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Natural Language Processing Applications for Tourism Sector

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Abstract: *Now a day mobile phones are necessary part of the people's life. There is continuously rising in a number of mobile computing applications centered on people's daily life and information technology has been playing a fundamental role in the tourism industry for a long time. Such as 'location dependent system' , 'smart travel guide', 'tour guide system' and so on. To guide tourist with respect to visit particular place our aim to create architecture tourism application for android mobile phones that is able to provide special Aurangabad historical places information in three different languages such as Hindi, Marathi, and Urdu. For that we have to go through a NLP technique. To provide facilities to the users for the purpose of tourism different kind of android app has been made. In this paper we are providing with the survey of top tourism apps which are trending in the market. By having the study on this survey of different tourism apps it is easy to get the idea of the better app.*

Keyword: *NLP in tourism, Translation Techniques, Literature survey, Tourism website and Applications.*

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I. Introduction

Nowadays, people's consumption structure is improving steadily. There has been a large increase in the number of people out on tours, for the sake of recreation and entertainment. Tourism is the strongest and largest industry in the global economy world, generating an estimated 11% of the global gross domestic product (GDP) and employing 200 million people and serving 700 million tourists worldwide-a figure which is expected to double by the year 2020.Meanwhile, there is greatly enriched travel information provided to the tourists on the Internet. However, a problem is shown that tourists are not able to get travel information timely when they are on the move. [1]

In Earlier tourism system, whenever a tourist visits famous spots, to know more about the place he hires a guide. The hired guide then narrates history of the place and there is no surety that all narrate story is true. The visitor is not aware about location or place before going there, hence the whole information is hidden by visitors and that is the main disadvantage of visitors.

A. Advantage and disadvantage of existing system

In the tourism industry, tourist information is obtained mainly through newspaper, magazines, radio and other simple ways those are available easily. But problem is that tourists are not able to get travel information timely when they are on the move. While today's mobile devices are becoming more intelligent, compared with PC, they still have the following limitations like small screen and tiny keyboard, limited CPU capacity, limited memory space, slow and fitful Internet connection. Many mobiles of recent decades have travel guide application. But the application on these mobiles works slow due to continues acquisition of the bandwidth. Therefore, the mobile end-user's operation is very difficult, and the contents display on the screen of mobile device is limited [05]

B. Basic Concepts of Application

The application aims to develop detailed texts, pictures, and other guidance information are provided, and so people can better understand the tourist attractions and make decision objectively. A problem is shown that tourists are not able to get travel information timely when they are on the move. Therefore, we intend to explore how to build a mobile tourist guide system to solve this problem. [3]

C. Modules in Application

- Find Current Location
- Locate in Map
- translate information in three different languages
- News

The information provided is static and limited in size a caused to the restricted storage, and they obliged time to be introduced on customer side.[02]

II. NLP in Tourism

Natural Language Processing (NLP) is a computational model of human language processing which operate internally as humans do. A computational system that proficiently process both text and speech and share the behavioral pattern of human whereby programs acts, interacts and handle languages like humans. In this field of research, computers perform useful and interesting tasks with human languages, taking as input one natural language such as English Language and output its translation in another Target Language (TL), pronounce the source language (SL), or give semantic knowledge of the source language (SL). [13]

The input and output of NLP can be text only, speech or both. However speech recognition and synthesis is outside the scope of this paper. In the translation scheme above, the source language is fed into the Natural Language Understand (NLU) unit for processing and the output is passed as input to the Natural Language Generated (NLG) unit of the system to generate the target language.

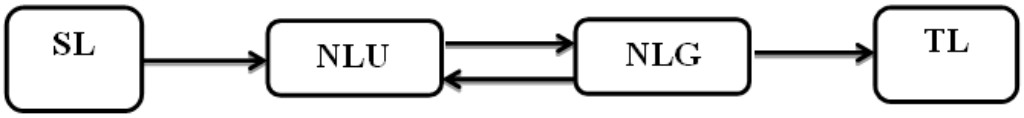

Figure A: below shows the representation of NLP translation

Translation is inevitable because communication is the lifeblood of business or transaction, or for understanding so many things hence the need for NLP of one is tourism. Tourism is a topic where different people come from different cities to visit different places. But before visiting the place every tourist want to know little bit overview about the place. To fulfill their these needs we are trying to develop an android application which helps the tourist to gather knowledge about Aurangabad historic places in three different languages and by using NLP the application can also answer the different queries of tourist.

In blow diagram there are four faces the SL phase can be any language such as Hindi, Marathi, and Urdu and after passing through next two phases (e.g. NLU, NLG) the TL phase returns the answers in user required language same as Hindi, Marathi and Urdu. This is how NLP is very useful in the tourism field.

India has the second largest population in the world after China with a fast growing economy. It is no surprise that many software and Internet companies are focusing on this fast growing market. Even though English is one of the official languages, not even 1% of Indian population speaks it.

The clear majority, 99.5%, speak languages such as Bengali, Gujarati, Hindi, Kannada, Marathi, Malayalam, Odia, Punjabi, Telugu, Tamil or Urdu, to name just a few of the 29 languages spoken in India at least by more than one million people.

This fact creates many challenges in developing applications for markets that rely on the understanding of text to function such as call center, social listening, search, virtual agents and market research.

Text based applications need to understand language to achieve high quality support, so linguistic support must be developed for these languages. Linguistics includes functionalities such as part of speech tagging, lemmatization, phrase extraction, text categorization, entity extraction, topic extraction and parsing. There are many challenges to developing these types of NLP processing pipelines for Indic languages:

NATURAL language processing is the task of analyzing and generating by computers, languages that humans speak, read and write.NLP is concerned with questions involving three dimensions: language, algorithm and problem. Figure B expresses this point. On the language axis are different natural languages and linguistics. The problem axis mentions different NLP tasks like morphology, part of speech tagging etc.

The algorithm axis depicts mechanisms like HMM, MEMM, CRF etc. for solving problems. The goal of natural language analysis is to produce knowledge representation structures like predicate calculus expressions, semantic graphs or frames. This processing makes use of foundational tasks like morphology analysis, Part of Speech Tagging, Named Entity Recognition, both shallow and deep Parsing, Semantics Extraction, Pragmatics and Discourse Processing. [14]

The example below illustrates these tasks:

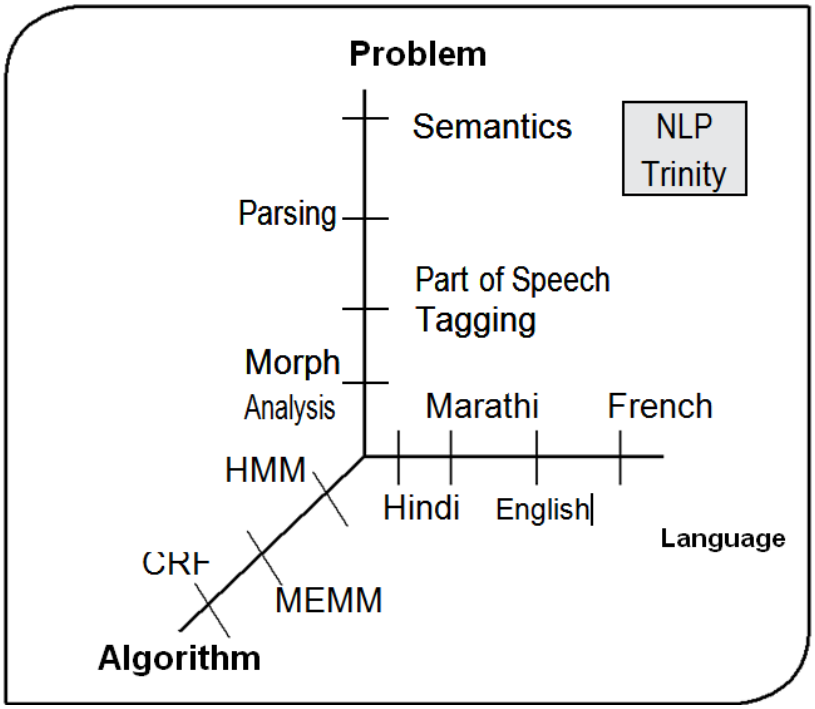

Fig B: Three dimensions of NLP [14]

III. Techniques For Translation:

The Aim of Machine translation is to translate one language to another language or source language to target language. Many people can use this Translator for Translation. Machine translation is from the broad area of Artificial Intelligence Natural language processing is based on different corpora (vocabulary), these corpora are used for the processing of NLP to generate and develop a standard model which can be used for many purposes such as speech recognition technique, etc. [06].

3.1 Approaches to MT

There are multiple approaches to Machine Translation. These are discussed as follows.

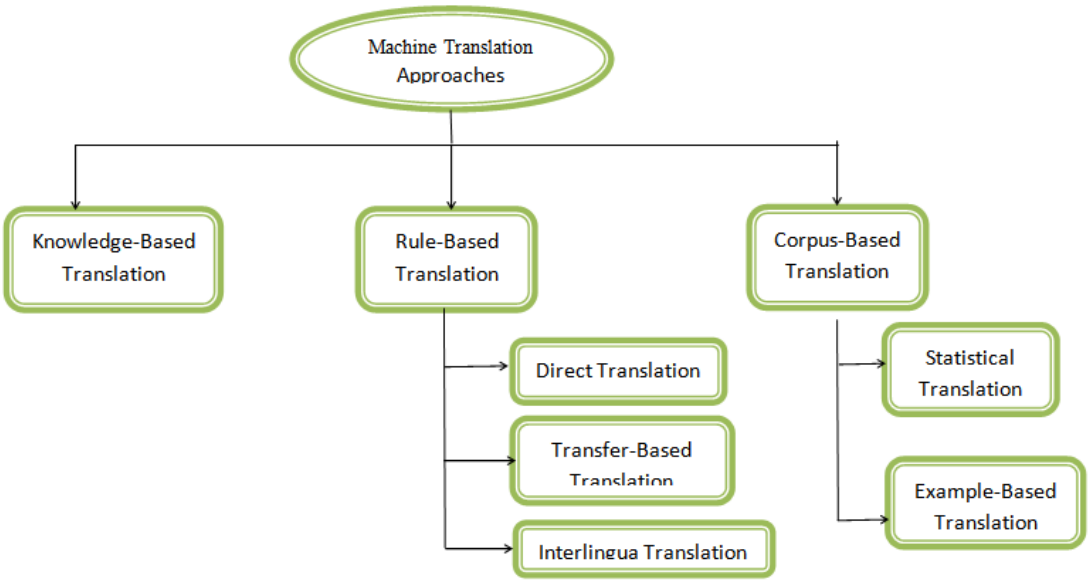

Figure C: Machine Translation approaches [27]

3.1.1. Rule-based MT

A Rule-based M T system parses the source text and produces an intermediate representation, which may be a parse tree or some abstract representation. Rule-based machine translation manages the morphological, syntactic and semantic data about the source and target dialect. This data is utilized to manufacture linguistic tenets. The principle methodology of RBMT frameworks is in light of connecting the structure of the given information sentence with the structure of the requested yield sentence, fundamentally saving their novel importance. [16].

3.1.2. Direct-based MT

Direct Machine Translation is the one of the simplest machine translation approach. In Direct Machine Translation, a direct word by word translation of the input source is carried out with the help of a bilingual dictionary and after which some syntactical rearrangement are made. [17]

3.1.3. Transfer Based MT

In this translation system, a database of translation rules is used to translate text from source to target language. Whenever a sentence matches one of the rules, or examples, it is translated directly using a dictionary. It goes from the source language to a morphological and syntactic analysis to produce as or to Interlingua on the base forms of the source language, from this it translates it to the base forms of the target language and from there a better translation is made to create the final step in the translation.

3.1.4. Interlingua Based MT

Interlingua machine translation is another classical approach to machine translation. This is an alternative to less efficient direct translation approach and includes transfer approach. In this approach, the source language is transformed into an Interlingua, which is an intermediate abstract language independent representation. Then target language is generated from this Interlingua.

3.1.5. Corpus-based MT

Corpus based MT systems require sentence-aligned parallel text for each language pair. The corpus based approach is further classified into statistical and example-based machine translation approaches since 1989; Corpus based methodology for machine translation has developed as one of the broadly investigated region in machine translation. This technique has ruled over different methodologies, in view of high level of exactness accomplished amid the translation of this page for three addresses. If only one address is needed, center all address text. For two addresses, use two centered tabs, and so on. For three authors, you may have to improvise[16].

3.1.6. Statistical Based MT

In 1949, Warren Weaver presented the thought of statistical machine translation. In this methodology, statistical methods are employed to create translated form utilizing bilingual corpora. Statistical machine translation uses factual translation models whose parameters stem from the examination of monolingual and bilingual corpora. Building statistical translation models is a fast process; however the innovation depends intensely on existing multilingual corpora. At least 2 million words for a particular space and considerably more for general dialect are needed. Hypothetically it is conceivable to achieve the quality edge however most organizations don't have such a lot of existing multilingual corpora to construct the important translation models. Also, statistical machine translation is CPU concentrated and requires a broad equipment arrangement to run translation models for normal execution levels [15].

3.1.7. Example Based MT

Example based systems use previous translation examples to generate translations for an input provided. When an input sentence is presented to the system, it retrieves a similar source sentence from the example-base and its translation. The system then adapts the example translation to generate the translation of the input sentence.

IV. Literature Survey

In Earlier tourism system, whenever a tourist visits famous spots, to know more about the place he hires a guide. The hired guide then narrates history of the place and there is no surety that all narrate story is true. The visitor is not aware about location or place before going there, hence thewhole information is hidden by visitors. And that is the main disadvantage of visitors.

To overcome this cons we are trying to create a tourism android application which will having Aurangabad's historical places information in different languages with the help of some translation technique and user can also put their queries and can get answers in their particular language with the help of NLP technology.

4.1 Android Application for Tourism

The preference of users of mobile apps for tourism is concentrated on the searching/finding specific information, followed by the download of categories Guidance/Maps/Localization and booking hotels, tickets, restaurants, etc.; these applications are downloaded mostly from mobile app stores and the free applications are preferred.

Table 1 – Mobile tourism apps – categories, downloading locations, types

Mobile tourism apps category	%
Finding information	29.21
Guidance/Maps/Localization	26.34
Booking (hotels, tickets, restaurants, etc)	22.45
Transportation	8.77
City, travel guides	9.02
Travel games	4.21
Location the mobile apps are downloaded from	
Mobile apps store	78.13
Tourism service providers' websites	21.87
Free/paid mobile apps	
Free	91.07
Paid	8.93

4.1.1 Aurangabad – Wiki

Aurangabad utility app. This app is having multiple features such as Hotel, food, shopping, sports, ATM, Transport, Flightand Radio. You are in Aurangabad city or you are visiting Aurangabad city, Aurangabad – Wiki would be helpful utility Version 1.0.0, released on 2 Oct 2018.

4.1.2 Tour Maharashtra

This gives the most important tourist places in Maharashtra. Maharashtra attracts many tourists from different states and foreigners too and was the fourth most visited state by domestic tourists in the country in 2014. Version 1.0, released on 19 Nov 2016.

4.1.3. Tourist Guide System

The main idea behind the project is to develop an android application which will help tourists to find the better place at one instant. The long time which Tourists waste on searching for the better places like Hotels, museums, parks etc for their enjoyment in the new city which is totally unknown to them will get reduced, if they use this application.In our system basically we have three modules one for the query answering system second for recommendation to the user and third for the notification to the user using Google map [19]

- This application is useful for the tourist.
- It works in offline as well as offline mode.
- The application is self starter.
- Itrecommends you places and things as per the point of interest. [19]

4.1.4. Smart Travel Guide

By Smart Travel Guide, users can get an attraction's detailed information, including text, picture and video. In particular, Smart Travel Guide can provide users with location-based information, which can be browsed or queried through a map. User can search the nearby attractions after he or she configures the distance between the current location and the view spots. When the user moves out of the current location, the mobile phone will automatically send its new position to the server side, and the corresponding attraction list will be received by the user. [5]

Modules in Application

- Find Current Location
- Locate in Map
- Calculate Distance between two Cities
- Video Search
- Weather Forecast[5]

4.1.5. Travel Guide

The scope of our project is mainly for the travelers of Bangladesh. Moreover, Bangladeshi people particularly the new comers to Chittagong city can also use the application for knowing the route and source to destination cost by different transportation medium. Currently our project is covering only Chittagong region, so only travelers who visit Chittagong, can use the application to know the transportation information of this region. [20]

There are two basic features of our proposed system „Travel Guide" except the home page.
These are –

i. Home Page

The first page of the application contains the two button named "Phrase" and "Search Transportation Medium"

ii. ii. Phrase

The second page of the project is called "Phrase". This page has three buttons named "Hotel", "Restaurant", and "Bus".

iii. iii. Search Transportation Medium

The page will provide a Google map with route from source to destination. It will also give the basic transportation cost and distance. [20]

4.1.6. California Travel Guide WithMe

California travel Guide WithMe is an offline travel guide, which give the detailed articles around the countries in relation to the current locations. It's a great source for the general travel information as well as for the beaten track advice This app is also provided with the information of how to stay safe and healthy, about the restaurants and hotels (all with low costs and taxes) including all the road rules and verities of other information are stored in one single app. [22]

4.1.7. Tourism Thailand

Application with Tourism Thailand by the Tourism Authority of Thailand is provided with the information on the tourism in country. This information includes the attractions, accommodation restaurants, shopping, events, festivals and about the famous foods. [22]

4.1.8. Visit Portugal Travel Guide

The best feature of this Visit Portugal Travel Guide is that it is free; it is available in 10 languages (Portugal, English, Spanish, German, French, Italian, Dutch, Russian, Japanese and Mandarin. This app is available in both online and offline with no roaming expenses. This app also contain the geo referenced Reality with it. This app gives the information and holiday suggestion according to your interest also about the mini holidays, Art and Culture, Religious Tourism etc. [22]

4.1.9. Australia Tourism

This app helps in planning the trip to Australia and provide 1 hour of unlimited access to all the information and features in your travel guide. This app is available in 2 languages and this app works 100% offline. This app always let you know that where you actually are. It provides travel tips from thousands of travelers. It provides the information of hotels, attractions, bars, clubs and many more. [22]

4.1.10. Travel Dubai, United Arab Emirates

This mobile reference guides helps you to get most out of your vacation. It's a kind of guides which h are available for most of the destinations worldwide and always include FREE offline GPS maps. The GPS may display your location along with the nearby sights and attractions. There will be no roaming charges for this. This can also help in finding the top restaurants and select them individually. The attraction articles can be accessed from both an alphabetical and a categorical index. [22]

4.1.11. Travel Spain

If you want to travel to Spain, this tourism app is for you. This app provides the information that you need in your Spain travel guide. It is very easy to use, and you will find everything you need in your mobile phone or tablet.

The Following facilities this app includes and these are:
-Booking of flight, hotels in travel guide of Spain.
-All the tourist attraction place and cities which you want to see in Spain.

-It provides the map of Spain with all interesting point and also the photos and videos of all tourist places in Spain**.**[22]

4.1.12. Interactive Mobile Based Tour Guide

Sri Lanka being a popular tourist destination entertains a large number of tourists each year. Tourists are issued a printed guide booklet to find out interesting places during the visit. Tourists are not able to visit all the attractions during a visit. This application is a Solution to improve the situation providing convenience to the visitors. This tour guide application replaces the traditional tour guide booklet. Main features of the application are; virtual tour of important places located, voice based information provider, location identifier and a map based path selection function to select the best path to a specified destination within the premises. The application was developed based on the Android platform, and delivered as a mobile application. Main goal of this project is to help the tourists to travel on their own and take full advantage of the visit without missing the main attractions**.** [23]

4.1.13. Mytilene E-guide

Mobile guide application offering services to tourists such as a personal profiling-based recommendation system, a commenting system and location-based services.Mobile tourist guides offer more appreciative user experience, even more so by incorporating features like maps and location-based services. a multiplatform mobile tourist guide application that incorporates a 'web-to-mobile' model and allows for the dynamic adaptation of personalized tourist web content, transformed into a dynamically generated customized mobile thick client application. [24]

4.1.14. Tamilnadu Tourism E-Guide

Tamil Nadu Tourism E-Guide propose architecture of mobile tourist guide system for Android Mobile Phones that is able to provide tourism information to the mobile users conveniently. It can realize to query information for restaurant, bus stops, so on and gives multi output and hence it has more practical significance. The main idea behind the project is to develop an android application which will help tourists to find the better place at one instant. The long-time which tourists waste on searching for the better tourist spots like hill station, waterfall, beaches, etc. for their enjoyment in the new city which is totally unknown to them will get reduced, if they use this application. Hence this idea was very new and useful for all those who love to travel in a new city on a regular basis. The project is about tourist guide system how the tourist will get best use of the application according to his/her point of interest. [25]

4.1.15. Tourist Assistant (TAIS)

TAIS is a mobile application, which is related to the "Travel Guides" category the tourist can see images extracted from accessible internet sources around, clickable map with his/her location, context situation (weather), and the best attractions around ranked by the recommendation service. When the tourist clicks an attraction the context menu is open. The tourist can see detailed information about the chosen attraction, browse attraction reaching path that is proposed by the system route to an attraction, and/or estimate it. Authors propose application "Tourist assistant – TAIS", which is related to "Travel Guides" category and generates recommendations for the tourist about interesting attractions around. The main differences of presented application from existing in repositories is extraction of information about attractions from different internet sources that allows the tourist to get up-to-date information and does not require to download attraction database before the trip. Application consists of several services that join for solving the tourist task. For interoperability support between these services the smart space technology is used, which allows providing for ontology-based information sharing between different devices. [26]

4.2 Website for Aurangabad Tourism

4.2.1. Yatra:

Yatra.com is an Indian travel search engine and online travel agency, based in Gurgaon. Bollywood actor Salman Khan is the shareholder and brand ambassador of Yatra and the company also acquires 100% stake in Travelguru [28].

4.2.2. Holidify:

Holidify.com is a destination discovery website that helps travellers find the right destinations according to their preferences and help them plan their holidays in a hassle free manner. At Holidify, we aim to make discovering your next holiday destination as much of an eye-opener as your vacation itself. We help you break out of the monotony of the same vacation spots you have known for years and open in front of you, a

world of possibilities. With our interactive map interface and powerful filters, you can plan your vacation like never before [29].

4.2.3. Tripadvisor

TripAdvisor, the world's largest travel site*, enables travelers to unleash the full potential of every trip. With over 760 million reviews and opinions covering the world's largest selection of travel listings worldwide – covering approximately 8.3 million accommodations, airlines, experiences, restaurants and cruises – TripAdvisor provides travelers with the wisdom of the crowds to help them decide where to stay, how to fly, what to do, where to eat and how to cruise [30].

4.2.4. Tmi (tour my India)

Founded in the year 2003 as TourMyIndia.com, an online travel platform, the company boosted as a private limited in the year 2013 and has emerged as the "Best Upcoming Inbound Tour Operators in India". It has been awarded in the category of "Excellence in the Tourism Industry" by World Tourism Brand Academy. Strong Associations with budget and luxury hotels across the country enables us to give our clients their best value for money. This trait of Tour My India Pvt. Ltd., makes it the most attractive tour and travel agency for you. The team is prompt in their replies to your queries, which has earned a reputation as one of the best and most efficient tour and travel operators in India by the clients and overseas partners [31].

4.2.5. MakeMyTrip

MakeMyTrip founded by Deep Kalra is the most popular Indian online travel company, provides online travel services for domestic and international flight, Train tickets, hotel reservations and holiday packages. The company operates across 50 cities in India and recognized as one of India's best travel portal [32].

V. Conclusion

World is contracting with the growth of mobile phone technology. As the number of users is increasing day by day, facilities are also increasing. Starting with simple regular handsets which were used just for making phone calls, mobiles have changed our lives and have become part of it. Now they are not used just for making calls but they have innumerable Android apps are available in the Google Play Store (formerly known as the Android Market), so in this paper I took the attention to the android app for tourism.

In first Section we have explained the detail technique of machine translation which is going to be following for multilingual tourism system.

We have presented a literature survey in this paper on some existing android application for tourism for the study purpose. Which is helpful for us in development of our Aurangabad based tour guide android application.

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