# Shopping Planner

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## **Project Description**

Using the Location wise Shops Dataset, we intend to provide the following services -

- Analyse and sort a particular area.
  - Take different location inputs from users
  - Compute and provide the shortest path.

Why this project

- Challenging Problem (NP-hard)
- Common problem faced by all

### Dataset

SimpleGeo Public Spaces CCo Collection Services Dataset - ( only US locations -7.4 GB )



## User Input



## **Functional Flow**



## Classic TSP vs Our Approach

### **Classic TSP**

Traverse all the points in the given list of vertices.

### Our approach

Pick one point from each category in the list of vertices.



## Algorithm

**Clustering and Centroid** 

- Creating separate clusters of unique shop categories.
- Finding centroids for those individual clusters.
- Selecting the cluster which has the smallest distance from home.
- Might give incorrect results in case a cluster has shops at far ends.



## Algorithm

Nearest Neighbour Algorithm

- Locate shops from individual categories which are closer to home.
- Generate distance matrix for these selected shops.
- Plan the ordering of visiting each store.





### Architecture



Client browser RESTful & concurrent NodeJS server MongoDB Instance

## Technologies Used

- MongoDB
- NodeJs
- Express
- JQuery
- Bootstrap
- Select2JS
- UnderscoreJs
- Google Direction API
- Google Maps API
- Github



## Why mongoDB?

### Geo spatial queries -

- 2d sphere index (Geohash)
- GeoNear query
- Aggregation pipeline



#### \$geoNear Algorithm



Series of \$geoWithin + sort

#### MongoDB Aggregation Framework



## Sample UI



## Sample UI



Radius 2 miles

#### Categories

× School × Business Services × Construction × Computers & Home Electronics ×Bank

## Detailed Route in UI

	Map Satellite Search Box	A Mode of Travel: Driving
Shopping Planner	Route	× Ave-
1026-1038 Walker Ave, Baltimore, MD 21250, USA		Ø adig
Radius 2 miles	1026-1038 Walker Ave, Baltimore, MD 21250, USA	Hooper Ave
Catagorian	0.7 mi. About 3 mins	the second second
Categories	1. Head southwest 138 ft	
Construction	₽ 2. Turn right toward Walker Ave 466 ft	
Computers & Home Electronics	➡ 3. Turn right toward Walker Ave 121 ft	
*Bank	1 4. Continue straight 98 ft	and the second
	← 5. Turn left onto Walker Ave 466 ft	Ten Dille
Get Directions	➡ 6. Turn right onto Hilltop Cir 0.3 mi	Coate of D
See detailed directions	<ul> <li>7. Make a U-turn at Center Rd 499 ft</li> <li>Destination will be on the right</li> </ul>	TTO AND AND
Total Distance : 0.40 miles	Hilltop Cir, Baltimore, MD 21250, USA	he Rid
	1.2 mi. About 4 mins	
	1. Head northwest on Hilltop Cir toward Walker Ave 0.8 mi	8 3
	Q 2. At the traffic circle, take the 1st exit onto UMBC Blvd 0.2 mi	
	3. At the traffic circle, take the 2nd exit onto Research Park Dr 0.1 mi	
	5520 Research Park Dr, Catonsville, MD 21228, USA	Sulphur Spring Rd
	1.3 mi. About 4 mins	
	1. Head west on Research Park Dr 223 ft	ar here
	Q 2. At the traffic circle, take the 1st exit onto UMBC Blvd 0.2 mi	
	3. At the traffic circle, take the 1st exit onto Hilltop Cir 0.5 mi	
	➡ 4. Turn right onto Poplar Ave 0.2 mi	+
	5. Turn right onto Shelbourne Rd     0.3 mi	

# Demo

## Project Deliverable

Initial Presentation (19th September)	Data Cleansing and Merging	
	Get all data in MongoDB	
	Initial App setup, clear idea of Application flow	
Midterm Demonstration (31st October)	Algorithm Design	
	Start Front End design	
	Implement Algorithm	
	Integration	
	Testing	
Final Demonstration (5th December)	Prepare Draft Report	
	Review and Edit, Prepare Final Report	
Final Report Submission (22nd December)		

## Future Scope

• Cost

Factor in cost of goods / services.

• Trends

Use the user's previous searches / routes to give better results.

Package Delivery

Use it to solve Vehicle Routing Problems

• Potential areas

Discover potential areas to set up business / factories.

Mobile Application

Android / iOS application

## References

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Any Questions?