Decision Making Under Uncertainty
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Lecture - 27
Costs, Ratings, Options and Choices for both Restaurants

We are continuing with the restaurant A, restaurant B delivery example. Here, we are going to talk about Costs, Ratings, Options and Choices for Restaurant A and Restaurant B.

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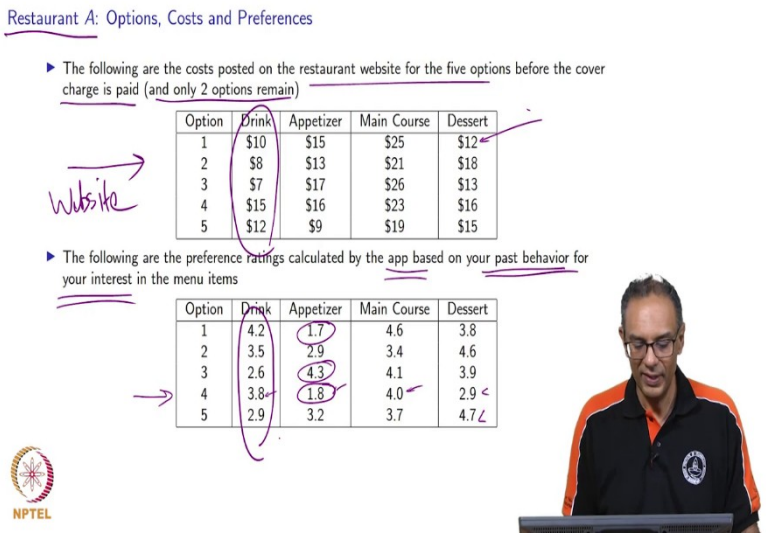

So, let us first start with restaurant A and I am going to say a little bit about the options, costs and preferences. If you look at it: remember, I told you earlier that you are going to be displayed the 5 options. So, this is something like I am only presenting the costs and I am not presenting the items. Like I said earlier, the actual item will be also written right here: it would say something like a fruitcake or it would say something like ice cream like sundae or something like that.

So, the items will be written and the price. I am keeping it simple by not using up too much space and remove the items. I know that would have been exciting, but turns out that I took it out. So, here the options are all given, so look at the amounts. So, this is what you see on the website and you will see the 5 options before you pay the 30 dollars.

So, this is what happens first- once you pay the thirty dollars charge, only two of those options will be there. Ok, but before we pay the 30 dollars, I have not yet formulated the problem, I do want to say that we are still in terms of explaining what is going on- so this is the situation.

Now, the app that I told you looks at your past behavior and your interest in the various menu items. So, for example, the first dessert there is on the right and say: well I am giving you a 3.8 because this is how much you like that, this other stuff- dessert and the fifth option is something that you really like. So, you get a rating of 4.7, this is based on your past preferences. Likewise, this gets very low number (Refer Slide Time: 02:12), so this appetizer is excellent.

Now, if you think about it let us say option number 4 is revealed, then for example, you are going to get a fairly so-so dessert and a fairly so-so appetizer as far as your interests are concerned. Again it might this might be something that other people love, something that you do not.

However, the main course is all right and the drink is alright, so we have to see which one comes in. Now, turns out that an entire option- you would either get the entire this choice and this choice for example. I will come to that in the next slide, but that is what it is going to be revealed. But before getting revealed, you get to see all 5 items.

You get to see this entire table and then it will tell you: well, you are going to pick two out of this at random. Why are they doing something like this: well, when they are doing a delivery, they do not want to make too many items, they just want to make 2 items, make them well and keep it available for delivery. And they want to a mix and match a little bit and then they also want to make it random. So, that you know there is some element of surprise, that is just for that.

Truthfully, it is just to make this problem interesting from my standpoint. Now, this is this situation that we have. So, you have your ratings, now another thing to notice that is interesting; I am going to erase some of this because it is a little bit crowded. If you look at this, there is also you know you can say what kind of a person you are. If you look at it here- your preferences of drinks are also in the same order roughly as the costs.

That means, you like the expensive ones a little bit more, I mean this not of perfect correlation, but you know it looks like the cheap ones- you are not a big fan of. Now, in the appetizers on the other hand, also you know you have a similar format and I know I mean it is just interesting to see this. You look at it and you say: you have some expensive tastes, you can kind of make such inferences as well.

Now, anyway that is beside the point, that is somewhat outside the- what we are going to be doing in this problem.

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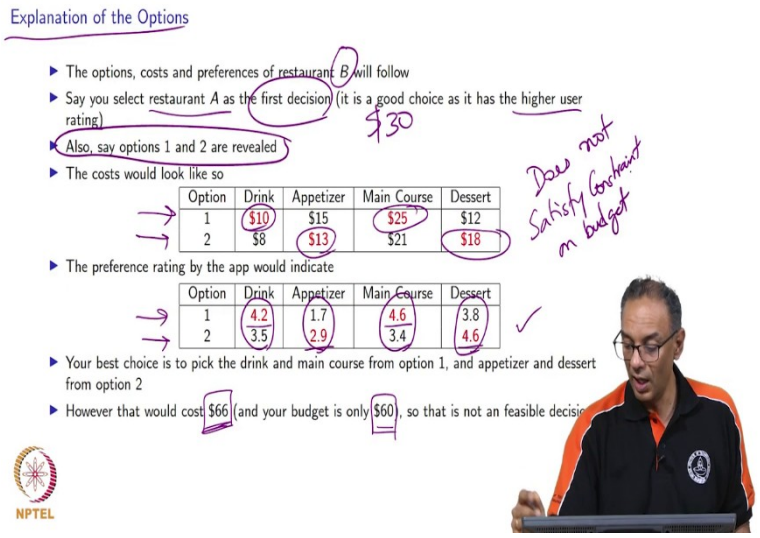

Now, I am going to explain the various options. Now, we will talk about restaurant B later. In the next slide, we talk about restaurant B, we are still sticking with restaurant A. So, in the restaurant A your first decision could be the one to pick restaurant A, that is a good choice. Why is that a good choice because it has a higher user rating, remember that rating for restaurant A was higher than restaurant B.

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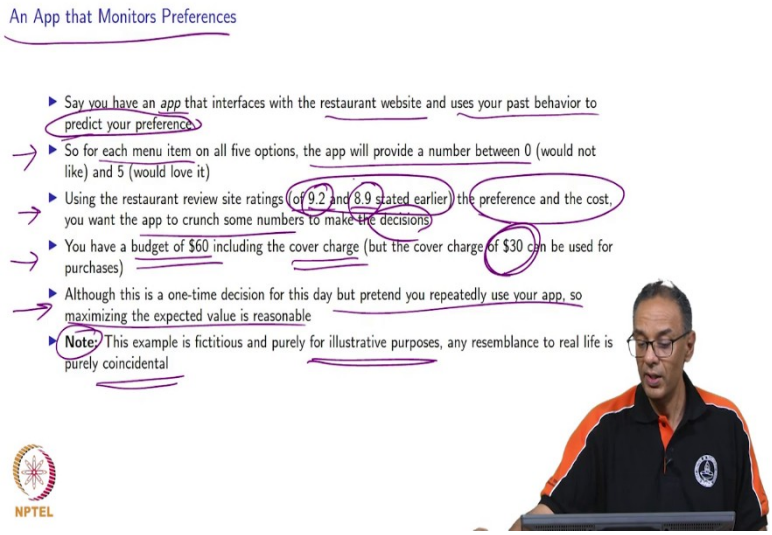

I am talking about this one- this 9.2 and 8.9. So, between the two restaurants if you did not have all this information, with no other piece of information, your best option is to go with restaurant A. Because you know clearly it is a better rated among the two, let us say you did not even get to see the menu that is what you would do.

Now, in our case that is not what is going to happen, we are going to reveal what menu items, not just that, but we are going to keep something hidden. We are going to say: well, we do not know which two options are going to be actually revealed. So, you pay the 30 dollars, so once you pay the dollar 30, you get two options that are revealed. So, let us say you reveal options 1 and 2, so you go to the previous page, you reveal option 1 and option 2.

So, once you reveal option 1 from that table that is all is being presented here: option 1 and option 2. The various prices and the various ratings by your app. Remember you have an app that rates between 0 and 5. So, higher the rating, chances are you going to like that particular item, so this is your preferences. Now, if you look at this between these two the one in the red is higher; between these two, the one and red is higher; again between these two, one in red is higher.

So, ideally what you would do is- you would order this drink, this appetizer, this main course and this dessert. Like you would the drink and the main course from option 1 and then you will order the appetizer and dessert from option 2. Remember one more time, you do not have

to get the entire option, you do not have to get the whole option, it is there just for you to choose between two.

So, in some sense once the 2 options are revealed, it is like saying: well, you get 2 drinks out of these 5, but it is not any random two, 2 specific ones. Option 1 and option 2- these are the two that get revealed. At this point if you look at the cost- so you are looking at paying 10 dollars for this, 13 dollars for this, 25 dollars for this and 18 dollars for this.

So, you add up the four numbers, you will get 66 dollars, but your budget is only 60, yes I do want to emphasize that the first 30 you have already paid. So, the second 30 is all that you have. So, 66 is way too much. And you are saying: well I want to stick with my budget, I do not want to spend 6 dollars from my pocket for a trip that I made on work- very reasonable.

So, this is not a feasible solution, this is the best thing that you would do from your preferences standpoint that is the optimal choice, but it does not satisfy. So, satisfy constraint does it? No, it does not. So, does not satisfy constraint on budget. So, now what do you do? So, I am going to the next slide.

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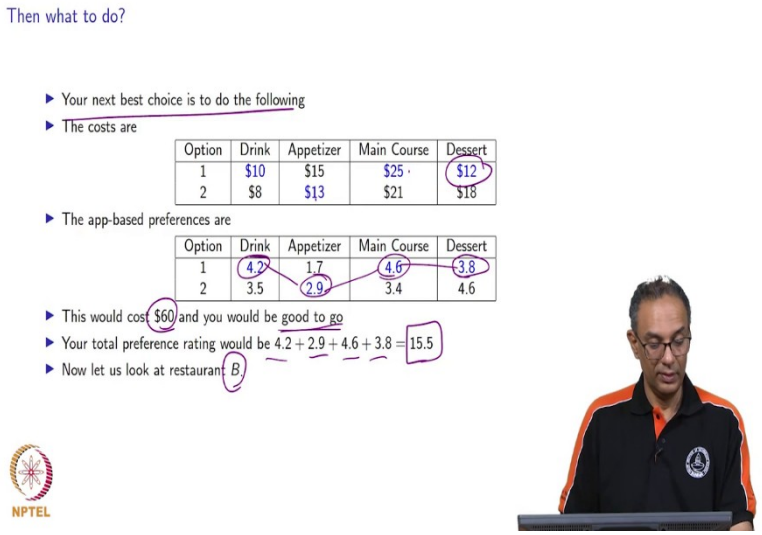

So, your next best choice is to do the following. So, you look at this and then you say: well, in my previous choices I could either take the cheaper dessert, the cheaper main course, the cheaper appetizer, or the cheapest drink. Now, I also want to pick the option that would be the best bank. So, for example, the cheaper drink is not an option for me- I only go down by 2

dollars. I need to go down by 6, the cheaper appetizer is also not an option. The main course is also not an option, my only option is the dessert.

So, I will say: ok, I will settle for the desert and the desert settling is not too bad. Because that was one which you know is only going to go down by a few points. So, I take the desert here, and then the main course here, the appetizer and drink. Now, if you look at it, remember it goes down by 6 dollars. So, therefore, now your total cost must be 60. So, 10 + 13 = 23, 23 + 25 = 48, 48 + 12 = 60 dollars.

So, this would be great and your total preference rating is 15.5. So, remember you only need to add these 4 numbers. So, 4.2 + 2.9 + 4.6, + 3.8. If we did the calculations, you will get 15.5. Now, let us look at restaurant B.

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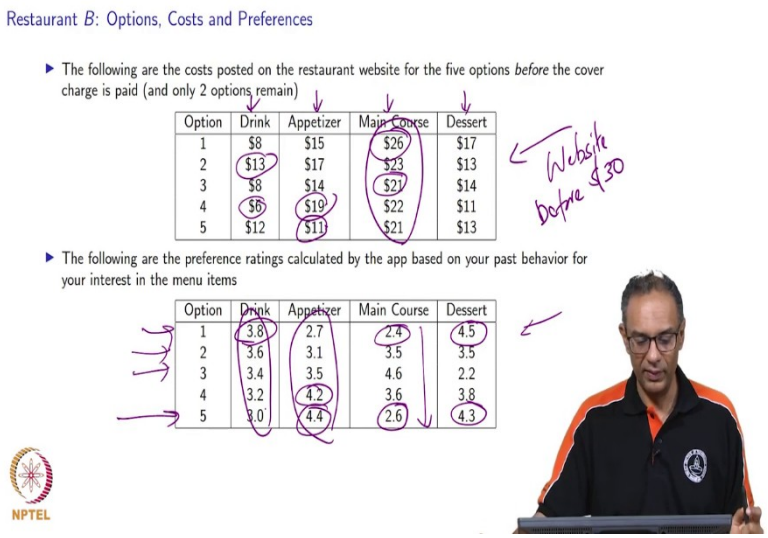

Restaurant B, what are your costs, options and preferences; very similar to restaurant A it gives you this table- this is what is available on the website before the dollar 30 is paid. Now, look at these numbers- slightly different from the restaurant A's number. So, you see these numbers as well and your preferences are also slightly different from what we saw in restaurant A.

So, notice here that this 13 dollar, so all the drinks are such that they are all about similar. So, you know if you pick the 6 dollar drink, you would not be terribly worse off than picking the

expensive one, which is here. So, that is an interesting thing to notice. Also notice that the appetizers have a lot more variability- it goes from. 2.7 to 4.4.

The costs of the appetizers on the other hand is from 11 to 19 and turns out that some of the cheaper appetizer especially the 11 dollar one is actually something that you really like. So, if option 5 is revealed, you might be really lucky that means you have a lot more bang for the buck. However, if option 4 is revealed, it is also another appetizer that you really like, but you are going to be paying a whole lot.

And then we come on to the main course. So, remember you have to get one drink, you have to buy one appetizer, you have to buy one main course, you have to buy one dessert that is your only option. Now, when we look at the main course again these main course values are all somewhat similar. However, the ratings are kind of all over the place.

So, one more time if you went with option 5 here, the downside is the main course is pretty weak. So, you are hoping that one of these nicer main course maybe option 2 or option 3 gets revealed then you are all set because price wise option 3's main course is very reasonable and option 2's main course is not too bad either, so that is the deal. If option 1 came about then you have a main course that is too expensive and it also is something that you do not like a whole lot.

So, that is the risk, So, if you get option 1 and 5 for example, then we are looking at two very ordinary main courses, but you might be extremely satisfied with the drink and the dessert. So, the desserts are pretty good. So, that is really what we are looking at here, You do not know what is going to come, but if something that is nice comes up, you are in good shape. So, now let us look at what happens here when things get revealed.

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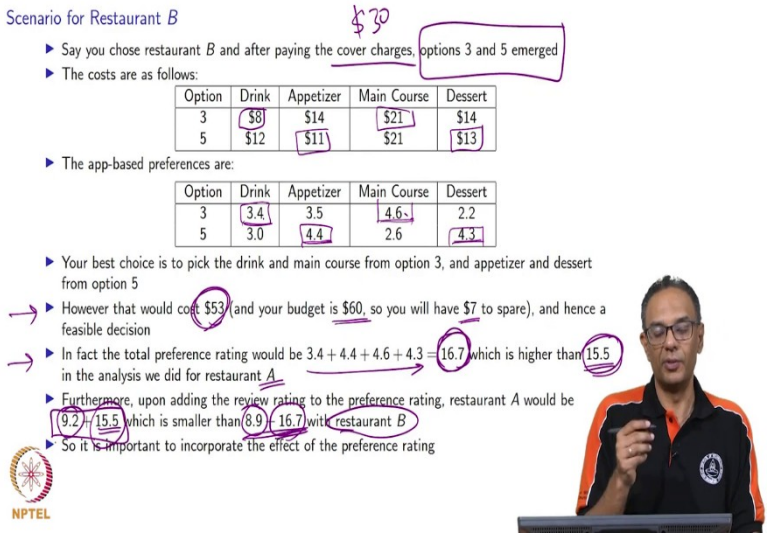

Now, let us look at the restaurant B's scenario. So, we were here and now I am going to the next slide. Now, let us say once you pay the 30 dollar cover charge, options 3 and 5 get revealed, they emerge, and this is what comes up. So option 3 has a drink that is ranked well, and then it has an appetizer that is ranked well, it has a main course and dessert.

So, you would typically select this drink because it is ranked higher, this appetizer, because it is higher rank for you or rated better for you, this main course and this dessert. This is what you would select. If you look at the price: this is 8 + 11 = 19 dollars, plus 21. So, that is 19 + 21 = 40, 40 + 13 = 53.

So, now you are only at 53 dollars, so in your budget of 60 dollars, you have dollar 7 to spare. So, maybe you could order something for room service as a matter of fact a little later or you know grab that expensive bottle of water that they have or something like that. So, you are you probably be ok and this is a very feasible decision that sounds great.

Now, it turns out that the rating that we have is going to be 3.4 + 4.4 + 4.6 + 4.3. If you add those numbers up you get 16.7, notice that in restaurant A our total was 15.5. In restaurant B, our total is 16.7. So, two ways we have done better. One is that we have only used up 53 dollars and secondly our ratings are much higher. Now, we are using 16.7 instead of 15.5.

So, now if you add up these two numbers, now see the ratings only tell me what I have liked in the past. It tells me nothing about this restaurant. Maybe they do not have the best cakes,

maybe they do not have the best sundaes. We do not know, but in general I really like sundaes and I do not like fruitcake. So, that is all I know, but I do not know anything about this restaurant.

Now the first number the 9.2 and the 8.9 gives me an idea of how good this restaurant is. So, you want to really balance between what you get for this restaurant against what is your preference. You also do not want your preference to completely go. For example, let us say you do not like snake gourd and they have snake gourd in your menu, it does not matter which restaurant serves it, you do not like it. So, that is pretty much you know why you need to have both these.

So, we if you add up these two numbers, turns out that 9.2 plus 15.5 is actually smaller than 8.9 plus 16.7. So in fact, it is better if these options came, of course you do not know this, you are not an oracle who knows all this, but if you had selected restaurant B in the first place, you would actually be better off. And this is an important thing to incorporate, when you actually decide whether you do A or B.

So, instead of purely going by the ratings 9.2 versus 8.9, you also want to incorporate what your preferences are. But of course, you do not know what is going to be revealed. So, what to add here is the next question, which we will address after this particular lecture.

Thank you.