

**Analysing Neighbourhoods in Arunachal Pradesh, India
in order to provide for an appropriate location for setting
of holiday homes**

Submitted By

Pragyan Pandey

28th November 2020

1. Introduction

1.1 Background:

Northeast India (officially North Eastern Region, NER) is the easternmost region of India representing both a geographic and political administrative division of the country. It comprises eight states – Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The Northeast region can be physio-graphically categorised into the Eastern Himalaya, the Patkai and the Brahmaputra and the Barak valley plains. Northeast India (at the confluence of Indo-Malayan, Indo-Chinese, and Indian biogeographical realms) has a predominantly humid sub-tropical climate with hot, humid summers, severe monsoons, and mild winters. Along with the west coast of India, this region has some of the Indian subcontinent's last remaining rainforests, which support diverse flora and fauna and several crop species.

The region is covered by the mighty Brahmaputra-Barak river systems and their tributaries. Geographically, apart from the Brahmaputra, Barak and Imphal valleys and some flatlands in between the hills of Meghalaya and Tripura, the remaining two-thirds of the area is hilly terrain interspersed with valleys and plains; the altitude varies from almost sea-level to over 7,000 metres (23,000 ft) above MSL. The states of Arunachal Pradesh and Sikkim have a montane climate with cold, snowy winters and mild summers.

Arunachal Pradesh (literally "land of dawn-lit mountains") is a state in Northeast India. The state is also known as the Orchid State of India or the Paradise of the Botanists. It borders the states of Assam and Nagaland to the south. It shares international borders with Bhutan in the west, Myanmar in the east, and a disputed border with China in the north at the McMahon Line. Itanagar is the state capital of Arunachal Pradesh. Arunachal Pradesh is the largest of the Seven Sister States of Northeast India by area.

Arunachal Pradesh is located between 26.28° N and 29.30° N latitude and 91.20° E and 97.30° E longitude and has an area of 83,743 km² (32,333 sq mi). It is an ethnically diverse state, with predominantly Monpa people in the west, Tani people in the center, Tai people in the east, and Naga people in the south of the state.

The highest peak in the state is Kangto, at 7,060 metres (23,160 ft). Nyegi Kangsang, the main Gorichen peak, and the Eastern Gorichen peak are other tall Himalaya peaks. The state's mountain ranges, in the extreme East of India, are described as "the place where the sun rises" in historical Indian texts and named the Aruna Mountains, which inspired the name of the state. The villages of Dong (more accessible by car, and with a lookout favoured by tourists) and Vijaynagar (on the edge of Myanmar) receive the first sunlight in all of India. Major rivers of Arunachal Pradesh include the Kameng, Subansiri, Siang (Brahmaputra), Dibang, Lohit and Noa Dihing rivers. Subsurface flows and summer snow melt contribute to the volume of water. Mountains until the Siang river are classified as the Eastern Himalayas. Those between the Siang and Noa Dihing are classified as the Mishmi Hills that may be part of the Hengduan Mountains. Mountains south of the Noa Dihing in Tirap and Longding districts are part of the Patkai Range.

Arunachal Pradesh has among the highest diversity of mammals and birds in India. There are around 750 species of birds and more than 200 species of mammals in the state. Arunachal's forests account for one-third of habitat area within the Himalayan biodiversity hot-spot. It

harbours over 5000 plants, about 85 terrestrial mammals, over 500 birds and many butterflies, insects and reptiles. At the lowest elevations, essentially at Arunachal Pradesh's border with Assam, are Brahmaputra Valley semi-evergreen forests. Much of the state, including the Himalayan foothills and the Patkai hills, are home to Eastern Himalayan broadleaf forests. Toward the northern border with Tibet, with increasing elevation, come a mixture of Eastern and Northeastern Himalayan subalpine conifer forests followed by Eastern Himalayan alpine shrub and meadows and ultimately rock and ice on the highest peaks. It supports many medicinal plants and within Ziro valley of Lower Subansiri district 158 medicinal plants are being used by its inhabitants. The mountain slopes and hills are covered with alpine, temperate, and subtropical forests of dwarf rhododendron, oak, pine, maple and fir. The state has Mouling and Namdapha national parks. A new subspecies of hoolock gibbon has been described from the state which has been named as Mishmi Hills hoolock. Three new giant flying squirrels were also described from the state during the last one and half-decade. These were, Mechuka giant flying squirrel, Mishmi Hills giant flying squirrel, and Mebo giant flying squirrel.

All this qualifies Arunachal Pradesh as a top-class tourist spot. However, till date its tourism potential is not utilised upto its capacity.

1.2 Business Problem:

Given the natural beauty, Arunachal Pradesh has the potential of developing as a tourist hub. **The aim of this project** is thus, to study and analyse neighbourhoods in Arunachal Pradesh's various districts in order to determine potential locations for opening of holiday homes.

1.3 Stakeholders:

This can thus be **useful for** entrepreneurs and business owners who are looking forward to setting foot in Tourism Industry. This project will analyse available data and find proper recommendations for the stakeholders in order to provide them a good business opportunity.

2. Data acquisition and cleaning

2.1 Data Sources:

The data requirement for the project were sourced from various sources as follows:

- The **data for districts** of Arunachal Pradesh was obtained from the wikipedia page (https://en.wikipedia.org/wiki/List_of_districts_of_Arunachal_Pradesh).
- The **geographical coordinates** were sourced from GeoPy library in python for map display.
- **Venue data** were extracted from Foursquare API data to study popular venues around in order to determine the location for our holiday homes.

2.2 Data Cleaning and Assembling:

- The data for districts is obtained through web scrapping. The data was read into a pandas dataframe using read_html() method. The columns like Area, Density, etc. that were not needed were dropped during the cleaning process.
- The **geographical coordinates** were sourced from GeoPy library in python for map display. The data was combined with districts data to obtain district wise geographical coordinates.
- Foursquare API was used to obtain **Venue data** in order to study popular venues around so as determine the location for our holiday homes.

2.3 Data Visualisation:

A map of Arunachal Pradesh was plotted using Folium in python to depict the various districts.

3. Data Analysis:

Using data from Foursquare API Districts were explored. To get an estimate top 10 Venues around the first district, Tawang, were explored first within a radius of 5 kms. It was obtained that there were no location of interest available with Foursquare data. So, the area was expanded to include 10 kms radius. There were tourist attractions but no hotel/restaurant within 10 kms. Further expanding the radius, we did find a restaurant, an amphitheater and a hotel in the area. Yet, there were not many of them and thus the area seem to have the potential for setting a holiday home consisting even of restaurant, etc. owing to less competition.

The same analysis was expanded to include other districts. Venues were determined and converted to a pandas dataframe. These were further grouped according to their neighbourhoods. The venues were then categorised (into various sections like railway station, restaurants, hotels, etc. to analyse the places in each district. The top 10 most popular venues for each district were then converted into a pandas dataframe.

4. Predictive Modelling:

The neighbourhoods were clustered using KMeans Clustering. The number of clusters were determined using Silhouette Score. A maximum score was obtained for k equals to 5. Thus, the neighbourhoods were classified into 5 clusters. Cluster labels were added to the dataframe consisting of district wise most popular venues.

Again, the map was plotted. This time, however, to visualize the clusters.

The clusters were then analysed to get appropriate locations of interest.

5. Results and Discussions

It was gathered from the data and clustering that there are places of Tourist attractions like Mountain ranges, Waterfalls, Other water bodies, National Parks, etc.. But, for tourists visiting these places there are not many places for their leisure like holiday homes, resorts, eateries or restaurants.

Establishing these leisure places for tourists visiting the area seems to be a lucrative business opportunity considering the steps taken by various state governments to increase tourism in these states that will definitely result in increase in footfall. For example, as seen in cluster 3, there is only one hotel, one restaurant and an amphitheater in Tawang. The restaurant is of Indian Cuisine. A restaurant can be opened in the nearby area that provided foods and dishes from the neighbouring Tribal Cuisines. For tourists coming from Big towns and cities it will provide an altogether different experience, that increases its ability to prosper as a business venture. There are other districts in Arunachal Pradesh like Anjaw (cluster 4), Lower Subansiri (cluster 2) that do seem to have tourist attractions but do not have many holiday homes and restaurant.

Thus, these districts and areas that provide ample natural beauty as tourist attractions can be utilised as places for establishment of leisure homes and restaurants for visiting tourists.

6. Conclusion

In this project, the districts in Arunachal Pradesh, India were successfully analysed for determining the best neighborhoods for establishment of a holiday home, resort or restaurant. Based on the analysis, there are districts in Arunachal Pradesh like Tawang. Lower Subansiri and Anjaw that can serve as a potential location for establishment of a holiday home, resort or restaurant. These were also plotted on the map.

7. Future Course:

The stakeholders and investors further require to tune this by considering various other factors like legal formalities, transport requirements, tourism potential of each area, cost, etc.. and after obtaining these information the area can be further analysed to figure out the most profitable location to serve the purpose.

