mongoDB.

Food Sniff

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Abstract

Food Sniff is a delightful and insightful platform that brings restaurant data to life. Imagine having all the rich information from Zomato's API at your fingertips, transformed into vibrant visualizations and easy-to-understand insights. That's exactly what Food Sniff delivers!

At its heart, Food Sniff is built on three powerful technologies: MongoDB for storing the treasure trove of restaurant data, Streamlit for creating a friendly and intuitive interface, and Plotly for crafting beautiful interactive visualizations that tell stories about the restaurant landscape.

The platform welcomes you with three inviting doorways: the Explorer, where you can run 10 pre-made queries with just a click (no coding required!); the Analytics dashboard, where colorful charts reveal patterns about restaurants, cuisines, and events; and an About section that shares the story behind our creation. We've wrapped it all in a modern glass-morphism design that's as pleasing to the eye as a well-plated dish.

Food Sniff bridges the gap between complex data and human understanding, making restaurant insights accessible to everyone—whether you're a data wizard or someone who's never written a line of code. By transforming raw restaurant details into meaningful patterns about ratings, cuisines, events, costs, and locations, Food Sniff helps you discover the stories hidden within the numbers.

PROBLEM STATEMENT

The restaurant world is bubbling with data—each rating, review, and reservation telling part of a larger story. Yet this feast of information often remains untasted due to several challenges:

1. The Locked Data Cabinet: Restaurant information sits tucked away in MongoDB databases, accessible only to those who know the secret language of database queries.
2. Numbers Without Pictures: Raw restaurant data is like ingredients without cooking—you can't immediately see what it could become without the right preparation and presentation.
3. The Technical Taste Test: Traditionally, you needed to be fluent in both database languages and visualization tools to make sense of restaurant data, leaving many hungry for insights they couldn't access.
4. The Puzzle of Pieces: Restaurant data comes in many flavors—ratings, locations, events, cuisines—and connecting these pieces into a cohesive picture requires special tools.
5. The Steep Learning Curve: Most analytical platforms demand significant time investment before you can extract your first meaningful insight.

Food Sniff sets the table differently. We've created an inviting platform where anyone can sit down, explore restaurant data through friendly pre-configured queries, and enjoy the visual feast of interactive charts—no technical expertise required. We're bringing the rich flavors of data insights to everyone's palate.

INTRODUCTION

About Project

Food Sniff is like having a knowledgeable foodie friend who's also a data expert. We've created a window into the world of restaurant data that's both beautiful to look at and easy to understand. Our platform takes the complex information gathered from Zomato's API and transforms it into insights that speak to you in human terms.

Think of Food Sniff as your restaurant data companion. Whether you're curious about popular cuisines in different neighbourhoods, wondering which areas have the most special events, or looking to find budget-friendly places with great ratings, Food Sniff helps you explore these questions through an interface that feels more like a conversation than a database query.

We've built Food Sniff using Streamlit, a friendly framework for creating data applications, and connected it to MongoDB, where all the restaurant details live. The visualizations come to life through Plotline Express, turning numbers and statistics into colorful stories about food trends and patterns.

The look and feel of Food Sniff is inspired by modern glass-morphism design—imagine looking through a frosted glass window at a beautiful landscape of restaurant data. And we've made the platform smart enough to adapt to different data structures, so it can understand and work with various types of restaurant information.

Project Plan

Creating Food Sniff was like preparing a complex recipe, with careful attention to each ingredient and step:

1. **Gathering the Ingredients**: We started by understanding what people really want to know about restaurants and what kinds of insights would be most helpful.
2. **Setting the Table**: We established a flexible connection to MongoDB that can adapt to different ways restaurant data might be organized.
3. **Crafting the Menu**: We developed 10 delightful pre-configured queries that answer common questions about restaurants, with clear explanations of what each query reveals.
4. **Cooking Up Visualizations**: We created interactive charts and graphs that bring restaurant metrics to life—showing patterns in locations, ratings, cuisines, and events.
5. **Plating with Style**: We designed a modern, inviting interface with a glass-morphism theme that makes exploring data feel like a premium experience.
6. **Taste Testing**: We rigorously tested Food Sniff with various datasets to ensure it performs beautifully even with large collections of restaurant information.
7. **Writing the Cookbook**: We created friendly documentation to help users get the most out of Food Sniff.
8. **Preparing to Serve**: We made sure Food Sniff can be easily deployed in different environments with simple configuration options.

Functional Requirements

Food Sniff offers a feast of features to satisfy your restaurant data appetite:

1. **Easy Connection to Your Data**:

- Connect to any MongoDB restaurant database with a few simple settings
- Use your own database and collection names
- See at a glance how many restaurants are available to explore

2. **Effortless Exploration**:
   - Choose from 10 ready-made queries with a single click
   - See exactly what's happening behind the scenes with clear MongoDB syntax
   - View results in friendly, readable tables
   - Let Food Sniff automatically figure out your data structure
3. **Delightful Visualizations**:
   - Bar charts that compare restaurants and events across different areas
   - Pie charts that show the popularity of various cuisines
   - Line charts that reveal how events trend over time
   - Maps that plot restaurant locations so you can see geographical patterns
   - Quick summary metrics for ratings and costs
4. **Friendly User Experience**:
   - Navigate easily between Explorer, Analytics, and About sections
   - Adjust filters and parameters through intuitive controls
   - Enjoy the beautiful glass-morphism design that makes data feel approachable
   - Expand sections to dive deeper into information that interests you
5. **Smooth Performance**:

- Experience fast loading thanks to clever caching of results
- Browse through large datasets with pagination support
- Benefit from efficient database queries that deliver quick insights.

PROPOSED SYSTEM

Food Sniff serves up a delicious solution to the challenges we've identified. Here's how our system brings restaurant data to everyone's table:

System Architecture

Food Sniff is built like a well-designed three-course meal:

1. **The Pantry (Data Layer)**: MongoDB database storing all the rich restaurant information collected from Zomato API
2. **The Kitchen (Application Layer)**: Python backend using PyMongo to prepare and process the data
3. **The Dining Room (Presentation Layer)**: Streamlit-based interface with Plotly visualizations serving up beautiful insights

Key Components

1. The Explorer Menu

Our Explorer is like a tasting menu with 10 carefully crafted dishes, each revealing different flavors of restaurant data:

- Discover restaurant names and their neighborhoods
- Track special events and see where they're happening
- Filter restaurants by cost and rating to find hidden gems
- Explore cuisine varieties and delivery services
- Analyze neighborhoods and price ranges with multi-faceted views

Each query comes with:

- A clear recipe (MongoDB syntax) so you understand what's happening
- Adjustable ingredients (parameters) where you might want to customize
- Beautiful presentation of results
- Visual garnishes that bring the data to life

2. The Analytics Dashboard

Our Analytics dashboard is like a chef's table experience with a view of all the important kitchen activity:

- Key metrics displayed front and center—total restaurants, active events, average ratings, and costs
- Distribution charts showing where events and restaurants cluster by neighborhood
- Cuisine popularity showcased through colorful pie charts
- Monthly event trends tracked over time like a seasonal menu
- Restaurant locations mapped geographically for spatial understanding

3. The Adaptable Chef

Food Sniff is like a chef who can work with whatever ingredients are available:

- It intelligently identifies the important fields for restaurant names, neighborhoods, events, and ratings
- When certain ingredients (fields) are missing, it gracefully adjusts the menu
- It handles complex nested data structures with ease, just as a skilled chef manages complex recipes

4. The Efficient Kitchen

To ensure your experience is smooth and responsive:

- We use MongoDB aggregation pipelines to do much of the preparation on the server side
- Frequently requested visualizations are cached, like having popular dishes ready to serve
- Large result sets are paginated so you're never overwhelmed with too much at once
- Queries are optimized to transfer just what you need, nothing more

5. The Inviting Atmosphere

Food Sniff welcomes you with a modern, appealing interface:

- Glass-morphism design creates a sophisticated yet approachable ambiance
- The responsive layout adjusts to your screen size, like a well-designed dining space
- Clear navigation between Explorer, Analytics, and About sections makes the experience intuitive
- Interactive controls let you customize your data dining experience

Food Sniff transforms the complex world of MongoDB restaurant data into an accessible feast of insights. We've removed the technical barriers so everyone can enjoy the rich flavors of restaurant analytics, whether you're looking to understand trends, discover patterns, or just explore the culinary landscape through data.

DATA DESCRIPTION

Food Sniff works with a rich collection of restaurant information harvested from the Zomato API and stored in MongoDB. Let's take a closer look at this data—the secret ingredients that make our insights possible.

Data Structure

Each restaurant in our database is represented as a JSON/BSON document—think of it as a detailed recipe card with all the essential information about a restaurant. Here's what we know about a restaurant like "Hauz Khas Social":

The Basics

_id: A unique identifier for each restaurant in our database

name: The restaurant's name (e.g., "Hauz Khas Social")

url: Link to the restaurant's Zomato webpage

cuisines: The types of food they serve (e.g., "Continental, American, Asian, North Indian")

average_cost_for_two: How much you might spend for a meal for two (e.g., 1600 ₹)

price_range: A simple 1-4 scale indicating how expensive the restaurant is

currency: What currency they use (e.g., "Rs.")

featured_image: A beautiful photo of the restaurant or its food

thumb: A smaller version of the image for quick loading

Location Details

The restaurant's location is stored as a nested bundle of information:

```json
"location": {
  "latitude": "28.5542851000",
  "longitude": "77.1944706000",
  "address": "9-A & 12, Hauz Khas Village, New Delhi",
  "city": "New Delhi",
  "city_id": 1,
  "locality": "Hauz Khas Village",
  "locality_verbose": "Hauz Khas Village, New Delhi",
  "country_id": 1
}
```

Ratings and Reviews

What people think about the restaurant:

```json
"user_rating": {
  "aggregate_rating": "4.3",
  "rating_text": "Very Good",
  "rating_color": "5BA829",
  "votes": "7931"
}
```

Services and Features

- **has_online_delivery**: Can you order food to your doorstep? (0/1)
- **is_delivering_now**: Are they currently delivering? (0/1)
- **has_table_booking**: Can you reserve a table? (0/1)
- **switch_to_order_menu**: Is an order menu available? (0/1)

Special Events

Restaurants often host events, stored as a collection of event details:

```json
"zomato_events": [
  {
    "event": {
      "title": "IPL Match Screenings",
      "description": "It's #IPL season and we're screening 'em all!...",
      "start_date": "2017-04-05",
      "end_date": "2017-05-21",
      "display_date": "05 April - 21 May",
      "start_time": "10:00:00",
      "end_time": "01:00:00",
      "photos": [
        {
          "photo": {
            "url": "https://b.zmtcdn.com/data/zomato_events/photos/...",
            "thumb_url": "https://b.zmtcdn.com/data/zomato_events/photos/..."
          }
        }
      ]
    }
  }
]
```

The Nature of Our Data

- **It's Abundant**: Our collections typically contain thousands of restaurant documents
- **It's Complex**: Information is often nested within nested structures, like Russian dolls
- **It's Diverse**: Not all restaurants have the same information available
- **It's Mappable**: Location data lets us place restaurants in geographical context

Food Sniff is designed to handle all these complexities with ease. It automatically detects the important fields and adapts its queries and visualizations to make the most of whatever data is available. Think of Food Sniff as a skilled chef who works with seasonal and variable ingredients to create consistently delightful dishes.

Code Snippets

1. All restaurant names:

db.zomato.find({}, { name:1, _id:0 });

	Restaurant
0	Hauz Khas Social
1	Qubitos - The Terrace Cafe
2	The Hudson Cafe
3	Summer House Cafe
4	38 Barracks
5	Spezia Bistro
6	Manhattan Brewery & Bar Exchange
7	The Wine Company
8	Farzi Cafe
9	Indian Grill Room
10	Cafeteria & Co.

2. Unique localities

db.zomato.distinct("location.locality");

	Locality
0	12th Square Building, Banjara Hills
1	A Hotel, Gurdev Nagar
2	AAAA
3	Abu Dhabi Mall, Tourist Club Area (Al Zahiyah)
4	Abu Shagara
5	Acropolis Mall, Kasba
6	Adajan Gam
7	Addition Hills
8	Adyar
9	Aggar Nagar
10	Agra Cantt

3. Restaurants & their event titles:

```
db.zomatoo.aggregate([
{ $match: { zomato_events: { $exists:true, $ne:[] } } },
{ $project: { _id:0, name:1,
   event_titles: {
      $map: { input:'$zomato_events', as:'e',
in:'$$e.event.title' }
   }
} }
]);
```

	Restaurant	event_titles
0	Hauz Khas Social	IPL Match Screenings
1	Qubitos - The Terrace Cafe	Live Fusion Night with Suboni Brothers, Raenit Singh Ft. Sarvagya The Band, Qubitos
2	Summer House Cafe	SALSA NIGHT, Karaoke Night, COMEDY NIGHT, BoxoutWednesdays #007 w/ bj&oslas
3	Manhattan Brewery & Bar Exchange	Bollywood Night With Raftaar
4	HotMess	Acoustic Sunday Sessions With The Rush Band
5	My Bar Headquarters	IPL LIVE SCREENING
6	Odeon Social	IPL Match Screenings
7	What's Up	TRIPPY TUESDAY, 11th Hour, BUY 2 GET 1 FREE
8	Asia Kitchen by Mainland China	Fantastic 4
9	Santa's Fantasea	OPENING SOON NEAR YOU!
10	Mumbai Vibe	IPL Screenings at Mumbai Vibe!

4. Events per locality :

```
db.zomato.aggregate([
{ $match: { zomato_events: { $exists:true, $ne:[] } } },
{ $project: { locality:'$location.locality',
              num_events:{ $size:'$zomato_events' } } },
{ $group: { _id:'$locality', total_events:{
$sum:'$num_events' } } },
{ $sort: { total_events:-1 } }
]);
```

	Locality	Events
0	Christian Basti	7
1	Vagator	7
2	Hauz Khas	5
3	Sarjapur Road	5
4	Crowne Plaza Abu Dhabi, Al Markaziya	5
5	Koramangala 7th Block	4
6	The St. Regis, Westbay	4
7	Koregaon Park	3
8	Lal Kothi	3
9	Connaught Place	3
10	Mylapore	3

5. Top 3 active localities (events/restaurant) :

```
db.zomato.aggregate([
{ $match: { zomato_events: { $exists:true, $ne:[] } } },
{ $group: {
   _id: '$location.locality',
   restaurants_with_events: { $sum:1 },
   total_events: { $sum:{ $size:'$zomato_events' } },
   avg_cost:    { $avg:'$average_cost_for_two' },
   avg_rating:   { $avg:{
$toDouble:'$user_rating.aggregate_rating' } }
} },
{ $addFields: {
   events_per_rest: {
$divide:['$total_events','$restaurants_with_events'] }
} },
```

```
{ $sort: { events_per_rest:-1 } }, { $limit: 3 }
]);
```

	Locality	Restaurants	TotalEvents	AvgCost	AvgRating	Events/Restaurant
0	Vagator	1	7	2,000	4.2	7
1	Christian Basti	1	7	1,400	4.2	7
2	Crowne Plaza Abu Dhabi, Al Markaziya	1	5	350	4.4	5

6. One raw document:

```
db.zomato.findOne();
```


```
{
  "_id" : "ObjectId('68077a692e55167f81efcc98')"
  "has_online_delivery" : 1
  "photos_url" :
  "https://www.zomato.com/HauzKhasSocial/photos?
  utm_source=api_basic_user&utm_medium=api&utm_campaign=v2.1#tabtop"
  "url" : "https://www.zomato.com/HauzKhasSocial?utm_source=api_basic_user&utm_medium=api&utm_campaign=v2.1"
  "price_range" : 3
  "apikey" : "b90e6a8c738410315a20c449fe2eb1b1"
  "user_rating" : {
     "rating_text" : "Very Good"
     "rating_color" : "5BA829"
     "votes" : "7931"
     "aggregate_rating" : "4.3"
  }
  "R" : {
     "res_id" : 308322
  }
  "name" : "Hauz Khas Social"
```


7. High-rated & budget-friendly :

```
db.zomato.find(
   {
      $expr: {
         $and: [
            { $gt: [ { $toDouble:
"$user_rating.aggregate_rating" }, 4.0 ] },
            { $lte: [ "$average_cost_for_two", 1500 ] }
         ]
      }
   },
   { name: 1, "user_rating.aggregate_rating": 1,
average_cost_for_two: 1, _id: 0 }
);
```

	user_rating	Restaurant	Cost for 2
0	{"aggregate_rating":"4.5"}	Qubitos - The Terrace Cafe	1,500
1	{"aggregate_rating":"4.4"}	The Hudson Cafe	850
2	{"aggregate_rating":"4.6"}	Spezia Bistro	900
3	{"aggregate_rating":"4.6"}	Cafeteria & Co.	900
4	{"aggregate_rating":"4.2"}	Molecule Air Bar	1,500
5	{"aggregate_rating":"4.2"}	The Barbeque Company	1,200
6	{"aggregate_rating":"4.3"}	Saravana Bhavan	500
7	{"aggregate_rating":"4.8"}	Spice Kraft	1,200
8	{"aggregate_rating":"4.2"}	Hoppipola	1,200
9	{"aggregate_rating":"4.3"}	Peter Cat	1,000
10	{"aggregate_rating":"4.4"}	6 Ballygunge Place	1,000

8. Page Through Restaurants by Cost

```
db.zomato.find({},
{ name: 1, average_cost_for_two: 1, _id: 0 })
.sort({ average_cost_for_two: 1 })
.skip(0)
```

```
.limit(5);
```

	Restaurant	Cost for 2
0	The BrewMaster	0
1	Atmosphere Grill Cafe Sheesha	0
2	Chapter 1 Cafe	0
3	Sheroes Hangout	0
4	UrbanCrave	0

9. Continental / Asian OR Online Delivery

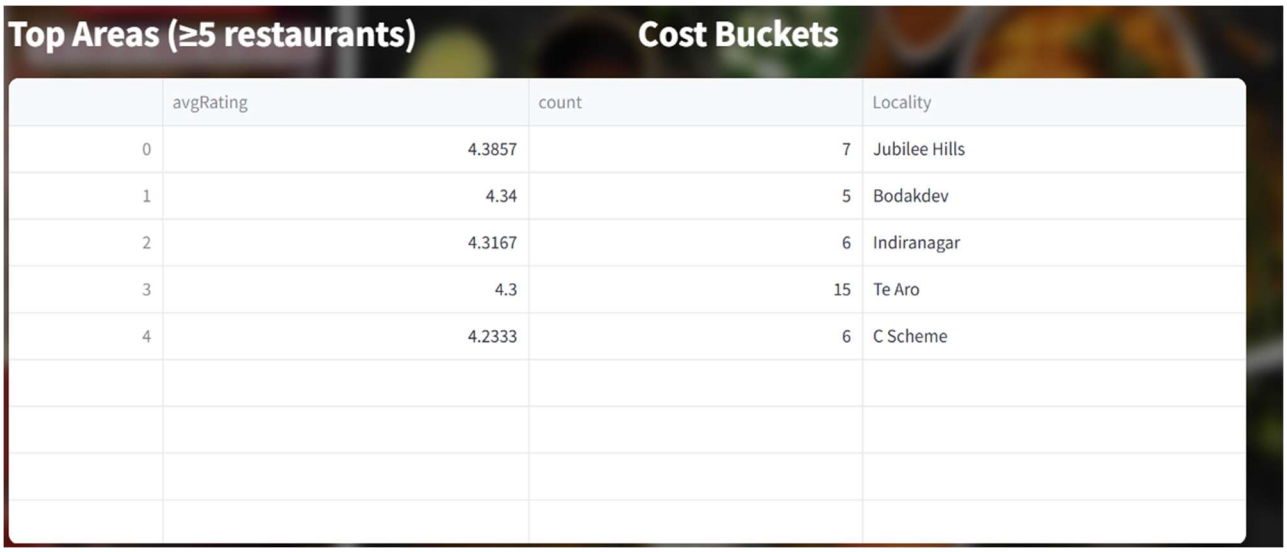
```
db.zomato.find(
{
   $or: [
      { cuisines: { $in: ["Continental", "Asian"] } },
      { has_online_delivery: 1 }
   ]
},
{ _id: 0, name: 1, cuisines: 1, has_online_delivery: 1 }
);
```

	Delivery?	Restaurant	Cuisines
0	1	Hauz Khas Social	Continental, American, Asian, North Indian
1	1	The Hudson Cafe	Cafe, Italian, Continental, Chinese
2	1	Spezia Bistro	Cafe, Continental, Chinese, Italian
3	1	Indian Grill Room	North Indian, Mughlai
4	1	HotMess	North Indian, Mediterranean, Asian, Fast Food
5	1	Saravana Bhavan	South Indian
6	1	Hoppipola	Italian, Mexican, American, Mediterranean
7	1	Peter Cat	Continental, North Indian
8	1	6 Ballygunge Place	Bengali
9	1	TGI Friday's	Tex-Mex, American
10	1	Asia Kitchen by Mainland China	Asian, Chinese

10. Facet – top areas & cost buckets

```
db.zomato.aggregate([
{
   $facet: {
   topNeighborhoods: [
      { $group: {
         _id: "$location.locality",
         avgRating: { $avg: { $toDouble:
"$user_rating.aggregate_rating" } },
         count:     { $sum: 1 }
      } },
      { $match: { count: { $gte: 5 } } },
      { $sort:  { avgRating:-1 } },
      { $limit: 5 },
      { $project: { _id:0, locality:"$_id", avgRating:1,
count:1 } }
   ],
   costBuckets: [
      { $bucket: {
         groupBy: "$average_cost_for_two",
         boundaries:[0,500,1000,1500,2000,3000],
         default:"3000+",
         output: {
         numRestaurants: { $sum: 1 },
         avgRating:{ $avg: { $toDouble:
"$user_rating.aggregate_rating" } }
         }
```

```
        } },
        { $project: { _id:0, range:"$_id",
                    numRestaurants:1, avgRating:1 } }
    ]
    }
}
]);
```



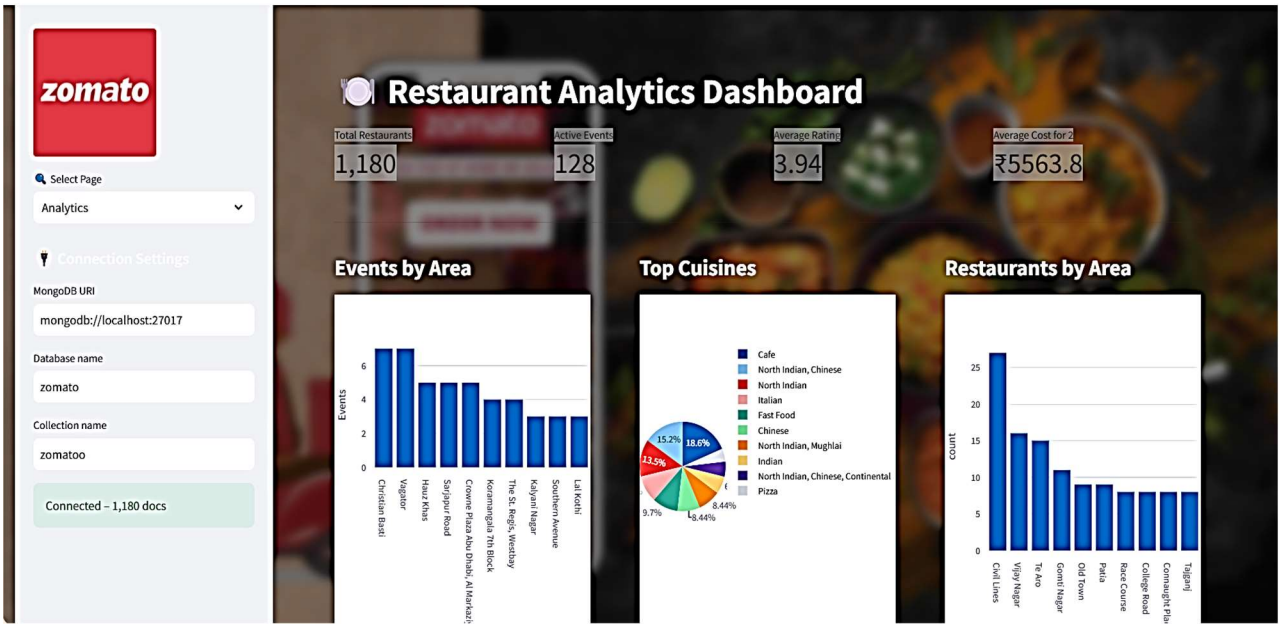
Top Areas (≥5 restaurants)

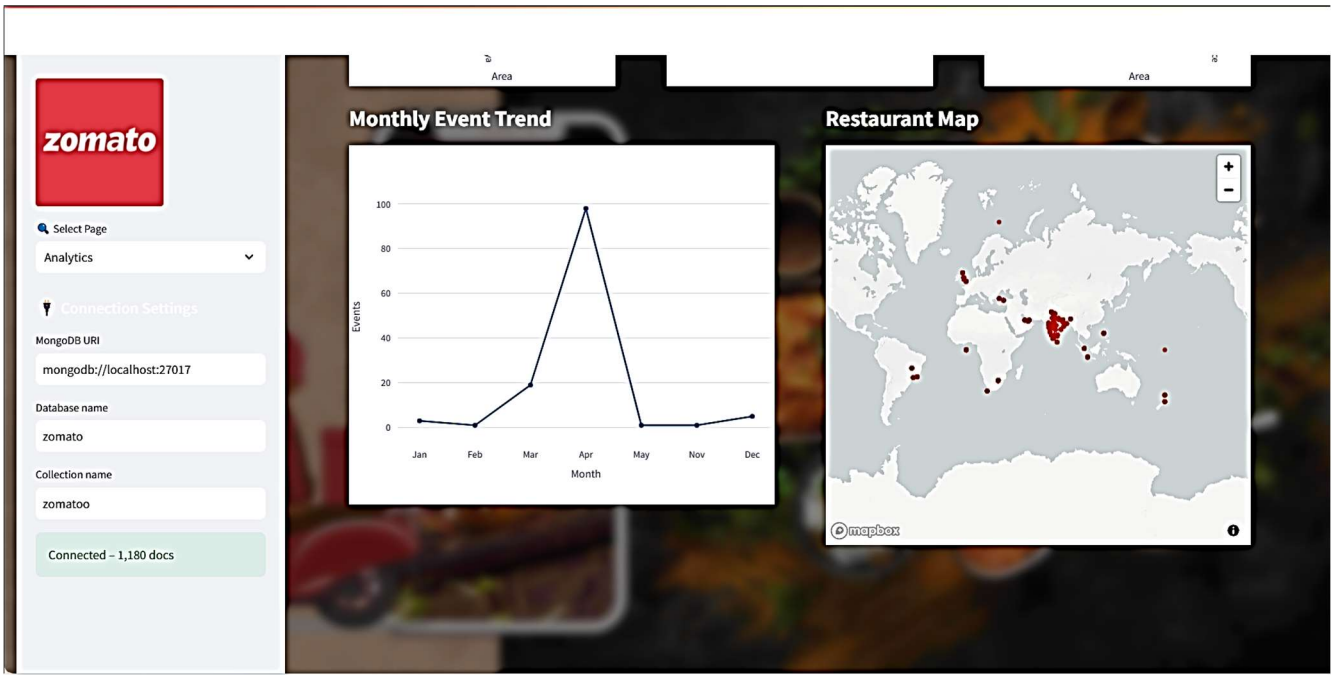
	avgRating	count	Locality
0	4.3857	7	Jubilee Hills
1	4.34	5	Bodakdev
2	4.3167	6	Indiranagar
3	4.3	15	Te Aro
4	4.2333	6	C Scheme

Cost Buckets

	Restaurants	avgRating	Range
0	491	3.9827	0
1	332	3.8057	500
2	180	3.9367	1000
3	110	4.0627	1500
4	35	3.9571	2000
5	32	4.3031	3000+

Analytical Dashboard





CONCLUSION

Food Sniff transforms the way we experience restaurant data, turning what was once a complex technical challenge into an engaging exploration that anyone can enjoy. By bringing together MongoDB's powerful data storage, we've created a platform that lets the stories within restaurant data shine through.

Food Sniff demonstrates how specialized data applications can bridge the gap between complex information sources and meaningful human insights. By removing technical barriers and creating an interactive, exploration-friendly environment, we've made it possible for anyone to develop a data-driven understanding of the restaurant landscape.

Just as a great meal brings people together around a table, Food Sniff brings people together around data, creating a shared language for understanding the patterns and trends that shape our dining experiences.

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