Data Analytics

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Definition

The Information Age has brought rapid technological advancements with an irreversible impact in our daily lives and social organizations. Advancements in computational speed and storage capacity has led our society to collect all sorts of data. This often leads to problems such as not having enough data or having too much data (big data). The end goal of data collection is to identify patterns or convert it into useful information which is then used for decision-making purposes that could have a direct or indirect impact on individuals, organizations and society.

As social organizations have transitioned towards business analytics and data-driven decisions, now, more than ever, it is crucial to ensure we select the *right* data to be analyzed with the *right* tools and techniques to obtain the *right* information, in the *right* format, to the *right* entities at the *right* time (our *Six rights of data analytics' social justice*). Within the **Data Analytics** focus area, students learn about selecting and analyzing the appropriate information to process, interpret, organize, structure and display meaningfully to optimize a process or assist in making better informed decisions.

Principles

The following principles are foundational to Data Analytics:

1. **Asking an interesting/important question**- Know the question being asked and the goal of the analysis. Additionally, basic things to know about the potential data include what data sources are available, how is that data structured, what tools or methods will be used for the analysis.

2. **Obtaining the data**- Understand how the data was generated or captured. Develop some familiarity with it to gain a basic understanding of what the data provides and does not provides. Ensure data reliability, credibility and validity.

3. **Exploring the data**- Understand how the data is organized or grouped. Identify which data is structured vs. unstructured, quantitative vs. qualitative. Recognize which data is nominal, ordinal, intervals or ratios. Clean and check the data for duplication, errors and completeness.

4. **Modeling the data** - Data analytics is broken into four basic types of analyses: Descriptive, Diagnostic, Predictive, and Prescriptive Analysis. Check for correctness and validity of the results.

5. **Stating assumptions** - It's unlikely that the data is perfect, and it probably doesn't capture everything needed to complete a thorough and exhaustive analysis. It is crucial to state the assumptions made throughout the work. These need to be explicitly stated when sharing results.

6. **Communicating and visualizing the results-** Identifying effective and ineffective visualizations.   Recognize when charts are attempting to "trick" the audience. Differentiate between causation ad correlation. Construct appealing visuals that offer valuable insight.

7. **Maintaining the ethics of data collection-** Cultural sensitivities should always be respected. This means considering differences in culture, local behavior and norms, religious beliefs and practices, sexual orientation, gender roles, disability, age, ethnicity and other social differences when planning data collection activities or communicating findings. Confidentiality, anonymity and avoidance of harm need to be respected as well.

Competencies and Courses

Competencies	Courses
Data Collection (Understanding data sources and what tools or methods will be used to understand the process and collect data. Time studies, work sampling, flow analysis, process mapping)	EIND 422 EIND 509
Data Exploration (Basic statistics, data classification, data mining, missing/incomplete data)	EIND 455/554 EIND 457/557 EIND 422 EIND 509
Data Modeling/Analytics (Descriptive, diagnostic, predictive and prescriptive analysis)	EIND 422 EIND 455/554 EIND 457/557 EIND 464 EIND 468/558 EIND 509 BMGT 405
Results Visualization (Statistical significance/implications, presentation/visualization)	EIND 422 EIND 509

Sources

Principles of good data analysis by Greg Reda.

Exploratory Data Analysis: the Best way to Start a Data Science Project by InData Labs.

5 Steps to Data-Driven Business Decisions by Elena Roth.

What is predictive analytics? Transforming data into future insights by John Edwards.

Using big data to predict the future by Tim Sandle.