Chapter-3
Proposed Methodology

I aim to implement different Multi-criteria decision-making (MCDM) algorithms and predict the best and optimal alternative among a number of choices based on a number of criteria as provided by the Places API.

3.1 DATA FETCHING AND PREPROCESSING

The dataset used will be generated from utilising Geoapify API Places API and Places Detail API for retrieving information about the places of interest in form of a csv. This Places API generates 10 relevant places within a given radius. It also generates an fsq Id which can be utilised to get information from Places Detail API.

fsq Id	Name	Address	Latitude	Longitude	Category Id	Popularity	Ratings	Total Ratin	Website
51530cf5e4	Dream Vacations Cr	30 W 61st St,	40.77001	-73.9832	19018	0.301663	4.6	1456	https://ebrill.dreamvacations.com/trave
e72e2abcd:	KG Travel Club	509 E 83rd S	40.77388	-73.9476	19055	0.725499	7.8	24	http://kgtravelclub.com
5851e62ccc	BlueOrange Travel -	1633 Broadw	40.76204	-73.9846	19055	0.129728	3.5	511	https://blueorangetravel.com
4bf9d8adb	Protravel Internatio	515 Madison	40.75974	-73.9738	19055	0.68529	6.7	78	http://protravelinc.com
57c9afd04	Empire Limousine	211 W 43rd St	40.75712	-73.9869	19053	0.189104	5	11	http://www.empirelimousine.net
df2d51d95e	Executive Global Tr	303 W 42nd S	40.75753	-73.9899	19055	0.280928	8	108	http://www.executiveglobaltours.com
8224a834a	PhotoTrek Tours	209 E 42nd S	40.75651	-73.9875	19055	0.457003	7	343	http://www.phototrektours.com
575f852b4	Encore Jets	1460 Broadw	40.75509	-73.9863	19055	0.893287	8.9	67	http://www.encorejets.com
9af1f6a91c1	Blue Ribbon Bags	119 W 40th St	40.75407	-73.9859	19055	0.239789	7.3	465	http://www.blueribbonbags.com
1c1b1f1762a	CIBTvisas New York	60 E 42nd St,	40.75222	-73.9788	19055	0.794145	4.5	43	http://cibtvisas.com?y_source=1_MzAzNj

Fig 3.1 Places of Interest Data

The different MCDM algorithms to be implemented are discussed here.

- Simple Additive Weighting (SAW)
- Analytic Hierarchy Process (AHP)
- TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution)
- Promethee (Preference Ranking Organization Method for Enrichment of Evaluations)

3.2 SIMPLE ADDITIVE WEIGHTING (SAW)

This method was first proposed by Fish burn in 1967 and is considered as one of the simplest MCDM methods. Each alternative is assessed with regard to every attribute. This is a single step algorithm and uses the following formula:

$$S_i = \sum_{j=1}^{m} wj * xij$$

Where A_i represents the performance score of a particular alternative.