



SNS COLLEGE OF ENGINEERING



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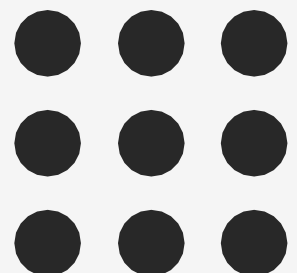
Department of Artificial Intelligence and Data Science

Course Name - Foundations of Data Science

III Year / V Semester

Unit 1 - Introduction

Topic 7: Classification of Analytics





Classification of Analytics

There are basically two schools of thought:

- Those that classify analytics into basic, operationalized, advanced, and monetized.
- Those that classify analytics into analytics 1.0, analytics 2.0, and analytics 3.0

First School of Thought

- **Basic analytics:** This primarily is slicing and dicing of data to help with basic business insights.
- **Operationalized analytics:** It is operationalized analytics if it gets woven into the enterprise's business processes.
- **Advanced analytics:** This largely is about forecasting for the future by way of predictive and prescriptive modeling.
- **Monetized analytics:** This is analytics in use to derive direct business revenue



Classification of Analytics



Second School of Thought

Analytics 1.0 - Era: mid 1950s to 2009

- Descriptive statistics (report on events, occurrences, etc. of the past)
- Relational databases

Analytics 2.0 - 2005 to 2012

- Descriptive statistics + predictive statistics (use data from the past to make predictions for the future)
- Database appliances, Hadoop clusters, SQL to Hadoop environments, etc.

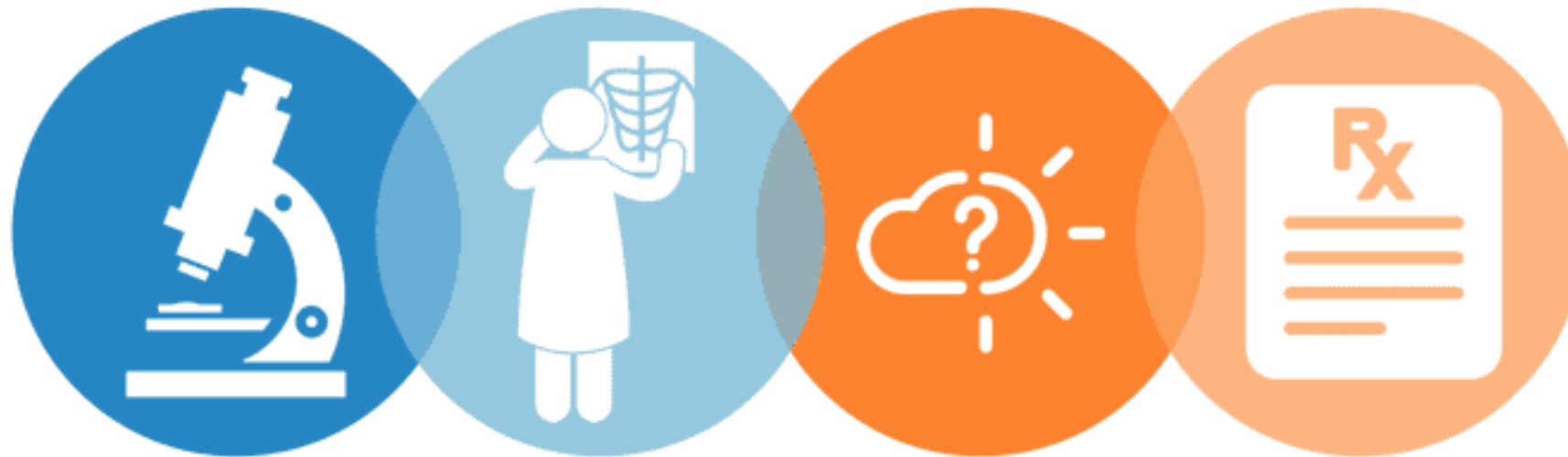
Analytics 3.0 - 2012 to present

- Descriptive + predictive + prescriptive statistics (use data from the past to make prophecies for the future and at the same time make recommendations to leverage the situation to one's advantage)
- In memory analytics, in database processing, agile analytical methods, machine learning techniques, etc.

Classification of Analytics

There are four types of analytics,

1. Descriptive Analytics
2. Diagnostic Analytics
3. Predictive Analytics
4. Prescriptive Analytics

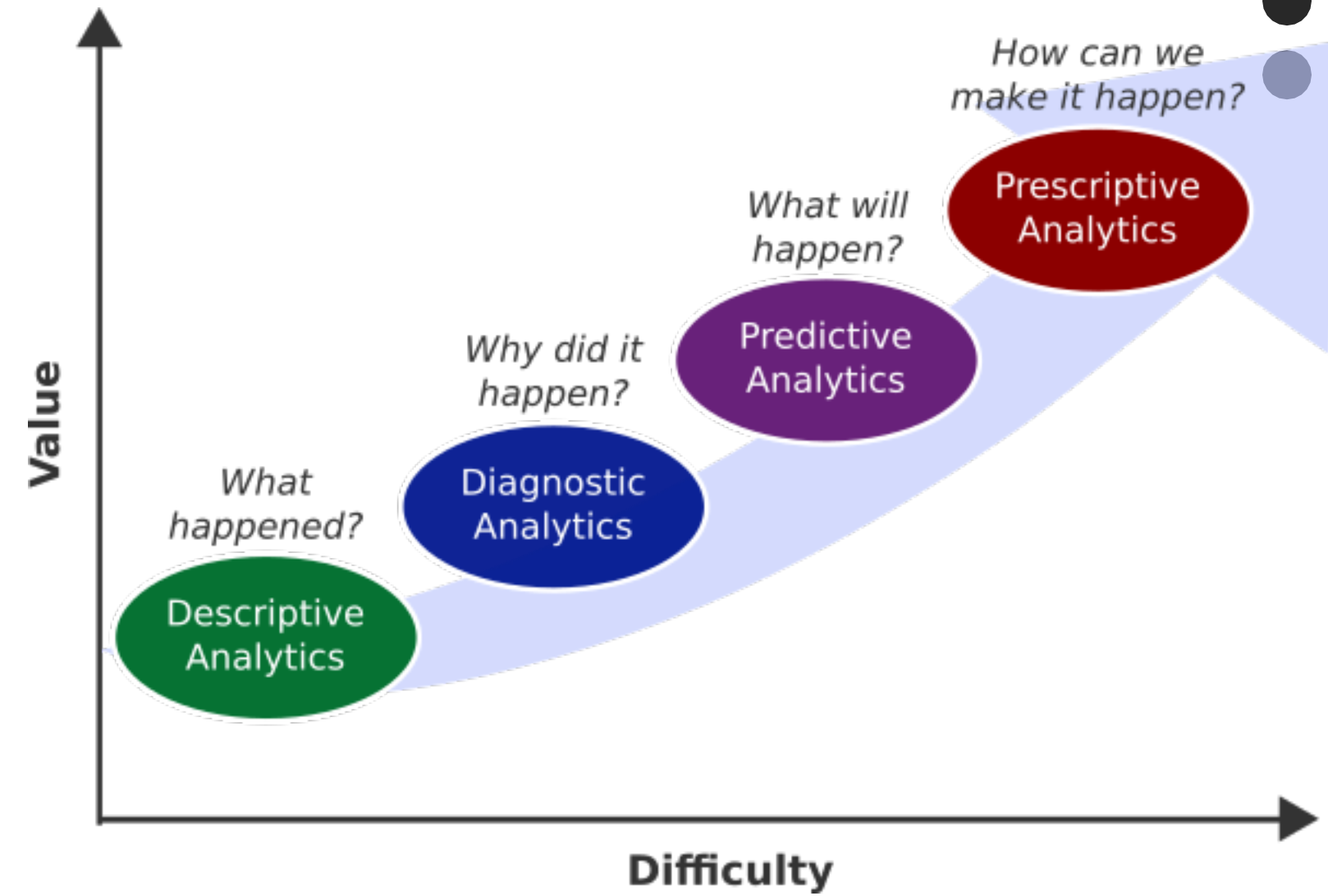


Descriptive
Explains what happened.

Diagnostic
Explains why it happened.

Predictive
Forecasts what might happen.

Prescriptive
Recommends an action based on the forecast.





Classification of Analytics



Descriptive Analytics

- Describing or summarising the existing data using existing business intelligence tools to better understand what is going on or what has happened.
- Descriptive analytics shuffles raw data from various data sources to give meaningful insights into the past, i.e., it helps you understand the impact of past actions.
- It looks at the past performance and understands the performance by mining historical data to understand the cause of success or failure in the past.
- The two main techniques involved are data aggregation and data mining stating that this method is purely used for understanding the underlying behavior and not to make any estimations.
- By mining historical data, companies can analyze the consumer behaviors and engagements with their businesses that could be helpful in targeted marketing, service improvement, etc.
- It's used to identify and address the areas of strengths and weaknesses. Almost all management reporting such as sales, marketing, operations, and finance uses this type of analysis.
- Tools used - MS Excel, MATLAB (MaTriX LABoratory), STATA, etc.



Classification of Analytics



Diagnostic Analysis

- Focus on past performance to determine what happened and why. The result of the analysis is often an analytic dashboard.
- Diagnostic analytics is used to determine why something happened in the past. Diagnostic analytics helps identify anomalies and determine casual relationships in data.
- It is characterized by techniques such as drill-down, data discovery, data mining and correlations.
- Diagnostic analytics takes a deeper look at data to understand the root causes of the events. It is helpful in determining what factors and events contributed to the outcome.
- It mostly uses probabilities, likelihoods, and the distribution of outcomes for the analysis.
- A few techniques that uses diagnostic analytics include attribute importance, principle components analysis, sensitivity analysis, and conjoint analysis.
- Training algorithms for classification and regression also fall in this type of analytics



Classification of Analytics



Predictive Analytics

- Emphasizes on predicting the possible outcome using statistical models and machine learning techniques.
- Predictive analytics is used to predict future outcomes. However, it is important to note that it cannot predict if an event will occur in the future; it merely forecasts what are the probabilities of the occurrence of the event.
- A predictive model builds on the preliminary descriptive analytics stage to derive the possibility of the outcomes. It uses findings of descriptive and diagnostic analytics to detect clusters and exceptions, and to predict future trends, which makes it a valuable tool for forecasting.
- The essence of predictive analytics is to devise models such that the existing data is understood to extrapolate the future occurrence or simply, predict the future data.
- Example application is sentiment analysis where all the opinions posted on social media are collected and analyzed (existing text data) to predict the person's sentiment on a particular subject as being-positive, negative or neutral.



Classification of Analytics



Predictive Analytics

- Hence, predictive analytics includes building and validation of models that provide accurate predictions.
- Predictive analytics relies on machine learning algorithms like random forests, SVM, etc. and statistics for learning and testing the data.
- Usually, companies need trained data scientists and machine learning experts for building these models.
- The most popular tools for predictive analytics include Python, R, RapidMiner, etc.
- Predictive analytics is used by companies such as Walmart, Amazon, and other retailers to recognize sales patterns based on customer buying patterns, forecast consumer actions, forecast stock levels, and predict the sales revenue at the end of each quarter or year.



Classification of Analytics



Prescriptive Analytics:

- It is a type of predictive analytics that is used to recommend one or more course of action on analyzing the data.
- It can suggest all favorable outcomes according to a specified course of action and also suggest various course of actions to get to a particular outcome.
- Hence, it uses a strong feedback system that constantly learns and updates the relationship between the action and the outcome.
- Prescriptive analytics utilizes emerging technologies and tools, such as Machine Learning, Deep Learning, and Artificial Intelligence algorithms, making it modern to execute and oversee.
- Furthermore, this cutting edge data analytics type requires internal as well as external past data to provide users with favorable outcomes.



Classification of Analytics



Prescriptive Analytics:

- For example, while calling for a cab online, the application uses GPS to connect you to the correct driver from among a number of drivers found nearby.
- Hence, it optimises the distance for faster arrival time. Recommendation engines also use prescriptive analytics.
- Prescriptive analytics is an advanced analytics concept based on –
 - Optimization that helps achieve the best outcomes.
 - Stochastic optimization helps understand how to achieve the best outcome and identify data uncertainties to make better decisions.



THANK YOU