

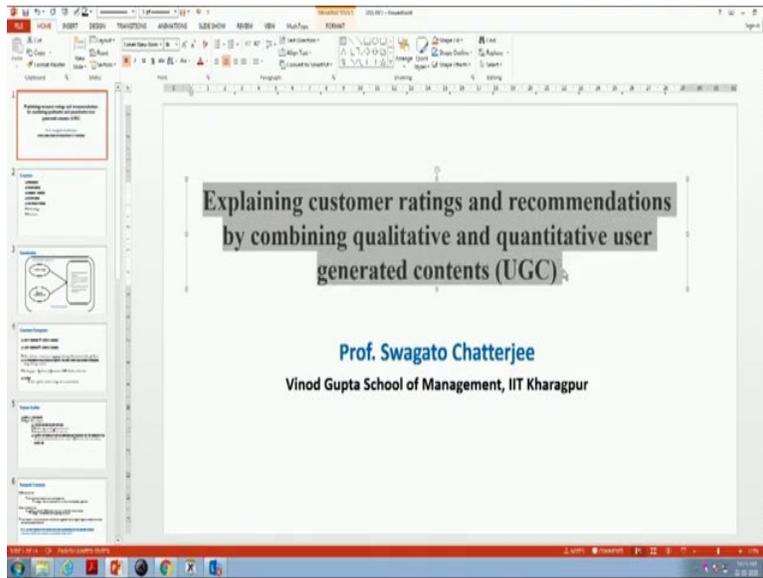
**Marketing Analytics**  
**Professor Swagato Chatterjee**  
**Vinod Gupta School of Management,**  
**Indian Institute of Technology, Kharagpur**  
**Lecture 59**  
**Text Mining and Sentiment Analytics (Contd.)**

Hello, everybody, welcome to Marketing Analytics course. This is Doctor Swagato Chatterjee from VGSOM, IIT Kharagpur, who is taking this course for you. And we are in week 11 and today we will discuss this particular paper. We so we were discussing about Text Mining and Sentiment Analytics and I want to just show 2 papers which I have worked on, I personally worked on this area, where we have applied qualitative analysis, text mining techniques and quantitative analytics on this together to create certain insights.

So, this is something that is that I am going to present in the next 2 videos and you will have an idea that where and how this kind of techniques can be applied in a real world situation. If by chance if any of my audience the participants are faculty in somewhere then you will also get an idea that what kind of research questions are there in the market, which are very, both of the papers are very recent 2019 paper and they will know that, okay, if these kind of things are there in the market in my we can work on this.

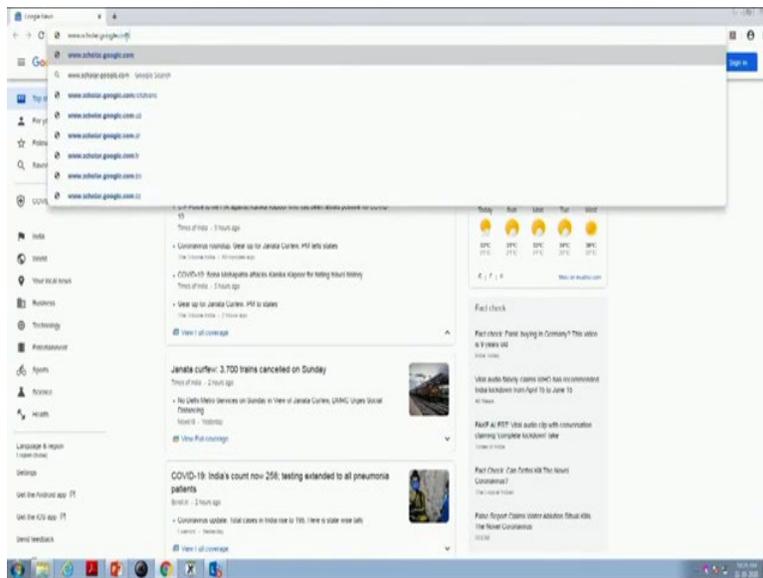
And data science is an area where the academia and the industry is merging together. So, whatever academia is doing industry is doing sometimes similar, sometimes as that this industry is doing something probably better than academia, sometimes academia is doing. So, there is a very I would say sharp competition between these 2 groups of people by saying that what I am trying to say is that if you actually understand or if you actually do some papers in this particular area also will be suitable for the industry as well. So, given that as a background, I will be explaining this particular the paper.

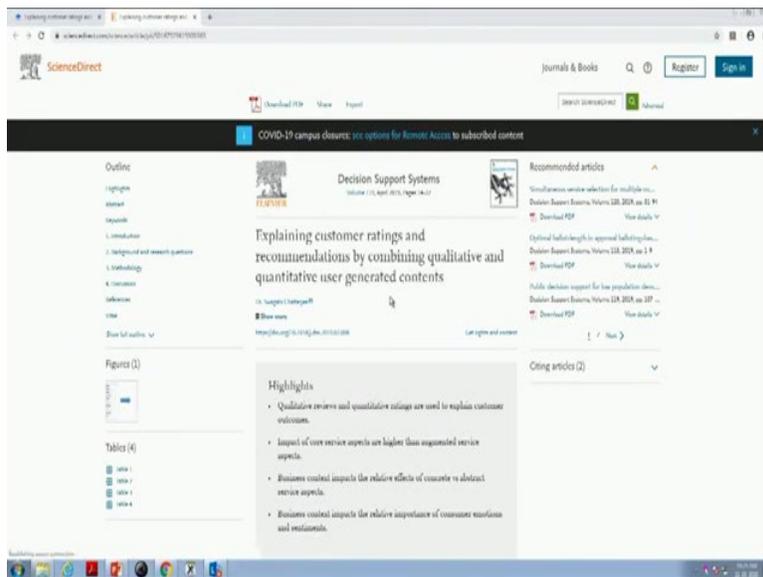
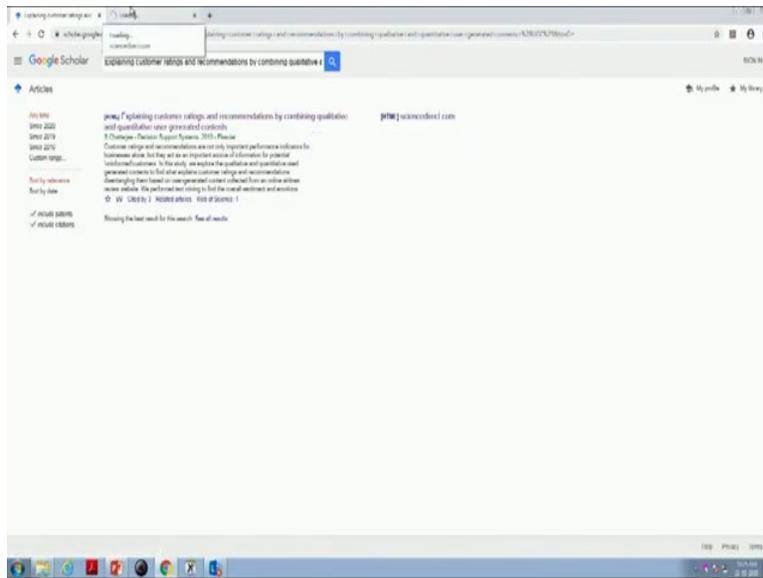
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The name of the paper is explaining customer ratings and recommendations by combining qualitative and quantitative user generated content.

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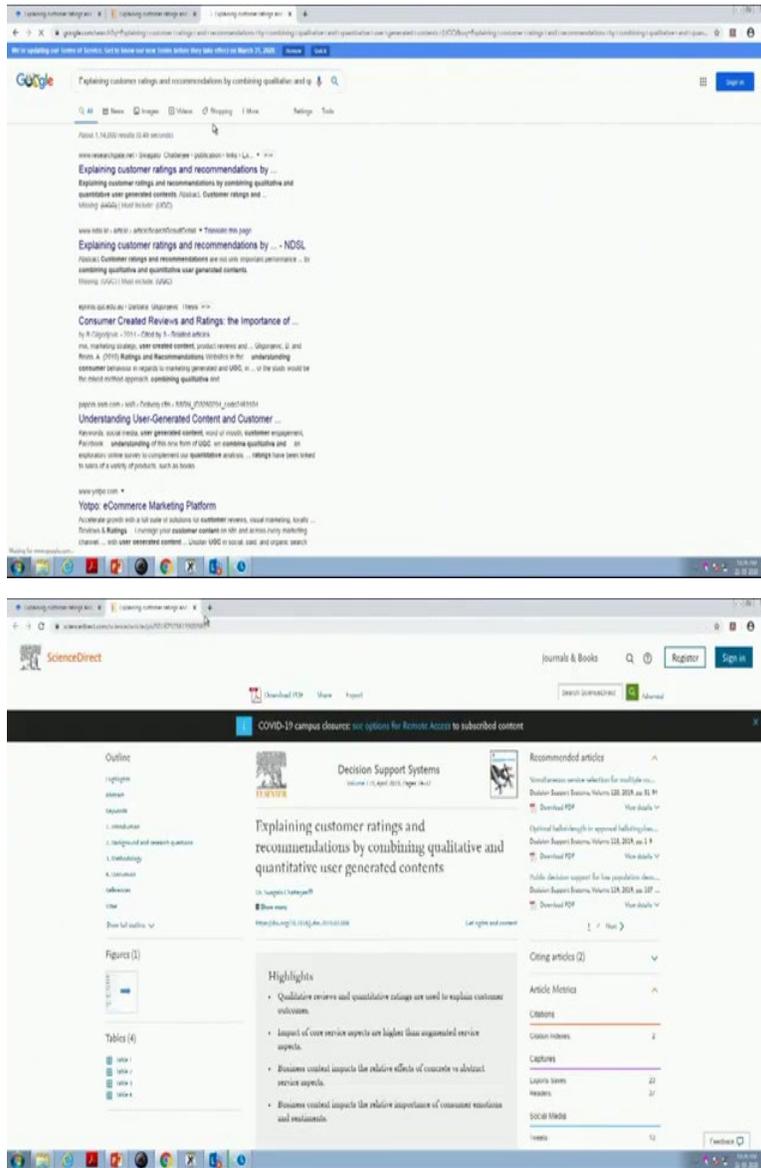


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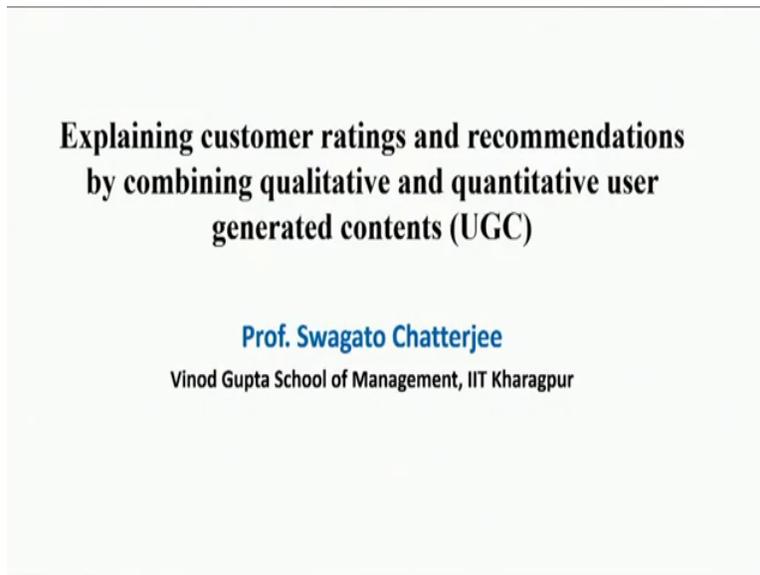
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So if I search in Google like just like this and in research gate you will find a version of this particular paper. So research gate I have my profile and in this profile if you go you can from it will come up now and there, there is a option called download the paper so you can request the paper and you can get it from there.

So, these are the 2 options to get them, okay, so here this paper is there. So, the edited version of the paper can be found out from research gate. So, this is the actual version, but not everybody might have this actual version in their organization or institution they might not have access, if they do not have access then research gate is the way.

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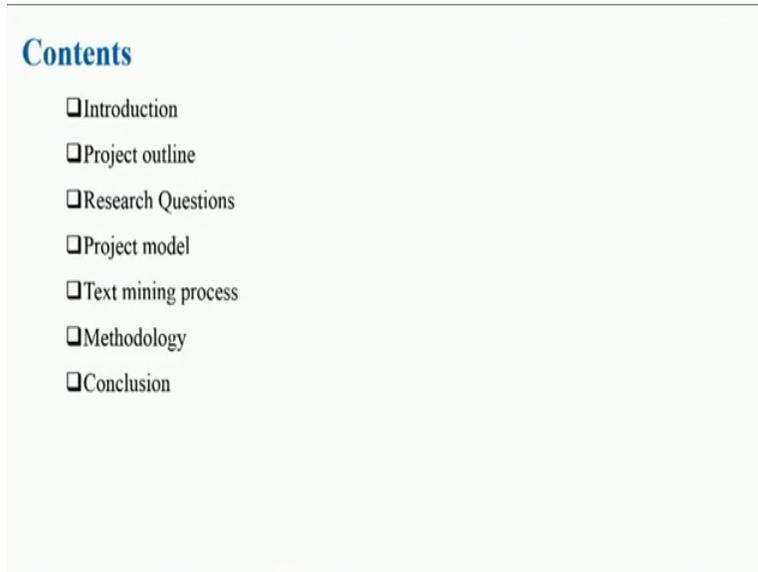
Now, coming to the presentation that what this paper is trying to do, so what is first of all, we have to discuss that what is user generated content. User generated content is any content that is created by the users of a website and when I say user generated content, it can be pages, it can be any pictures, it can be any videos, it can be blog posts, reviews, everything is user generated content.

Now, oftentimes these user generated content is a unstructured data they are not structured data. So if there are unstructured data. If I have to do any kind of mathematical analysis on unstructured data, till now, we used to do content analysis kind of techniques in marketing research, which is manually processing these particular things and try to see that what is coming out or what is not.

But, in in the in the age of marketing analytics, we can do that in our in a non-manual way as well, in a machine generated automated way as well. So, we can process the user generated content through machine to create certain insights, which are quantitative insights and those

quantitative insights can be later used in the analysis part to create certain actionable insights for the organizations which could, which they can, with which they can do something.

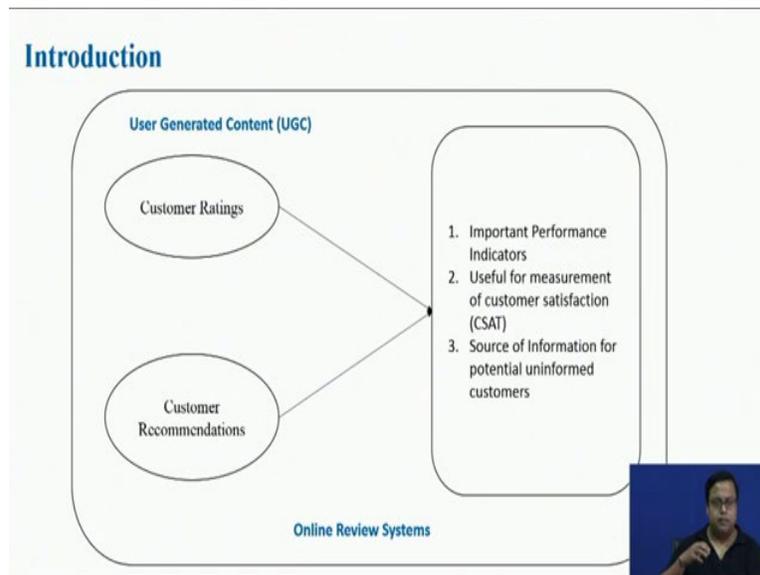
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<input type="checkbox"/>	Conclusion

So, the content of this particular presentation will follow introduction and then project outline, research questions, the model of the project, then the text mining process and methodology and whatever findings we got along with the conclusions. So, this is what I will be discussing in the next half an hour.

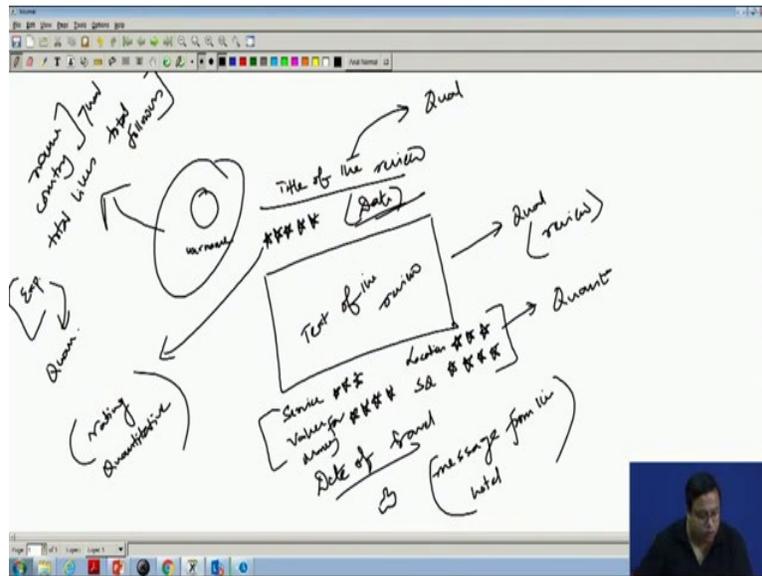
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So, now, let me discuss about this, what is as I told user generated content, in the context of internet. With internet has gone up that this kind of user generated content has gone up like anything. And one of the very important user generated content for marketers is whatever customer gives as reviews or ratings, those kind of stuff becomes very important. But what is the difference between a review and a rating?

So, if you if you remember if you just go and see any TripAdvisor data, you will see that in a TripAdvisor review, people post it like this. So, if I try to show you just 1 minute.

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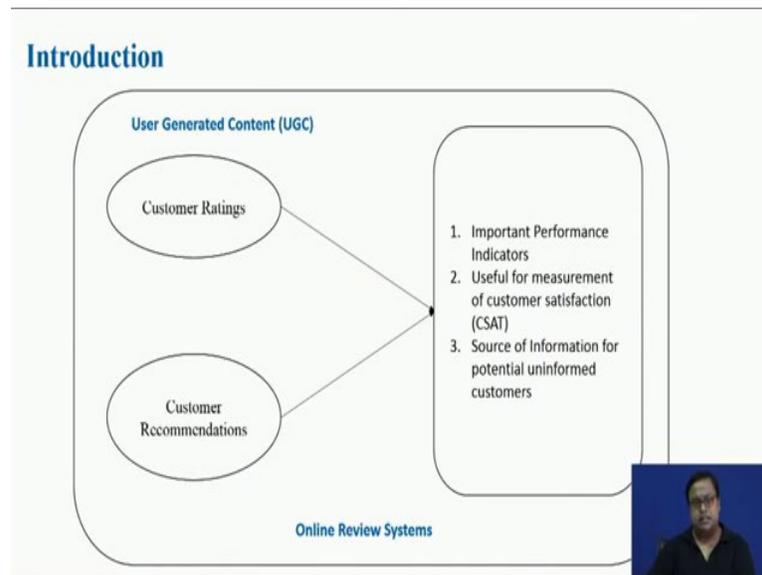
So yeah, so if I try to tell you here, so let us say this is how looks like this is the user name, then the user picture, then the title of the review then the rating, star rating, then the text of the review. We will also get certain attribute price rating, like service, if you remember service, value for money, and then location and the sleep quality. People rate these things as well and some other ratings.

So I also get the date, I also get date of travel. So, this is date of review posting, this is date of travel. And I also get how many likes he has got, how many likes or how many helpful and whether there is any message from the company or in this case the hotel or not. So that also we get. So, just think about in this text. This is qualitative data. This is basically the review.

On the other hand, this is basically the rating which is quantitative and both have some kind of information content in it. Also these guys are quantitative. This guy is this title of the review is qualitative. By chance I get certain new information about this user name, his name his country, this can be qualitative. But his experience or total likes that he has got, or total followers that he has, these are all quantitative.

So in all I am trying to say that there are a mixture of quantitative and qualitative data available in the in the reviews, and one has to find out insight from both of these quantitative and qualitative data.

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So, consumer ratings is quantitative consumer recommendations are also quantitative. And these are the 2 information which we actually play and they are important because they are important performance indicators.

They are useful for measurement of customer satisfaction, and their source of information for potential uninformed customer, so the customer who does not know about this Hotel or the service or the airlines, let us say if it is a airline service, this particular paper was on airlines.

So, they can get information from these ratings and the recommendation maybe are of the consumers, other customers to take a call that whether they should join this particular service or not or they should buy this particular railways tickets or not. So, that kind of information can be generated through this particular user generated content.

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**Customer Perception:**

- Happy customer → Positive Feedback
- Angry customer → Negative Feedback
- More and more customers are engaging in sharing information on online platforms
- An organization should focus on dealing with both positive and negative feedbacks along with repercussions.
- In this project : Qualitative + Quantitative UGC of online airline data
- To find:
  - what explains customer ratings and recommendations



So, how that helps that any customer perception, if it is a happy customer, they will give positive feedback and if it is an angry customer, they will give negative feedback, it is obvious. And more and more customers are indulging in sharing information on online platforms. There are various reasons for that some customers feel that there it is their moral obligation that they should do this.

This is something that they are doing good for the whole world. Some people just want to have their voice listened by somebody else, they want somebody else listen to them, they are egocentric, they, the person, they think that they are the major, the most important person on the world, and everybody should listen to them and that is why they had the post. Then there is certain other people who think that if somebody else, a group of people are saying positive, I have to say negative.

So they have always wanted to stand out of the crowd. So, there are various kinds of motivations for which people actually speak out in the online mode or online reviews, not always those reviews are true. Sometimes those reviews are biased also, but we have to take care of that. And an organization should focus on dealing with both positive and negative review. So you cannot say that negative review will not be there, even if you are a very, very good service provider.

So, as an organization, it is important for you to understand that how to deal with positive and what is the way to deal with positive and negative reviews you understand very few things. For

example, in the first part of our of this marketing analytics, we told that we have to understand that what are the features that are important for people while they are reviewing. Then I can also understand that what are the emotions that generally come out which is related to positive review, negative review?

Why these emotions matter? Because if by chance, if I can tackle those emotions through, through communication strategy, through my service, add-on strategy etc if I can tackle those, those emotions, then there is a chance that I will be having.

For example, for a very very easy example I want to say, let us say a lot of people who goes in airlines, domestic airlines, at least in India will be people who are working in some organizations in their meet 30 to, so 30 to 50 years of age, that will be probably the major chunk.

Now if that is the case that there are lots of people who works, flies as well, these are the people who might have nostalgia as an important component and they spent 2-3 hours in the sitting idle in the aeroplane and if there is something we can do to reduce their stress level while traveling, reduce the make them more happy while traveling that should be done.

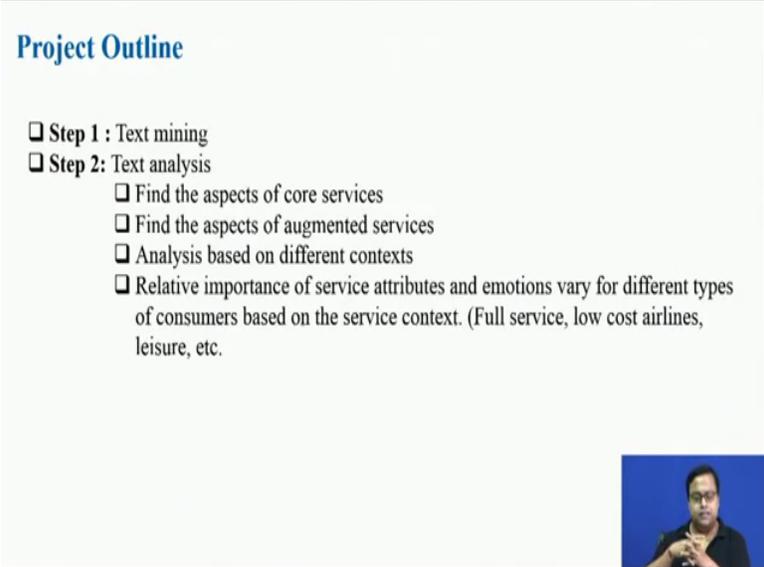
So, 1 of the key all brands which actually attach to nostalgia, if you remember, is like the paper boat. Paper boat is a particular beverage company, beverage brand basically which sells products which are related to nostalgia. So, certain organizations, certain airlines has created a tie up with this paper boat just to make sure that their products are available on in the flight on board.

And then that particular products will create certain kind of nostalgia in the consumers mind which might have a positive affluence or positive if I would say a positive perception about the airline as well. So, this is how they are trying to create a image or trying to create a I would say a positive experience in the customers mind, which might help.

Now to know these they have to understand that who their customer is? What they want? What are the products they are looking for? What kind of emotions they are lacking which? What are the needs of their emotions? This kind of information they want. So, that can be found out from this kind of analysis.

So, in this project, we have combined both qualitative and quantitative user generated content of online airline data. Online airline data means whatever the reviews has been posted by airlines to understand what explains customer ratings and recommendations.

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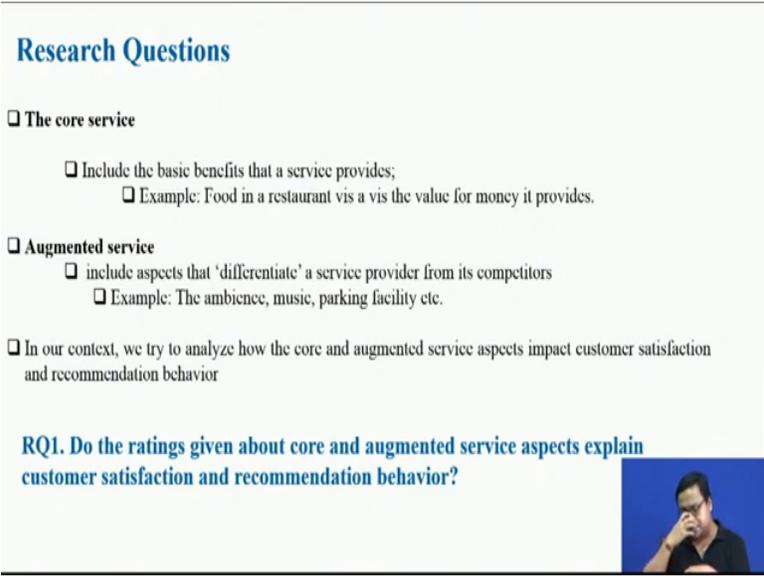


**Project Outline**

- ❑ Step 1 : Text mining
- ❑ Step 2: Text analysis
  - ❑ Find the aspects of core services
  - ❑ Find the aspects of augmented services
  - ❑ Analysis based on different contexts
  - ❑ Relative importance of service attributes and emotions vary for different types of consumers based on the service context. (Full service, low cost airlines, leisure, etc.

So, our project outline looks like this. So first, we have done text mining then text analysis, like finding the aspects of core services and augmented service aspects and then analysis of different context and relative importance of service attributes and emotions vary for different types of customers based on the service context. So, this is something that we try to focus on.

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**Research Questions**

- ❑ **The core service**
  - ❑ Include the basic benefits that a service provides;
  - ❑ Example: Food in a restaurant vis a vis the value for money it provides.
- ❑ **Augmented service**
  - ❑ include aspects that 'differentiate' a service provider from its competitors
  - ❑ Example: The ambience, music, parking facility etc.
- ❑ In our context, we try to analyze how the core and augmented service aspects impact customer satisfaction and recommendation behavior

**RQ1. Do the ratings given about core and augmented service aspects explain customer satisfaction and recommendation behavior?**



What are the research questions? What is core service and what is augmented service? This is something that we have to understand. So, for every service that we deal with, there are certain things which the service is trying to provide and there are certain things which is add-ons.

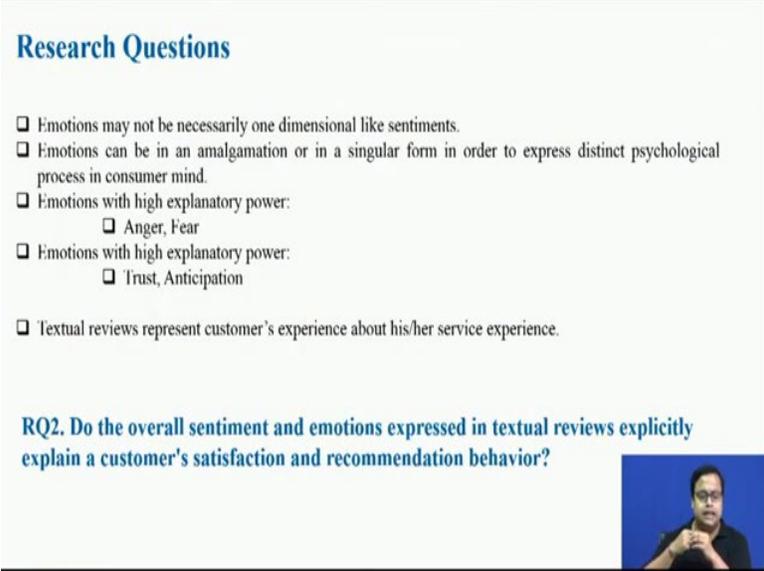
For example, if you go to a movie the movie viewing experiences the core service and the food and the check in and, and let us say certain all other amusements, kids zone within the movie theater, in the waiting zone, all of these things are let us add-on 5 star kind of experience in terms of sofas and etc.

These are all add-ons and these all add-ons are augmented service they are not core service. So, core services are the basic benefits of a service provider. So, in case of restaurant, it is a food which is the basic. So, whatever I pay and whatever I get, that food itself is the basic core services. But the ambience, the music, the live music that is going on, or let us say the service that you get, the valet parking that you get all of these things, add-on service, these are augmented.

A particular restaurant might run even if these things are not there or some of these things are not there, but the particular restaurant will not run with if the food is not there. So, in our context, we try to analyze how the core and augmented service aspects impact customer satisfaction. So which one is more important? Even if you have tens augmented service aspects, which aspect is more important?

Or if you have 3-4 core things that you are providing, which part of the core service is more important? So food quality or food hygiene or food taste, when I talk about food what of the food is important? We have to discuss that. So, do the ratings given by about the core and augmented service aspects explain customer satisfaction is something that we are trying to discuss.

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**Research Questions**

- Emotions may not be necessarily one dimensional like sentiments.
- Emotions can be in an amalgamation or in a singular form in order to express distinct psychological process in consumer mind.
- Emotions with high explanatory power:
  - Anger, Fear
- Emotions with high explanatory power:
  - Trust, Anticipation
- Textual reviews represent customer's experience about his/her service experience.

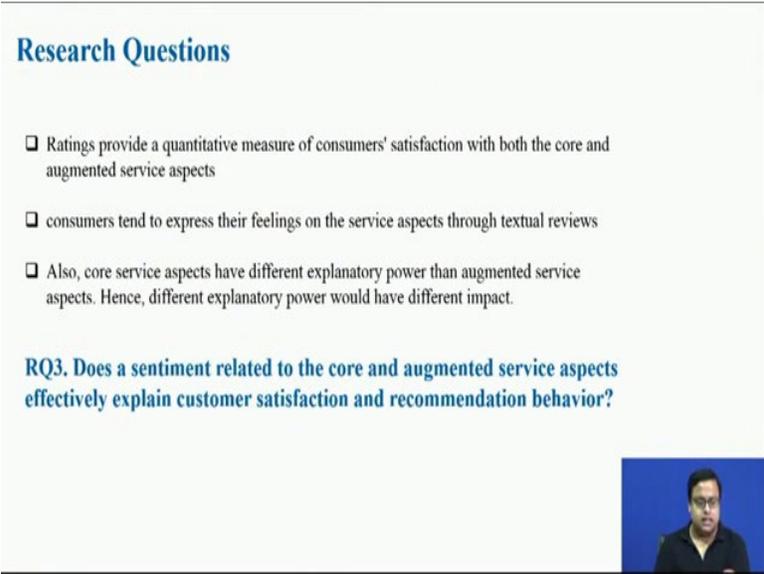
**RQ2. Do the overall sentiment and emotions expressed in textual reviews explicitly explain a customer's satisfaction and recommendation behavior?**



Next research question is also related to sentiment and emotion. So, not only the ratings also whatever the text is there, from there I can find out sentiments not only the overall sentiment, but I also find out there is a way that we are trying to deal with I will discuss that I am also trying to find out the aspect by sentiment. So, till now, we have discussed that how will I find out the overall sentiment from a text using NRC or Bing or any library.

But here I am discussing how to find out the aspect wise information. So this is to the overall sentiment and emotions explained in textual reviews.

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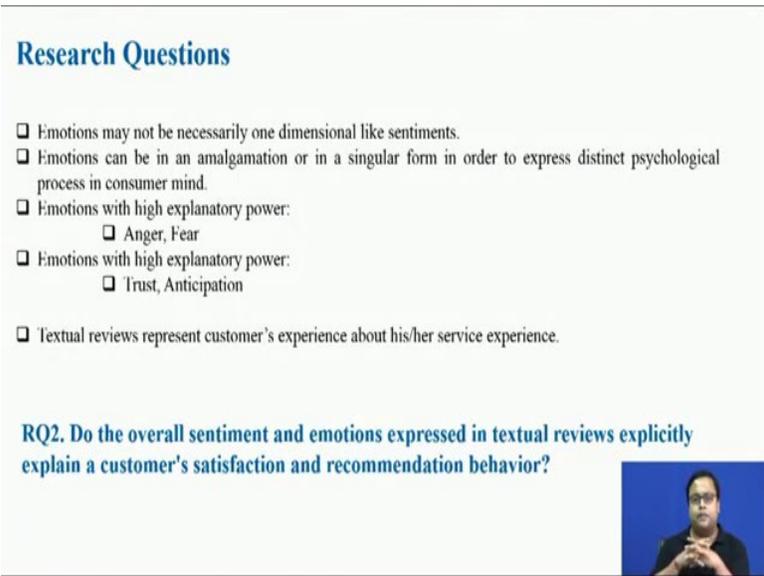
**Research Questions**

- ❑ Ratings provide a quantitative measure of consumers' satisfaction with both the core and augmented service aspects
- ❑ consumers tend to express their feelings on the service aspects through textual reviews
- ❑ Also, core service aspects have different explanatory power than augmented service aspects. Hence, different explanatory power would have different impact.

**RQ3. Does a sentiment related to the core and augmented service aspects effectively explain customer satisfaction and recommendation behavior?**

And the next question is, does the sentiment related to the core and augmented aspect. These are 2 things that we are trying to find out.

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**Research Questions**

- ❑ Emotions may not be necessarily one dimensional like sentiments.
- ❑ Emotions can be in an amalgamation or in a singular form in order to express distinct psychological process in consumer mind.
- ❑ Emotions with high explanatory power:
  - ❑ Anger, Fear
- ❑ Emotions with high explanatory power:
  - ❑ Trust, Anticipation
- ❑ Textual reviews represent customer's experience about his/her service experience.

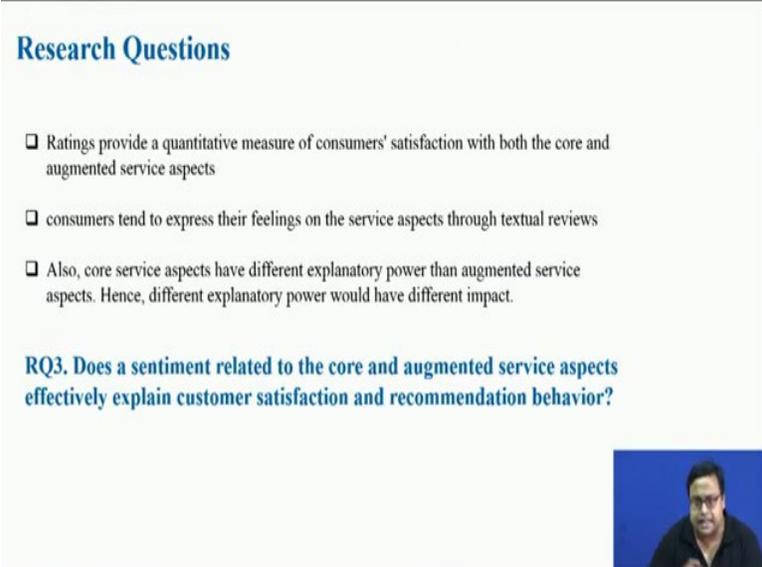
**RQ2. Do the overall sentiment and emotions expressed in textual reviews explicitly explain a customer's satisfaction and recommendation behavior?**

So, what is the overall sentiment and emotion? Overall sentiment and emotion is exactly what we are doing in the last class, take pick up a survey, pick up a particular's review find out the overall sentiment and 8 emotions. So, emotions can be in amalgamation or in a singular form in order to express distinct psychological processing consumer mind.

There are certain emotions which has high explanatory power, high arousal we call them for example anger, fear they are high arousal and there are certain others, like trust, anticipation which are low arousal. So when you have anger or fear, the action orientation is much more you want to do something. On the other end trust and anticipation is not so much action oriented, they are more internal.

You want to stay calm after doing this. So textual reviews represent customer experience about his or her service experience. So for example, that is why from the textual review, we will be trying to find out these sentiments and emotions.

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**Research Questions**

- ❑ Ratings provide a quantitative measure of consumers' satisfaction with both the core and augmented service aspects
- ❑ consumers tend to express their feelings on the service aspects through textual reviews
- ❑ Also, core service aspects have different explanatory power than augmented service aspects. Hence, different explanatory power would have different impact.

**RQ3. Does a sentiment related to the core and augmented service aspects effectively explain customer satisfaction and recommendation behavior?**



And as I told sentiment and emotion not only for the overall context, but also for the each service aspect context can be found out and I will explain how that can be done. So, consumer tends to express their feelings on the service experience to textual reviews, also core services will have different explanatory power than augmented service aspects. So, core and augmented guys might be different, we have to deal with that.

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**Research Questions**

The explanatory powers of various attributes vary depending on whether the business model is full service or low cost .

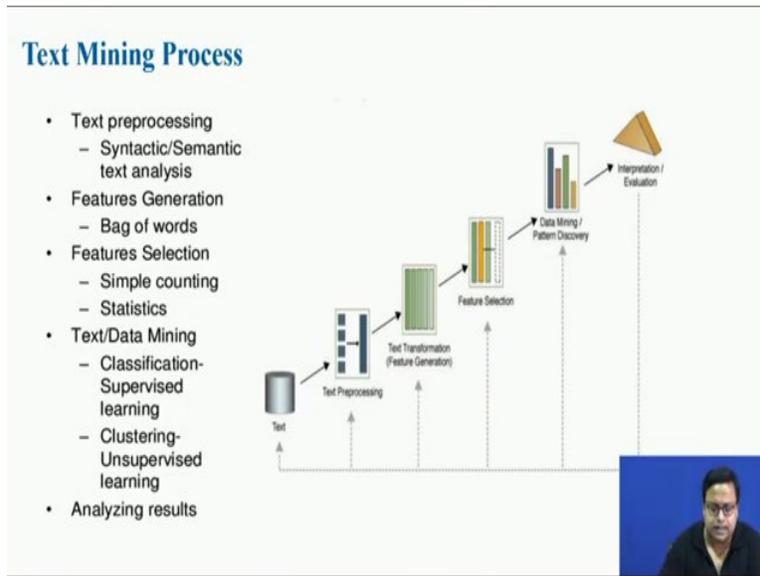
- Low cost airlines:**
  - 'No frills' and provides just the core benefits at a lower cost
  - For every extra service, there is an additional cost.
- Full service airlines:**
  - include all the associated services of airlines such as club, lounge, restaurant, priority

**RQ4. How does the above-mentioned explaining power change based on model of service?**



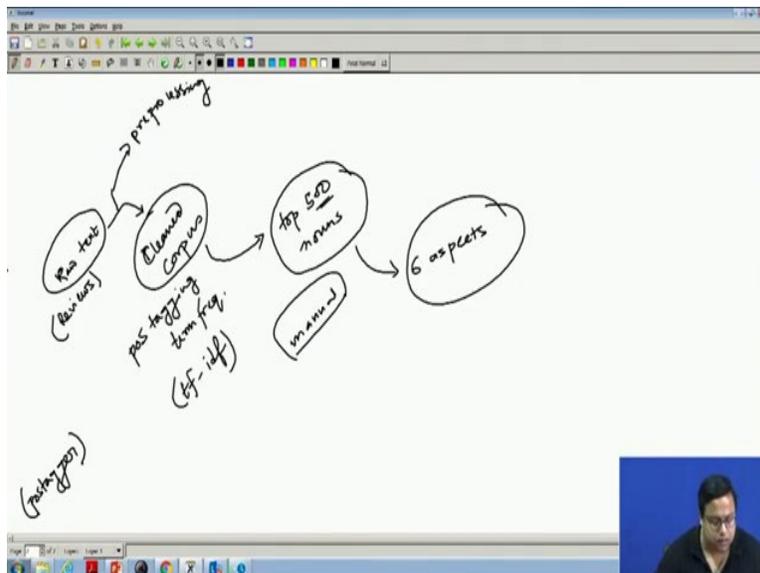
The last piece of question is that whether this can also be used in the predictive model. So, how does the augmented expressive power change based on the model of the service. So, if the service in this particular context we are discussing about airlines and in airlines there are low cost airlines and full service airlines whether these relative importance is changed depending on what kind of service it is, is something that we will be discussing in this particular video.

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So, let me just explain what I have done. So this is the text mining process, we did the, you know done it initially. So first we do text Preprocessing. So then we do feature generation. So this is something that is important. So let me just explain how I have done this.

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So what I have done is I had the raw text, so basically these are reviews. From there, I did preprocessing and create a cleaned corpus. So here are the procedure is preprocessing and I created a cleaned corpus. So using this cleaned corpus I found out the term frequency, which terms are more important?

Based on tf, idf I find out which terms are more important. And based on term frequency, inverse document frequency I found out the top 500 words. So the top 500 words are nouns specifically and also POS tagging parts of speech tagging, there is a P O S tagger library available. So using that POS tagger library, I have done previous tagging and I found out that top let us say 500 nouns, I forgot out this number, top 500 or 200 that we will find out in the paper, that many nouns.

Now, why nouns? Because people give reviews on nouns they explain a noun using an adjective, this is also something that we have discussed. So I am a good boy. Boy is a noun good is an adjective. This hotel is very clean. Hotel is the noun, clean is the adjective. So, by using the adjective they want to explain the noun. So that is why the nouns are the ones which we will talk about that what is that thing that they are discussing.

So from there, we found out, let say 6 aspects based on which people are giving reviews, manually this process is manual. For example, somebody is talking about, let us say charges and price and discounts and so the that means that they are talking about the price overall thing that they are talking about price. Then there somebody is talking about, let us say, seat come forward, and let us say leg space and seat size and cramp.

So this cramp is a is an adjective, something else, let us say anything which is seating, seat anything they are talking about seat or leg space or space, all of these things are practically talking about comfort. So, that will come to the comfort as a variable. So, similarly, we have created 6 aspects.

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### Methodology

- ❑ Data Collection: airlinequality.com
- ❑ Total Reviews: 41397 customer reviews of 362 airlines from 158 countries
- ❑ Scale: 1 to 10-point scale | 1: Highly dissatisfied | 10: Highly satisfied
- ❑ In our study we have used NRC Word-Emotion Association Lexicon (also called Emol.ex) created by Mohammad and Turney.
- ❑ It provides scores about the following sentiments and emotions
- ❑ sentiments: negative, positive; emotions: anger, anticipation, disgust, fear, joy, sadness, surprise, trust
- ❑ Overall Frequency Measurement:  $(pos - neg) / (pos + neg)$   
pos= frequency of positive words  
neg= frequency of negative words

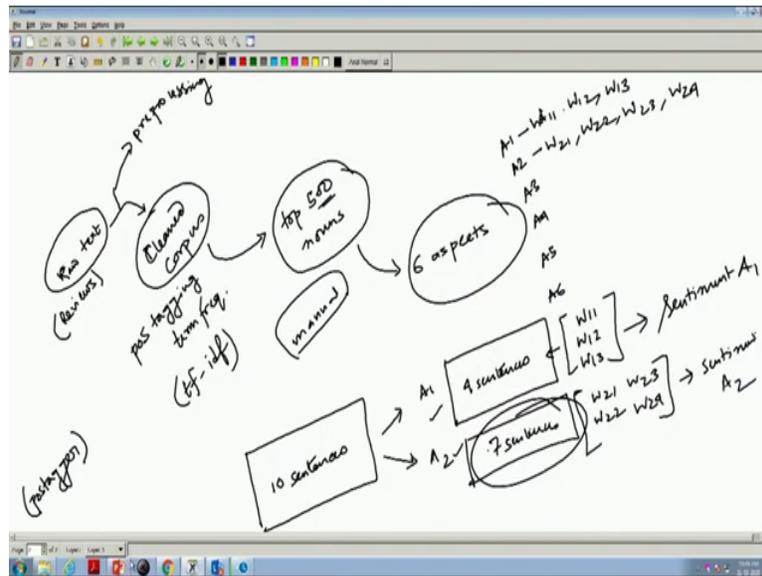
Service attributes	Bag of words
Punctuality	Time, hour, boarding, minutes, delay, day arrival, departure
Food and beverages	Food, meal, drinks, water, breakfast
Comfort	Seat, cabin, leg, lounge, room, legroom, seating, row, landing, sleep, space
Staff behavior	Crew, staff, attendants, people, ground
In-flight Entertainment	Entertainment, experience, inflight, movies
Check in	Check in, luggage, board, baggage

So, those 6 aspects were basically we have taken around 41397 customer reviews of 362 airlines and from 158 countries. So, pretty big data I would say and the customer rating was in a 1 to 10 point scale, satisfaction rating and recommendation was 1 0 which is whether it was positive or negative, whether somebody has recommended it or not, something like that. And in our study we have used NRC body. So, forget about that, we will discuss about that. And these are the service attributes and these are the words that we have created.

So, if you have checked this thing, you will know that these are the words that we have created. So the words are basically punctuality, food and beverage, comfort, staff behavior, in-flight entertainment and check in and corresponding you will see that these are all nouns that we are got. For food and beverage, food, meal drinks, whatever breakfast, some of the nouns that I have got and then for time of hour, I got boarding, time, hour, minutes, delay, day arrival, departure. So these are my basic nouns that I am got.

So, similar things I have got here for each of these particular service aspects. Now next, once I have created this bag of words, the method is like this.

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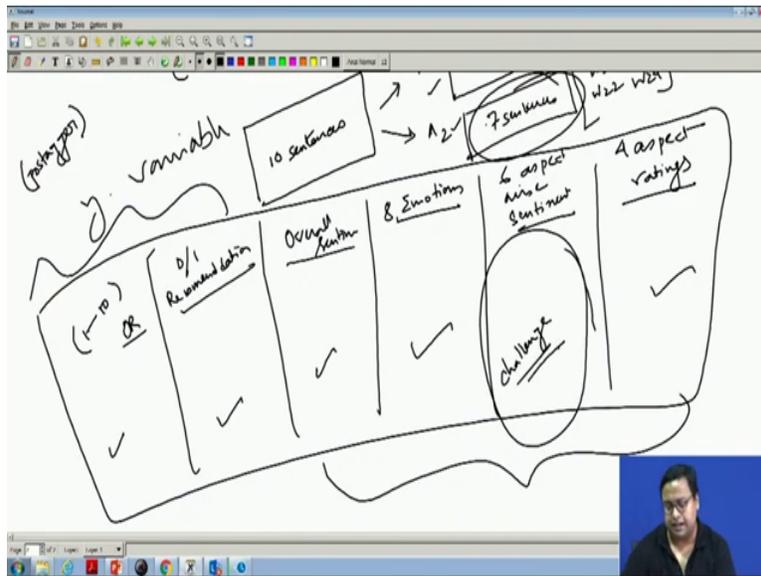
Once I have created the bag of words, from these 6 aspects, aspect 1, aspect 2, aspect 3, aspect 4, aspect 5 and aspect 6 is there and correspondingly aspect  $W_{11}$ ,  $W_{12}$  and  $W_{13}$  express aspect 1,  $W_{21}$ ,  $W_{22}$ ,  $W_{23}$  and  $W_{24}$  express aspect 2 and so on, let us say that kind of a thing is there.

Now, what, how I will find out aspect wise? So let us say this is my reviews, the overall review of a hotel has let us say, around 10 sentences. Out of these, there are 4 sentences which has any one of them, 1 of  $W_{11}$ ,  $W_{12}$  and  $W_{13}$ . Any one of them is occurring in 4 sentences out of these 10 sentences. So, that means that these are the 4 sentences which are talking about aspect 1.

The sentiment of this particular theme is basically the sentiment of  $A_1$ . And similarly, I do it for  $A_2$ ,  $A_2$  let us say there are 7 sentences and there are some sentences which are common in both these cases, there can be some sentences, which are common in  $A_1$  and  $A_2$ . So, 7 sentences are there, which has  $W_{21}$ ,  $W_{22}$ ,  $W_{23}$  and  $W_{24}$ . Any one of them or more than one of them does not matter at least one of them.

So, that these 7 sentiments, sentences sentiment is basically the sentiment of  $A_2$ . Now, this is how we actually create data then we do a pilot with some sample to see that whether on a vague it is coming properly or not. We have done a pilot in terms of some researchers to rate it manually by reading it and we check that whether the correlation is coming pretty good or not and that we found that they are coming. So based on that I found out the sentiments. So, what did I find out in total?

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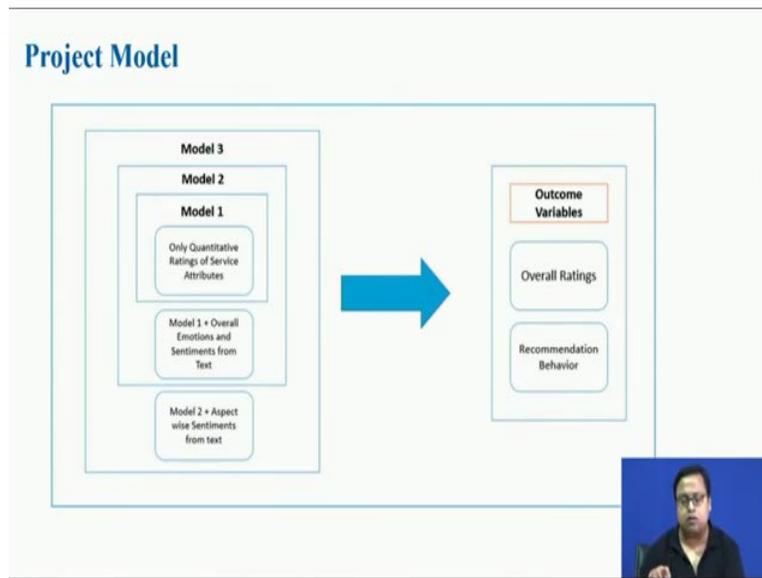


I had the overall rating. And I had the recommendation, overall rating of a hotel for airline is in 1 to 10 point scale recommendation is 0 1. So, then I had the overall sentiment I had 8 emotions and I had 6 aspect wise sentiments and I also had if I am not wrong 4 ratings, which is quantitative ratings. So, this is the whole data set that I have created where these 2 were my Y variable and these are all my X variables.

So, this you can do, this you can do by, by getting the data from the internet, this we have discussed in the last class, this we have discussed in the last class. This anyway, we will get from the review from the internet, this is something that I am asking you to do on your own, okay.

So, create the bag of words, based on those bag of words, find out that which can I subset the whole text in a smaller set based on sentences, and then find out the sentiment. So this is a challenge that I am giving to you. So, once you can do that, I have this model.

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So model 1, model 2, model 3 in the model 1, I had only quantitative ratings of let us say value for money, comfort and etc the quantity demand to 5 point scale rating that customers have given that. In model 2 whatever was there in model 1, along with that overall sentiment and emotions has also been included. And in model 3, the aspect wise sentiments was also included. And I had 2 outcome variables overall ratings which is 1 to 10 point scale and recommendation behavior.

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The 'Results' slide displays a regression table for Explanatory models for CSAT and RBV. The table is annotated with red handwritten notes, including significance levels (e.g., \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001) and circled values. The table is divided into two sections: Customer satisfaction (Linear) and Recommendation behavior (Logistic).

	Customer satisfaction (Linear)			Recommendation behavior (Logistic)			VIF of
	Model 1.1	Model 1.2	Model 1.3	Model 2.1	Model 2.2	Model 2.3	
AdjR2	0.56	0.57	0.59	17,900	16,830	15,862	
AIC				-9.51***	-8.91***	-8.15***	
(Intercept)	0.42***	0.95***	1.42***				
Seat comfort rating	0.37***	0.34***	0.32***	0.8***	0.46**	0.41**	2.13**
Cabin staff rating	0.33***	0.48***	0.43***	0.86***	0.79***	0.7***	2.38
Food and beverages rating	0.09***	0.08***	0.06**	0.21***	0.18**	0.14**	2.11
Inflight entertainment rating	0.04***	0.04***	0.05**	0.07***	0.04***	0.04*	1.48
Value for money rating	0.94***	0.76***	0.68***	1.42***	1.34***	1.27***	2.49
Anger	0	-0.01	-0.01	-1.42***	-0.07**	-0.09**	2.28
Anticipation		-0.01	-0.01		-0.04**	-0.04**	2.32
Disgust		-0.14***	-0.1**		-0.25***	-0.2**	2.38
Fear		-0.04**	-0.01		-0.09*	-0.04*	2.2
Joy		0.06***	0.03**		0.12**	0.08**	3.99
Sadness		-0.02*	-0.03**		-0.03	0	2.44
Surprise		0.03***	0.04**		0	0.03	2.13
Trust		0.04***	0.05**		0	0.01	3.18
Overall sentiment		0.69***	0.33**		0.91***	0.32**	2.2
Punctuality sentiment			0.03			0.24**	2.24
Food and beverages sentiment			0.19**			0.38**	1.62
Comfort sentiment			0.76**			1.21**	3.35
Star behavior sentiment			0.02			0.29**	1.57
Inflight entertainment sentiment			0.16**			0.38**	1.22
Check in sentiment			0.12**			0.15**	1.16
Non constant variance test of heteroscedasticity	p < 0.0001	p < 0.0001	p < .0001				

Handwritten annotations in red include: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001; circled values for AdjR2 (0.56) and coefficients for Seat comfort rating (0.37), Cabin staff rating (0.33), and Value for money rating (0.94); and a box on the right containing 'no mc.' and '< 4'.

So, this is how the model talks about if you carefully see that in my first thing, if I carefully seen the first thing, just 1 minute of in this, okay there is a pen here also. In the first thing we will see

that in model 1.1 and model 2.1 we have only taken the overall ratings and I can see that value for money is the most important attribute.

The next 2 most important attribute is cabin staff rating actual rate. So, cabin staff rating is the second most important attribute. And so basically if you can say value for money rating is core, is a core thing that you expect, food and beverage is augmented, in-flight entertainment is augmented, seat comfort is probably I do not know. So, it just checked I think seat comfort might be probably core also and this is also core.

So these 3 things is basically you need. So, if you see carefully that seat comfort rating, so intercept is 0.42, seat comfort rating is coming up to be 0.37 and 0.5 and then there is cabin staff rating which is 0.53 and 0.86 so these 3 guys are the most important attributes. So, obviously core attributes are more important than augmented attributes this is something that I get from model 1.1 and model 2.1.

So, 3 star means basically,  $P$  is smaller than 0.003 ( $P < 0.003$ ), star means  $P$  is smaller than 0.001 ( $P < 0.001$ ) that means 3 star and 2 star means up that is a significance level if you have done integration you will understand this and 2 star means  $P$  is smaller than 0.01 ( $P < 0.01$ ) and 1 star is  $P$  is smaller than 0.05 ( $P < 0.05$ ) So, this is the result that we have got and the Adjusted R squared was 0.56 which is good enough. So, as we included the other attributes only the Adjusted R squared went up, okay.

So, Adjusted R square went up and in this particular case it is a this is linear regression because 1 to 10 point scale this is logistic regression because the recommendation behavior is 1 0. All the VIF of my model is less than 4. So, no multi-collinearity. So, that is something that is also taken care of, some of them are very close to 4. So, you can also issue we should probably also check in a 2 by 2 model that whether that is coming up or not.

Now, when I included the emotions, what I found out is obviously positive emotions fully positively related negative emotions will be negatively related that is obvious there is nothing new to say. But what is more important is the most overall rating experience a lot first of all in both the cases, but other than that, if I see the ratings, the major important contributing emotion is disgust.

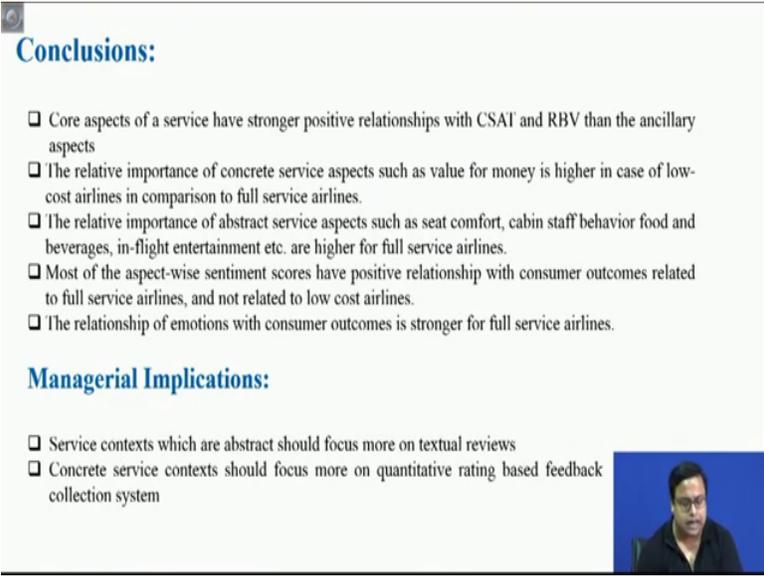
If you check, which is a very, I would say interesting observation that how can disgust and in case of positive reviews joy. Joy more related to recommendation, less related to satisfaction because joy might not come from the service provider it can be from the experience of your friends who are traveling with you also. But disgust is a very major variable. So you have to find out that people should not be very, very I would say dissatisfied with your behavior.

Disgust comes from what? Disgust comes from let us say something that you do not like at all. It is not like anger, you are not angry to some person you are. Sometimes disgust means you are disgusted with the overall experience of this particular thing. That becomes an important variable as well. Next, when I include the aspect wise ratings, we have to think about that when we include the aspect wise ratings, we find out that punctuality.

So, the most important is again, 0.76, 1.21 which is related to that is most important, right. So, punctuality is 0.03 this is 0.13. Comfort sentiment, so sentiment the most important one is comfort if you can see again core. And then the other ones are probably food and beverage one is the second most in terms of the sentiment involved which is augmented. So, in case of all I can say that in case of sentiments in terms of text, when people give rating, the core aspect becomes more important.

When people like something, the augmented aspects are also important because you see, beverage rating has quite a good 0.19, 0.38 in comparison to others and then in-flight entertainment is 0.16 and 0.28, which is good enough, which is almost comparable to let us say staff behavior which is 0.2 and 0.29. So here in case of sentiment, augmented services also becomes pretty important. So, this kind of an information I can get.

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**Conclusions:**

- ❑ Core aspects of a service have stronger positive relationships with CSAT and RBV than the ancillary aspects
- ❑ The relative importance of concrete service aspects such as value for money is higher in case of low-cost airlines in comparison to full service airlines.
- ❑ The relative importance of abstract service aspects such as seat comfort, cabin staff behavior food and beverages, in-flight entertainment etc. are higher for full service airlines.
- ❑ Most of the aspect-wise sentiment scores have positive relationship with consumer outcomes related to full service airlines, and not related to low cost airlines.
- ❑ The relationship of emotions with consumer outcomes is stronger for full service airlines.

**Managerial Implications:**

- ❑ Service contexts which are abstract should focus more on textual reviews
- ❑ Concrete service contexts should focus more on quantitative rating based feedback collection system



So, what are the conclusions? Core aspects of service have stronger positive relationship with customer satisfaction than augmented aspects. So ancillary aspects which is one. The relative importance of concrete service aspects such as value for money is higher in case of low cost airlines.

So, we have also done comparison of low cost and high cost you can see in the paper, the relative importance of abstract service aspects such as seat comfort, staff behavior and food and beverages, in-flight entertainment etc., is higher in full service aspect.

So, there are some services we found where I am not sure this particular result in this discussion you can see it in our original paper, but when we talk about the same models in the context of high low cost airlines and full service airlines the importance is changed.

What is the managerial implications? What can I do with this? If I know that for which kind of service aspects which things are important which product or service aspects are important in my context, then I can put more money more importance on that.

And I can also create a automated way of finding out from how from text which aspects are important. So, rather than doing a content analysis, it is not possible to do a content analysis in 41000 data points, so, we can do it in one go. So, that is how is probably this particular paper is contributing. I will see you in the next video. Thank you very much and see you.