type" : "Feature",
167   "properties" : {
168   },
169   "geometry" : {
170    "coordinates" : [
171      -73.9378967,
172      40.823448
173    ],
174    "type" : "Point"
175  }
176 },
177 {
178   "_id" : {
179     "$oid" : "55cba2476c522cafdb05864b"
180   },
181   "name" : "Tia Melili's Latin Kitchen",
182   "type" : "Feature",
183   "properties" : {
184   },
185   "geometry" : {
186    "coordinates" : [
187      -73.9378967,
188      40.823448
189    ],
190    "type" : "Point"
191  }
192 },
193 {
194   "_id" : {
195     "$oid" : "55cba2476c522cafdb05864b"
196   },
197   "name" : "Tia Melili's Latin Kitchen",
198   "type" : "Feature",
199   "properties" : {
200   },
201   "geometry" : {
202    "coordinates" : [
203      -73.9378967,
204      40.823448
205    ],
206    "type" : "Point"
207  }
208 },
209 {
210   "_id" : {
211     "$oid" : "55cba2476c522cafdb05864b"
212   },
213   "name" : "Tia Melili's Latin Kitchen",
214   "type" : "Feature",
215   "properties" : {
216   },
217   "geometry" : {
218    "coordinates" : [
219      -73.9378967,
220      40.823448
221    ],
222    "type" : "Point"
223  }
224 },
225 {
226   "_id" : {
227     "$oid" : "55cba2476c522cafdb05864b"
228   },
229   "name" : "Tia Melili's Latin Kitchen",
230   "type" : "Feature",
231   "properties" : {
232   },
233   "geometry" : {
234    "coordinates" : [
235      -73.9378967,
236      40.823448
237    ],
238    "type" : "Point"
239  }
240 },
241 {
242   "_id" : {
243     "$oid" : "55cba2476c522cafdb05864b"
244   },
245   "name" : "Tia Melili's Latin Kitchen",
246   "type" : "Feature",
247   "properties" : {
248   },
249   "geometry" : {
250    "coordinates" : [
251      -73.9378967,
252      40.823448
253    ],
254    "type" : "Point"
255  }
256 },
257 {
258   "_id" : {
259     "$oid" : "55cba2476c522cafdb05864b"
260   },
261   "name" : "Tia Melili's Latin Kitchen",
262   "type" : "Feature",
263   "properties" : {
264   },
265   "geometry" : {
266    "coordinates" : [
267      -73.9378967,
268      40.823448
269    ],
270    "type" : "Point"
271  }
272 },
273 {
274   "_id" : {
275     "$oid" : "55cba2476c522cafdb05864b"
276   },
277   "name" : "Tia Melili's Latin Kitchen",
278   "type" : "Feature",
279   "properties" : {
280   },
281   "geometry" : {
282    "coordinates" : [
283      -73.9378967,
284      40.823448
285    ],
286    "type" : "Point"
287  }
288 },
289 {
290   "_id" : {
291     "$oid" : "55cba2476c522cafdb05864b"
292   },
293   "name" : "Tia Melili's Latin Kitchen",
294   "type" : "Feature",
295   "properties" : {
296   },
297   "geometry" : {
298    "coordinates" : [
299      -73.9378967,
300      40.823448
301    ],
302    "type" : "Point"
303  }
304 },
305 {
306   "_id" : {
307     "$oid" : "55cba2476c522cafdb05864b"
308   },
309   "name" : "Tia Melili's Latin Kitchen",
310   "type" : "Feature",
311   "properties" : {
312   },
313   "geometry" : {
314    "coordinates" : [
315      -73.9378967,
316      40.823448
317    ],
318    "type" : "Point"
319  }
320 },
321 {
322   "_id" : {
323     "$oid" : "55cba2476c522cafdb05864b"
324   },
325   "name" : "Tia Melili's Latin Kitchen",
326   "type" : "Feature",
327   "properties" : {
328   },
329   "geometry" : {
330    "coordinates" : [
331      -73.9378967,
332      40.823448
333    ],
334    "type" : "Point"
335  }
336 },
337 {
338   "_id" : {
339     "$oid" : "55cba2476c522cafdb05864b"
340   },
341   "name" : "Tia Melili's Latin Kitchen",
342   "type" : "Feature",
343   "properties" : {
344   },
345   "geometry" : {
346    "coordinates" : [
347      -73.9378967,
348      40.823448
349    ],
350    "type" : "Point"
351  }
352 },
353 {
354   "_id" : {
355     "$oid" : "55cba2476c522cafdb05864b"
356   },
357   "name" : "Tia Melili's Latin Kitchen",
358   "type" : "Feature",
359   "properties" : {
360   },
361   "geometry" : {
362    "coordinates" : [
363      -73.9378967,
364      40.823448
365    ],
366    "type" : "Point"
367  }
368 },
369 {
370   "_id" : {
371     "$oid" : "55cba2476c522cafdb05864b"
372   },
373   "name" : "Tia Melili's Latin Kitchen",
374   "type" : "Feature",
375   "properties" : {
376   },
377   "geometry" : {
378    "coordinates" : [
379      -73.9378967,
380      40.823448
381    ],
382    "type" : "Point"
383  }
384 },
385 {
386   "_id" : {
387     "$oid" : "55cba2476c522cafdb05864b"
388   },
389   "name" : "Tia Melili's Latin Kitchen",
390   "type" : "Feature",
391   "properties" : {
392   },
393   "geometry" : {
394    "coordinates" : [
395      -73.9378967,
396      40.823448
397    ],
398    "type" : "Point"
399  }
400 },
401 {
402   "_id" : {
403     "$oid" : "55cba2476c522cafdb05864b"
404   },
405   "name" : "Tia Melili's Latin Kitchen",
406   "type" : "Feature",
407   "properties" : {
408   },
409   "geometry" : {
410    "coordinates" : [
411      -73.9378967,
412      40.823448
413    ],
414    "type" : "Point"
415  }
416 },
417 {
418   "_id" : {
419     "$oid" : "55cba2476c522cafdb05864b"
420   },
421   "name" : "Tia Melili's Latin Kitchen",
422   "type" : "Feature",
423   "properties" : {
424   },
425   "geometry" : {
426    "coordinates" : [
427      -73.9378967,
428      40.823448
429    ],
430    "type" : "Point"
431  }
432 },
433 {
434   "_id" : {
435     "$oid" : "55cba2476c522cafdb05864b"
436   },
437   "name" : "Tia Melili's Latin Kitchen",
438   "type" : "Feature",
439   "properties" : {
440   },
441   "geometry" : {
442    "coordinates" : [
443      -73.9378967,
444      40.823448
445    ],
446    "type" : "Point"
447  }
448 },
449 {
450   "_id" : {
451     "$oid" : "55cba2476c522cafdb05864b"
452   },
453   "name" : "Tia Melili's Latin Kitchen",
454   "type" : "Feature",
455   "properties" : {
456   },
457   "geometry" : {
458    "coordinates" : [
459      -73.9378967,
460      40.823448
461    ],
462    "type" : "Point"
463  }
464 },
465 {
466   "_id" : {
467     "$oid" : "55cba2476c522cafdb05864b"
468   },
469   "name" : "Tia Melili's Latin Kitchen",
470   "type" : "Feature",
471   "properties" : {
472   },
473   "geometry" : {
474    "coordinates" : [
475      -73.9378967,
476      40.823448
477    ],
478    "type" : "Point"
479  }
480 },
481 {
482   "_id" : {
483     "$oid" : "55cba2476c522cafdb05864b"
484   },
485   "name" : "Tia Melili's Latin Kitchen",
486   "type" : "Feature",
487   "properties" : {
488   },
489   "geometry" : {
490    "coordinates" : [
491      -73.9378967,
492      40.823448
493    ],
494    "type" : "Point"
495  }
496 },
497 {
498   "_id" : {
499     "$oid" : "55cba2476c522cafdb05864b"
500   },
501   "name" : "Tia Melili's Latin Kitchen",
502   "type" : "Feature",
503   "properties" : {
504   },
505   "geometry" : {
506    "coordinates" : [
507      -73.9378967,
508      40.823448
509    ],
510    "type" : "Point"
511  }
512 },
513 {
514   "_id" : {
515     "$oid" : "55cba2476c522cafdb05864b"
516   },
517   "name" : "Tia Melili's Latin Kitchen",
518   "type" : "Feature",
519   "properties" : {
520   },
521   "geometry" : {
522    "coordinates" : [
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**¡Sigamos  
trabajando!**