Netno-Mining: Integrating Text Mining with Netnographic Analysis to Assess the Perception of Travelers using Select OTA Services in India

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***Abstract:** In this paper, a new term is coined and referred to as "Netno-Mining," which integrates two words Text mining and Netnography. In this paper, different results obtained by processing netnographic data and text mining techniques are used to interpret satisfaction, perceptions of travelers using online services of select travel companies in india. This paper also talks more about the Integration of netnographic analysis and text mining as an innovative method to assess the consumer sentiments of select online travel services in india. The novel approach helps to derive sentiments, perceptions, and its interpretation in the context of consumer and travel company too. A detailed architecture of the Netno-mining approach has been used to explain various steps in assessing the perceptions of travelers. In this approach, various website components such as website time to load, Service and support, Information depth, the content of the website, User-friendliness are used as parameters to compare the satisfaction of Travellers of select OTA such as MMT, Goibibo, cleartrip, redbus, and yatra.*

***Keywords:** Sentiments, perceptions, OTA, text Mining, Netnography, travelers.*

I. INTRODUCTION

Netno-Mining System Architecture:
The research work carried out in this paper uses the following architecture. The architecture is mainly divided into four essential modules, as shown in Fig. 1,

- Content acquisition module
- Netnographic analysis module,
- Text processing and sentiment analysis module
- Representation and visualization of results.

Content Acquisition Module :

In this module, the following activities are carried out identification of various platforms social platforms where Travellers have Express themselves in the form of reviews.   Then identification of specific referral greeting sites which can be e useful for the collection of relevant data for processing; in this research, we have identified mouthshut.com and Consumer Affairs as the common platforms for Data Collection. The next activity which is performed in this model is collecting data from these identified sources using netnographic guidelines. (Kozinets, 2010) This collected data is maintained in a particular template in Excel as a Data Collection repository. (Nusair & Kandampully, 2008)

Netnographic analysis module: In this module, data collected from the previous module is used to perform netnographic analysis. (Mkono, 2012) Various types of statistical values are identified to understand the relationship between OTA.   the gender-specific analysis is also carried out as a part of Netnographic analysis; each of the reviews, comments have been checked for various important words, keywords, tokens, and maintained as a part of results obtained from Netnographic analysis. (Kozinets, 2010)

Text processing and sentiment analysis module: The third module consists of text preprocessing and sentiment analysis. Preprocessing is carried out using a series of processes like tokenizing, converting to lowercase, removing punctuation, removing stop words, POS tagging, lemmatization, and join words; these are the series of processes carried out as a part of text preprocessing.   (Alsaqer, Sasi, & Summarization, 2017) (Gupta, Tiwari, & Robert, 2016). At the end of text preprocessing performed on the entire data collection, we expect an ideal type of review as an outcome of these clean reviews along with a dictionary known as Vader lexicon. Vader lexicon is used to perform sentiment analysis; as part of sentiment analysis, we are identifying the sentiments scores; based on the scores, we have classified the review as positive, negative, neutral word wise.
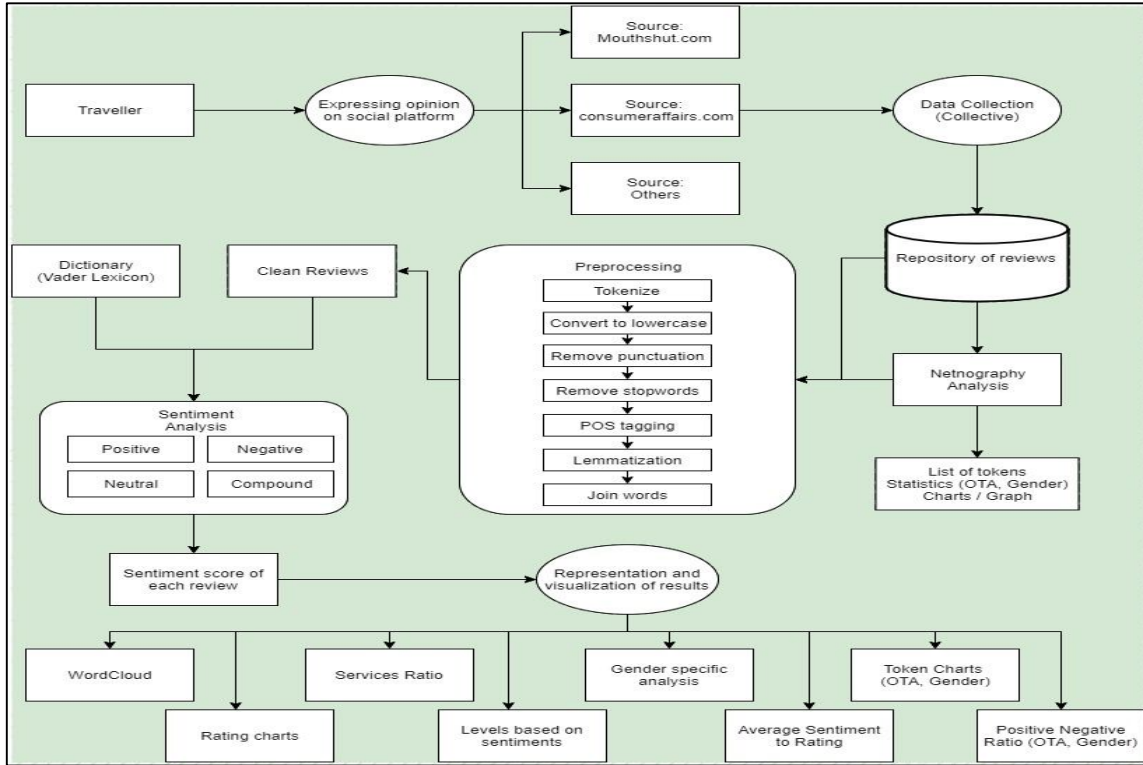
Fig.1 System Architecture Flow diagram

Representation and visualization of results: In this module, representation and visualization of results obtained by performing sentiment analysis on all the Reviews collected for select online travel agent(OTA) Cleartrip, Goibibo, MakeMyTrip, redBus, Yatra are carried out. Following Representations are carried out, including word cloud obtained for the entire data collection and for specific to online travel agents. Various rating charts are also being generated based on the ratings given by the Travellers to the reviews while expressing on identified rating sites. The gender-specific analysis is also being carried out, and graphically it is being represented. Average sentiment to rating talks about the sentiment analysis of rating given for all the website components on the online platform, positive negative classification, the positive-negative ratio for overall and specific to OTA, and comparatively for all OTA's that we been identified. The results obtained are also checked for statistical tests to understand relationships between the various category of results. Accordingly, interpretation terms of satisfaction, dissatisfaction, or our perception of travelers are interpreted. (Alsaqer et al., 2017)
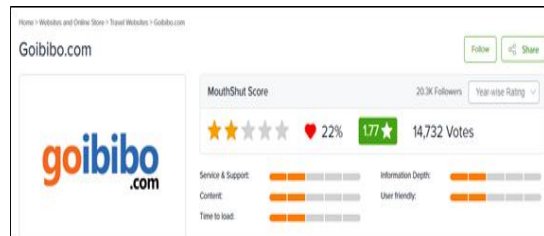

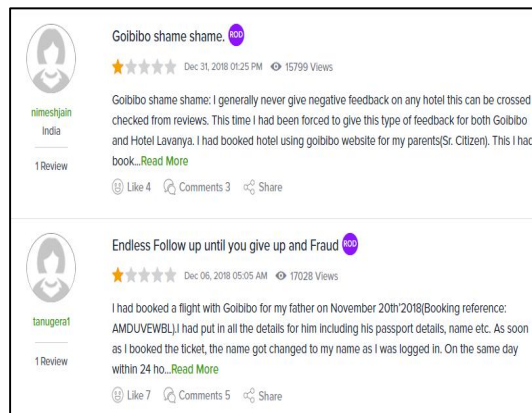Fig.2 overall Mouthshut score for Goibibo Reviews*(Source: Mouthshut.com)*

Fig. 3 Sample reviews for Goibibo with various fields *(Source: Mouthshut.com)*

Fig. 4 Format of reviews for OTA on Mouthshut.com *(Source: Mouthshut.com)*

Fig.5 below represents a summary version of sample reviews from Mouthshut.com

Fig.5 Sample reviews for Goibibo *(Source: Mouthshut.com*

Fig.2-5. Shows, sample overall rating, sample review, review format, and review rating respectively for Gobibo.

II. RESULTS & DISCUSSION

Review Website Components Analysis: Below section represents the analysis of the comments based on various parameters of the websites of online travel agents (Mane & Srivastava, 2020)

Rating of the scale used to grade the comment /post on travel sites is 1 indicate Poor, 2 as Average, 3 as Good, 4 as Very Good, 5 as Excellent. The website components used for assessing the perception of travelers are evaluated on a scale of 1-5, as mentioned above. Below are the various components of the website used for the analysis of reviews and comments. (Mane & Bhatnagar, 2020)

1. Service and Support
2. Information depth
3. Content
4. User friendly
5. Time to load
6. Overall rating

Service and Support: Table.1 represents rating values for the component service and Support. The total volume of review for each of the OTA distributed across all levels on a scale of 1 to 5. In this component of the website, the highest number of participants posting comments online is for goibibo is highest, followed by redBus, MMT, Cleartrip, yatra.

TABLE.1: RATING VALUES FOR SERVICES & SUPPORT(COUNT)

Rating Value (Service & Support)		1	2	3	4	5	Total Reviews
OTA	ClearTrip	197	9	5	20	19	250
	Goibibo	255	38	37	60	83	473
	MMT	201	18	29	104	109	461
	Redbus	262	62	31	53	60	468
	Yatra	154	16	13	31	34	248

Table 2. represents rating values for the component called to service and support in percentage. Distribution of all the reviews for each of the OTA is being carried out on a scale of 1 to 5. For service and support, it is clear from the results obtained that the highest percentage of reviews for the highest level of 5 is given for MakeMyTrip(23.6%), followed by Goibibo(17.5%), yatra (13.7%), Redbus(12.8%) then cleartrip(7.6%). Here we can conclude that for service and support, travelers have preferred MakeMyTrip more, and Cleartrip remains least preferred.

TABLE 2:RATING VALUES FOR SERVICE & SUPPORT(PERCENTAGE)

Rating Value (Service and Support)		1	2	3	4	5	Total Reviews
OTA	ClearTrip	78.8	3.6	2	8	7.6	250
	Goibibo	53.9	8	7.8	12.7	17.5	473
	MMT	43.6	3.9	6.3	22.6	23.6	461
	Redbus	56	13.2	6.6	11.3	12.8	468
	Yatra	62.1	6.5	5.2	12.5	13.7	248

Fig. 8 graphically represent Rating values of service and support for each of the OTA using the scale of 1 to 5 in percentage

Information Depth: Information depth is the next website component. It represents the usefulness and representation of detailed information on the website. Table.3 represents rating values for information depth in volume for all the OTA. From the data obtained, it is very much clear that for information depth,goibibo is having the highest number of

reviews, then comes MMT, redBus, Yatra, and

TABLE 3:RATING VALUES FOR INFORMATION DEPTH

Rating Value (Information Depth)		1	2	3	4	5	Total Reviews
OTA	**ClearTrip**	185	13	10	21	20	249
	Goibibo	242	49	31	78	71	471
	MMT	189	29	35	111	97	461
	Redbus	255	55	45	49	64	468
	Yatra	145	24	11	37	31	248

Table.4 represents rating values for information depth in percentage for all the online travel agents (OTA). The total volume of reviews obtained has been distributed across all 5 levels starting from 1to 5. 1 represents low and presents excellent. The table.4 it is very much clear that travelers have given more preference to MMT 21%, followed by bye Goibibo 15.1 %, RedBus 13.7 %, Yatra 12.5%, then Cleartrip 8%. From level 1 percentage values again, it is very much clear that 74.3 percentage of travelers travel using Cleartrip are not happy, followed by Yatra 58.5%, goibibo 51.4%, RedBus 54.5%, and then MakeMyTrip 41%. From this, we can conclude that MakeMyTrip has become a Travellers choice concerning information depth as another website component.

TABLE 4:RATING VALUES FOR INFORMATION DEPTH(%)

Rating value (Information Depth)		1	2	3	4	5	Total Reviews
OTA's	**ClearTrip**	74.3	5.2	4	8.4	8	249
	Goibibo	51.4	10.4	6.6	16.6	15.1	471
	MMT	41	6.3	7.6	24.1	21	461
	Redbus	54.5	11.8	9.6	10.5	13.7	468
	Yatra	58.5	9.7	4.4	14.9	12.5	248

Fig. 9 represents the percentage of rating values for information depth for all the online travel agents by distributing across level 1 to level 5 graphically.

Content: Table.5 represents the distribution of all the participants involved in posting comments on the content of all five OTA sites. The graphical representation of this distribution is shown in the figure. It is very much clear from Table.5 below the maximum number of posts is made regarding Goibibo, followed by redBus, MakeMyTrip, Yatra, and Cleartrip. The total volume of post reviews is distributed on a scale of 1 to 5, as shown in the Table.5(Claster, Pardo, Cooper, & Tajeddini, 2013)

Content quality has become one more major parameter for travelers to express their satisfaction on social platforms

Cleartrip.

TABLE 5:RATING VALUES FOR CONTENT(COUNT)

Rating Value(Content)		1	2	3	4	5	Total Reviews
OTA	**ClearTrip**	185	12	10	23	18	248
	Goibibo	242	39	30	77	84	472
	MMT	179	25	47	103	107	461
	Redbus	244	53	53	53	66	469
	Yatra	139	23	22	32	32	248

Table.6 represents the distribution of the percentage of rating values for content for all five OTA. The percentage of reviews posted for each OTA is being distributed across five levels mentioned in percentage. It is clear from the Table.6 that the highest percentage of rating value for content is for MakeMyTrip 23.2%, followed by Goibibo 17.8% RedBus 14.1 % Yatra, 12.9 %, and clear trip 7.3%. The interpretation of this percentage values is travelers have shown their satisfaction with the content of the website for MakeMyTrip then the rest of the OTA. Level 1 percentage values are shown in the Table.7 states that the highest value of percentage is for Cleartrip 74.6%, with itself explains that is their dissatisfaction regarding content available on the site .this is followed by Goibibo, Yatra, redBus, and then make my trip.

TABLE 6:RATING VALUES FOR CONTENT(%)

Rating Value (Content)		1	2	3	4	5	Total Reviews
OTA's	**ClearTrip**	74.6	4.8	4	9.3	7.3	248
	Goibibo	51.3	8.3	6.4	16.3	17.8	472
	MMT	38.8	5.4	10.2	22.3	23.2	461
	Redbus	52	11.3	11.3	11.3	14.1	469
	Yatra	56	9.3	8.9	12.9	12.9	248

Fig.10 is a graphical representation of the distribution of reviews across all five levels. Each OTA Rating values are shown for the content of the website for all 5 OTA

User Friendly: Based on the user-friendliness of the online travel agents website, Table.7-8 represents the distribution of all the reviews, comments posted by the travelers regarding user-friendliness of the website across all the levels for all five OTA. The total volume of reviews post for each OTA is being distributed based on the level IT carries. Table.7 shows the total volume for each of the OTA and its distribution in five levels. It clearly states that goibibo is Being recorded the highest reviews are posted for website user-friendliness, followed by MakeMyTrip, redBus Yatra, then Cleartrip. For the highest level that is excellent, goibibo has little laser

number of reviews than MakeMyTrip, whereas Cleartrip is being recorded as the low volume of reviews belonging to level 5 that is excellent in level 1, goibibo is second after redBus then MakeMyTrip comes Cleartrip and lastly yatra

TABLE 7:RATING VALUES FOR USER FRIENDLY (COUNT)

Rating Value (User Friendly)		1	2	3	4	5	Total Reviews
OTA	ClearTrip	170	22	14	18	23	247
	Goibibo	226	39	36	64	106	471
	MMT	174	22	42	96	126	460
	Redbus	240	51	45	56	77	469
	Yatra	139	17	19	33	40	248

Table 8. represents the percentage distribution of all the post reviews posted by travelers concerning the user-friendliness of the website of online travel agents considered in the study. The total volume of post reviews is distributed across all five levels in percentage for all OTA. From Table.8, it is very much clear that MakeMyTrip (27.4%) is having the highest percentage value for level 5 that is excellent, followed by Goibibo 22.5%, RedBus 16.4 %, Yatra 16.1% and lastly, Cleartrip 9.3%. For level 5, the interpretation is. Travelers are more satisfied with MakeMyTrip considering the user-friendliness of the website, whereas Travellers are list satisfied with Cleartrip, the respective user-friendly of the websites of the Cleartrip. Level 1 statistics says Cleartrip 68.8 percent is the highest, followed by RedBus 51.2%, Yatra 56%, goibibo 48%, and MakeMyTrip 37.8%.

TABLE 8:RATING VALUES FOR USER FRIENDLY (%)

Rating Value (User-friendly)		1	2	3	4	5	Total Reviews
OTA's	ClearTrip	68.8	8.9	5.7	7.3	9.3	247
	Goibibo	48	8.3	7.6	13.6	22.5	471
	MMT	37.8	4.8	9.1	20.9	27.4	460
	Redbus	51.2	10.9	9.6	11.9	16.4	469
	Yatra	56	6.9	7.7	13.3	16.1	248

Fig. 11 represents the distribution of rating values for the user-friendliness of the website for all the five OTA graphically

Time to Load: Time is taken by the website to load plays a significant role in understanding the satisfaction of travelers using online travel-related websites. The below section covers analysis carried out on the reviews post buy travelers based on the Time to load parameter of a website travel-related site of all the five OTA. Table.9 represents the distribution of the post/reviews for the Time to load

the parameter of a website across level 1 to level 5 for all the OTA. It is very clear from Table.9 that the total volume of reviews hosted by travelers is more for Goibibo than redBus, MakeMyTrip, Yatra, and Cleartrip. The meaning of that is Travellers are expressing more about Time to load parameters of the goibibo site than others.

TABLE 9:RATING VALUES FOR TIME TO LOAD(Count)

Rating Value (Time to load)		1	2	3	4	5	Total Reviews
OTA	ClearTrip	160	21	20	24	28	253
	Goibibo	224	47	33	79	90	473
	MMT	156	26	62	120	97	461
	Redbus	221	69	54	64	60	468
	Yatra	124	20	27	43	33	247

Table 10. covers the percentage of reviews post made by travelers about to Time to load parameter of analysis for the websites of five OTA. The percentage of values is distributed across level 1 to level 5 for all the OTA. From Table.10, the MakeMyTrip percentage value for level 5 is highest than the rest of the OTA. It means a good number of participants or travelers expressed about Time to load parameter has shown their satisfaction for or MakeMyTrip(21%), followed by Goibibo 19%, Yatra 13.4%, redBus 12.8% and Cleartrip 11.1%. Considering the percentage for the rest of the levels for the OTA, overall, goibibo remains the second choice after MakeMyTrip for the happy and satisfied travelers.

TABLE 10:RATING VALUES FOR TIME TO LOAD(%)

Rating Value(Time to Load)		1	2	3	4	5	Total Reviews
OTA's	ClearTrip	63.2	8.3	7.9	9.5	11.1	253
	Goibibo	47.4	9.9	7	16.7	19	473
	MMT	33.8	5.6	13.4	26	21	461
	Redbus	47.2	14.7	11.5	13.7	12.8	468
	Yatra	50.2	8.1	10.9	17.4	13.4	247

Fig. 12 represent the distribution of participants posted comments reviews about the Time to load parameter of website analysis graphically

Overall rating: below section represent the distribution of overall rating value for all the post, reviews given by travelers for all the five OTA, which of the post review given by travelers as an overall rating value is distributed across level 1 to level 5, Where level 1 indicates low, and level 5 indicate excellent. Table.12 represents the total volume of reviews with overall rating values for each of the OTA. From Table.11, we can conclude

RedBus has the highest overall rating value, followed by MakeMyTrip, Goibibo, Yatra, and cleartrip.

TABLE 11:RATING VALUES FOR OVERALL

Rating Value(Overall review rating)		1	2	3	4	5	Total Reviews
OTA	ClearTrip	98	7	5	10	7	127
	Goibibo	197	31	25	50	48	351
	MMT	174	24	33	114	88	433
	Redbus	262	52	53	54	47	468
	Yatra	140	17	18	38	28	241

Table.11 represents overall rating values in total percentage reviews. When the percentage is distributed across level 1 to level 5 from the Table.11, it is very much clear that MakeMyTrip has the highest percentage for level 5 with 20.3 percent, followed by goibibo 13.7 %, Yatra 11.6 redBus 10%, and Cleartrip 5.5%. We can interpret from this value is that Travellers have to Express their satisfaction more with MakeMyTrip for overall rating value. Cleartrip has a low percentage value, which states that travelers are not happy consulting the overall review rating.

TABLE 12:RATING VALUES FOR OVERALL (%)

Rating Value (Overall Rating)		1	2	3	4	5	Total Reviews
OTA's	ClearTrip	77.2	5.5	3.9	7.9	5.5	127
	Goibibo	56.1	8.8	7.1	14.2	13.7	351
	MMT	40.2	5.5	7.6	26.3	20.3	433
	Redbus	56	11.1	11.3	11.5	10	468
	Yatra	58.1	7.1	7.5	15.8	11.6	241

III. STATISTICAL ANALYSIS

Statistical Analysis: Once compiling the data in tabular form is being completed, and statistical analysis is carried out on that compiled version of the data. Statistical data analysis is being carried out using the Chi-square test at 0.05 level of significance. For analysis, the excellent feature of statistical calculations is used.

Table.13-14 represents the distribution of reviews, posts by Travelers about the review rating given for each of the online travel agents. Review rating values a distributed from level 1 to level 5, Where level 1 is low and level 5 excellent. It helps us to understand the relationship between OTA.
Fig. 6 &7 represent the statistical relationship between rating and OTA and Sentiment ratio.

that understand the relationship between online OTA and review rating, hence allow us to understand its dependency.

Chi-square test is being carried out on all the data collected

The following are the null and alternate hypothesis defined to understand the relationship between online travel agents(OTA) & Review Rating values

Null hypothesis (H0): No association between Review Rating and people using OTA Alternate *Hypothesis (H1):* Association between Review Rating and people using OTA

P-value obtained is 0.00 based on the observed and expected frequency of data collected for and review ratings. The calculated Chi-square value is 71.42, with a 0.05 level of significance and degree of freedom 16. The tabular value for chi-square is 26.30

Since the calculated Chi-square value is is greater than the tabular value for chi-square enough of the statistical evidence to reject the null hypothesis and accept the Alternate hypothesis. Hence it is clear that there is a relationship between online travel agents (OTA) participants and reviews ratings value.

Test called the Chi-square test is being carried out on all the data collected and shown below**.**
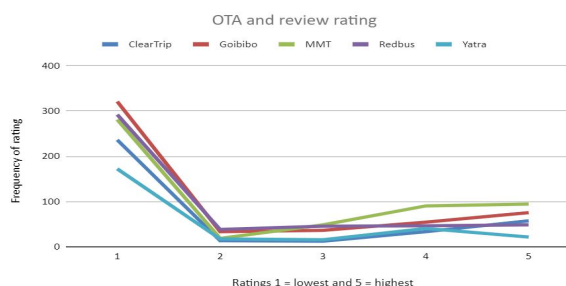

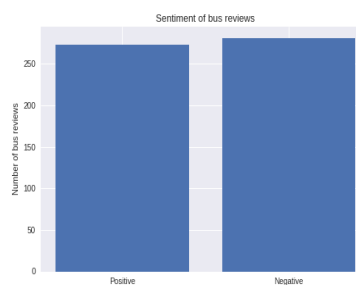Fig.6 Statistical Relationship between Review rating and OTA

Fig. 7 Sentiment Ratio(Overall)

TABLE 13: TEST STATISTICS FOR OTA Vs. REVIEW RATING VALUES(OBSERVED)

Review Rating	1	1%	2	2%	3	3%	4	4%	5	5%	Total
ClearTrip	236	18.13	13	10.92	12	7.69	33	12.55	57	19.32	351
Goibibo	321	24.65	33	27.73	36	23.08	54	20.53	75	25.42	519
MMT	281	21.58	18	15.13	48	30.77	90	34.22	94	31.86	531
Redbus	292	22.43	38	31.93	45	28.85	46	17.49	48	16.27	469
Yatra	172	13.21	17	14.29	15	9.62	40	15.21	21	7.12	265
	1302	100	119	100	156	100	263	100	295	100	2135

TABLE 14: TEST STATISTICS FOR OTA Vs. REVIEW RATING VALUES(EXPECTED)

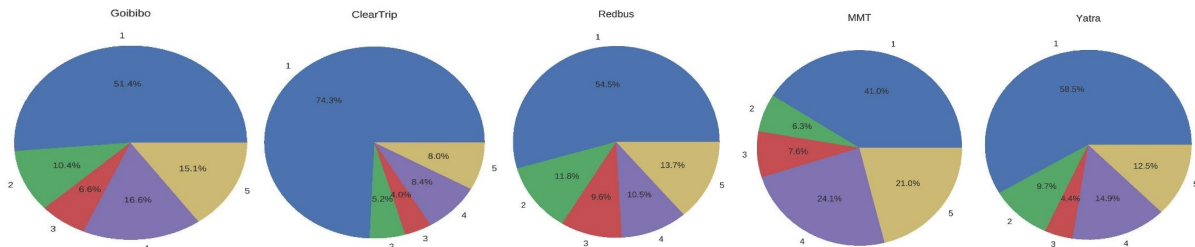| Review Rating	1	2	3	4	5
ClearTrip	214.05	19.56	25.65	43.24	48.50
Goibibo	316.50	28.93	37.92	63.93	71.71
MMT	323.82	29.60	38.80	65.41	73.37
Redbus	286.01	26.14	34.27	57.77	64.80
Yatra	161.61	14.77	19.36	32.64	36.62

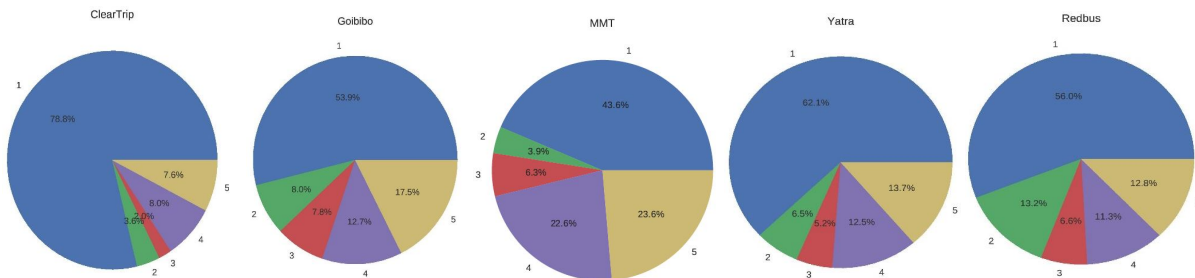Fig.8 OTA specific Distribution of Travellers reviews for Service & Support

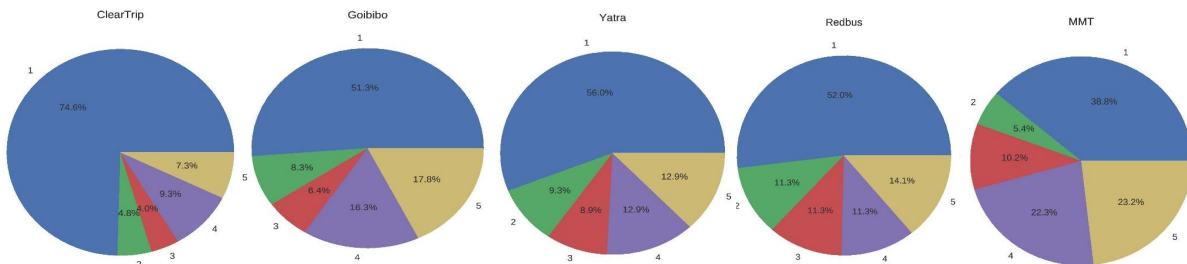Fig. 9 OTA specific Distribution of Travellers reviews for Information Depth

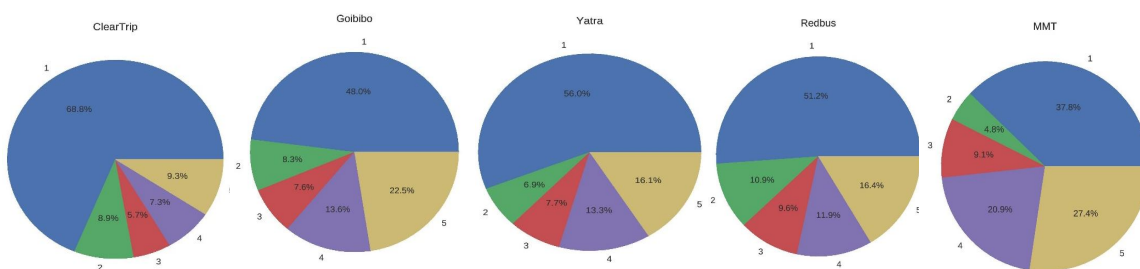Fig. 10 OTA specific Distribution of Travellers reviews for Content

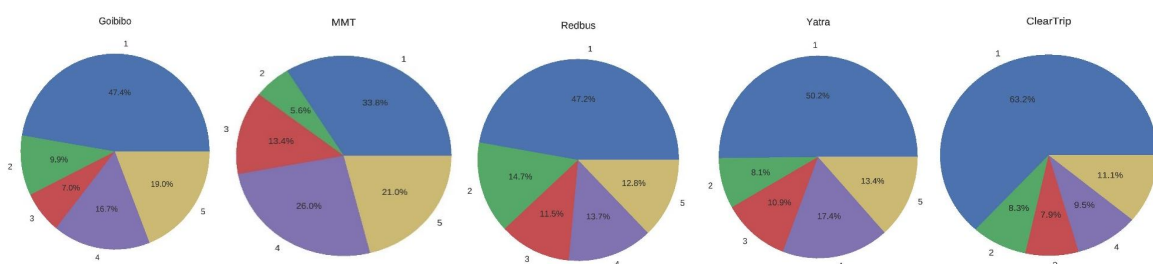Fig.11 OTA specific Distribution of Travellers reviews for User Friendly

Fig. 12 OTA specific Distribution of Travellers reviews for Time to load

TABLE 15: PERFORMANCE ANALYSIS OF OTA'S BY MAPPING TO REVIEW RATING VALUES

Website Component	OTA	Mapping to Review Rating Values(1-5)					
		1	2	3	4	5	Total Reviews
Service & Support	ClearTrip	78.8	3.6	2	8	7.6	250
	Goibibo	53.9	8	7.8	12.7	17.5	473
	MMT	43.6	3.9	6.3	22.6	23.6	461
	Redbus	56	13.2	6.6	11.3	12.8	468
	Yatra	62.1	6.5	5.2	12.5	13.7	248
Information Depth	ClearTrip	74.3	5.2	4	8.4	8	249
	Goibibo	51.4	10.4	6.6	16.6	15.1	471
	MMT	41	6.3	7.6	24.1	21	461
	Redbus	54.5	11.8	9.6	10.5	13.7	468
	Yatra	58.5	9.7	4.4	14.9	12.5	248
Content	ClearTrip	74.6	4.8	4	9.3	7.3	248
	Goibibo	51.3	8.3	6.4	16.3	17.8	472
	MMT	38.8	5.4	10.2	22.3	23.2	461
	Redbus	52	11.3	11.3	11.3	14.1	469
	Yatra	56	9.3	8.9	12.9	12.9	248
User Friendly	ClearTrip	68.8	8.9	5.7	7.3	9.3	247
	Goibibo	48	8.3	7.6	13.6	22.5	471
	MMT	37.8	4.8	9.1	20.9	27.4	460
	Redbus	51.2	10.9	9.6	11.9	16.4	469
	Yatra	56	6.9	7.7	13.3	16.1	248
Time to Load	ClearTrip	63.2	8.3	7.9	9.5	11.1	253
	Goibibo	47.4	9.9	7	16.7	19	473
	MMT	33.8	5.6	13.4	26	21	461
	Redbus	47.2	14.7	11.5	13.7	12.8	468
	Yatra	50.2	8.1	10.9	17.4	13.4	247

Table.15 clearly explains the overall traveler's preferences while expressing about OTA based on various website components

IV. CONCLUSION

This paper helps us understand the perceptions of travelers using services offered online by MMT, Goibibo, cleartrip,redbus, yatra. The tourism sector in india is growing speedily. Advancements in the social platforms, the large volume of data generated online are available for the processing of results.

In this competitive business era, each of the service providers wants to understand its customers in a better way. Similarly, in the online travel industry for getting better business outcomes, each of the service providers in the sector wants to research more on what there existing customers, travelers are saying about there services online. Also, each of the traveler using online travel-related services wanted to understand better options for a specific set of services he or she wants to avail, what can be the appropriate choice regarding that service. This research work helps both these parties to create a competitive advantage. In this paper, the results obtained by processing the volume of travel reviews help us understand various website components. We can compare the satisfaction or sentiments of Travellers who are using these five online travel service providers.

The various components of website assessment such as load time, service & support, user-friendliness, Content are used in this work for assessing travelers' perceptions. Online travel agents can refer to results obtained to understand their customers' expectations. Similarly, it helps the travelers to choose a particular online travel agent, helps them for the recommendation of a particular online travel agent service to others. Netno- mining is an innovative approach used in this study for deriving perceptions of travelers using online services for selective travel service providers in India.

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