Lecture - 03
Types of Learning Analytics – I

In this learning dialogue, we will talk about Types of Learning Analytics; Learning Analytics is also defined as analytics applied on learning data.
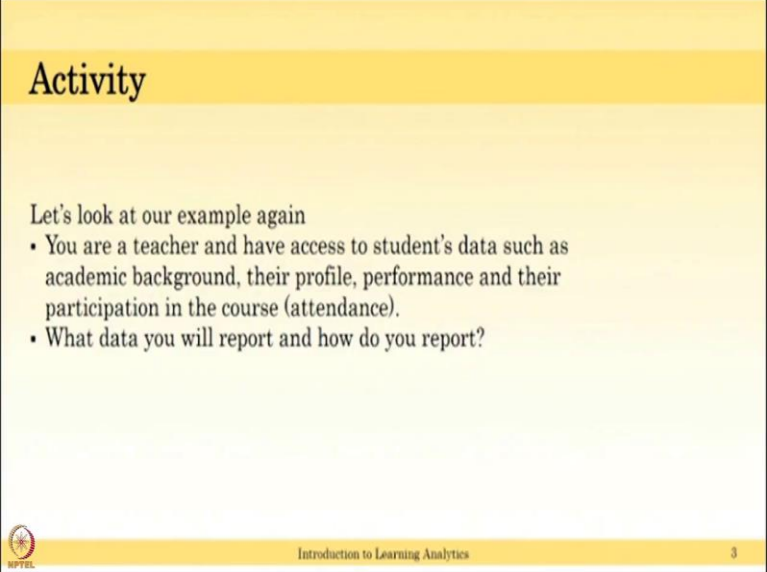
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As we see discussed in the first video, learning analytics definition is not fixed or it still evolving. So, there are few researchers, we consider that learning analytics is simply the analytics applied on learner data.

Hence if we look at learning analytics in that lens; we can apply types of data analytics in LA also. So, we can apply the types of data analytics in LA, there can be four types that is descriptive, diagnostic, predictive and prescriptive. Descriptive is actually to show what happened if you are lot of data, you have to report the data in the chart or you report in a in a pie chart, you have to report a data in the line graph or what is happened, you want to look at the data you can write a report the data in the text form also.

It is about reporting the data like you collected too many data, you have to report the data, what happened in the data. The next step is diagnostic. In diagnostic analytics, we want to apply, why this particular thing happened. You have a data there is suddenly some change in the data you want to so why this particular change happened in the data.

In the predictive analytics, now you have the knowledge about why the data happend, what is the data, can we predict to what will happen in the future and also predict analytics. The fourth type of analytics is called prescriptive analytics. In prescriptive analytics you want the user to achieve some level where the user currently in the some different level; what kind of information we can provide, what kind of hint, what kind of feedback you can provide. So, that the user can achieve the level you wanted them to go or the user set his own goal; that is called prescriptive analytics.

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We will learn each type of analytics by doing a small activity. Let us look at our example again. The example we discussed in our first class that you are the class teacher and you have access to data for last five years such as academic background, profile, performance and also the participation in the course, you have all this data. How will you report this data? And what data you will report?

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Activity

Descriptive Analytics

- Attendance, Performance over years
- Reporting using visuals
  - Pie charts, histogram, line graphs or scatter plots.
- Develop dashboard
  - For other stakeholders
- Mostly used in Class level and in academic analytics

Think about your answer. You can pause this video after writing your answer, you can resume the video to continue.

The descriptive analytics is a first step in analytics. It is to show the data report the data in using visuals also by the text methods. For example, if you said you want to report the attendance, you want to report the performance over years; yes that can be represented by using some pie charts or histograms or line graphs or some scatter plots or even more interactive visualizations.

You might have seen a dashboard in YouTube or in the Moodle data, you might have seen lot of dashboard. So, this dashboard data is actually called descriptive analytics where you show the data what has happened. By looking at the data in visual form, the researcher teacher can say; oh! yeah this particular class, the student participation is less or in this particular example the student were not able to answer the question correctly.

So, looking at a data, the learner can understand or the researcher can understand, what happened in the particular course. So, this is actually mostly used in a class level also in the academic analytics and this dashboard is presented for the stakeholders; for example, your customer or your students or for teachers also to discuss with the other researchers.

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Here is a couple of examples, the standard examples of reporting the visuals like a pie chart or the bar chart. In this pie chart, you show the distribution of male participants as well as female participants; there are more male participants in this class.

And there are pass percentage over the last 5 years of data like what happened in last 2018, 17 to 2014; like the past percentage of a particular class in a particular course maybe you are course you are teaching for last 5 years. By using this data you can analyze that in 2015 maybe the question paper was tough, the question paper contains some topics which you are not teaching in the class.

Now, you might go and check that question paper from 2015 and look at what are the contents you taught. If you are not taught some topics in that, you can give a more thoughts about it or the questions were not asked the way you taught, you can reconsider that. So, by looking at a data you can understand, what happened over the years or what happening in the class and what is happening the data.

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Diagnostic Analytics

- Analyzing the data to answer why X happened?
- X can be related to learners performance

The next type of analytics is called diagnostics is next level. Diagnostic analytics includes descriptive also. Analyzing the data to answer, why X happened, why something happened; It is called diagnostic analytics. The X can be related to learner's performance or learner's participation and anything.
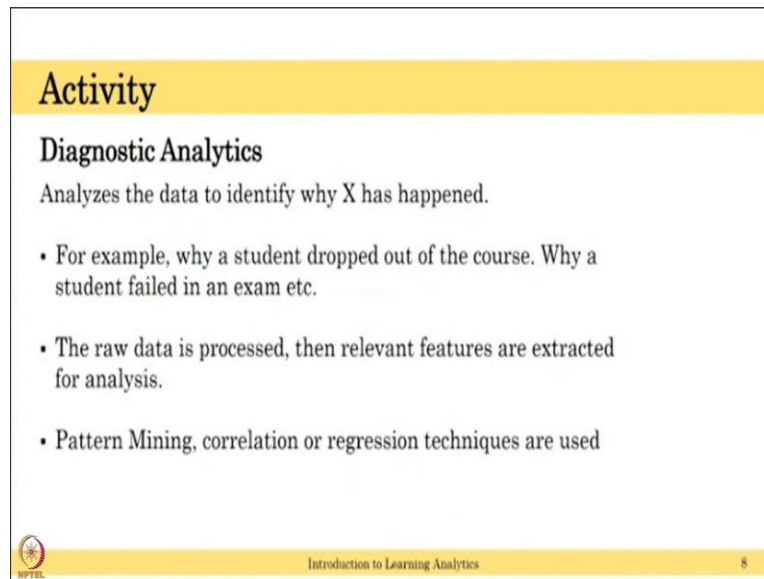
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Activity

- You have collected the data from your past courses and represented them as Bar Charts, Line graph etc.
- As a course instructor what would like to analyze from data! That is, what question you would like to answer from the data.

Let us do the activity to understand more about diagnostic analytics. You have collected a data from your past courses and also you represented them as a bar charts, line graphs or pie chart. As a course instructor, what you would like to analyze from the data? You are the course instructor, you have collected data, you represented using some visuals and what you want to do? That is what question you would like to answer from the data, do you have any questions. You can pause this video and write your answers, after completing the activity; you can resume this video.
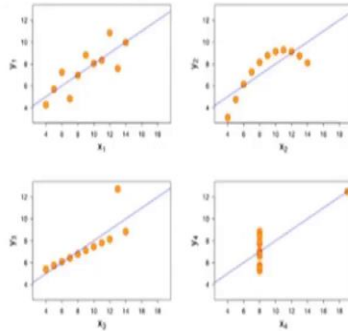
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Diagnostic analytics, analyzes the data to identify what something has happened, why it is happened. For example, why a student drops out of the course or why a student failed in an exam or why this particular student was not able to perform this particular question in this exam; it can goes as a fine grain analysis or how many students has passed in midterm. Such a high level analysis also can be possible.

The pre-processing methods has been discussed mostly in other ML courses. I will give the links to those courses when we talk about this diagnostic analytics. So, the first the raw data is processed, then the relevant features from this data was extracted for the analysis. These features are used to find why something happened, why it is happened. There are very few techniques applied for diagnostic analytics such as pattern mining, correlation or regression techniques are used to do why it is happened.

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The correlation analysis, there are four correlation analysis charts is shown here. In the upper left chart, you can see the correlation is very medium; it is not highly correlated. However, in a lower left chart, you can see the correlation is high, but the data leads to different correlation now. So, this kind of correlation analysis tells, when x happens what happens to y, when x increases y also increases.