Analytics

Cesar Acosta Ph.D.

Department of Industrial and Systems Engineering
University of Southern California

OVERVIEW

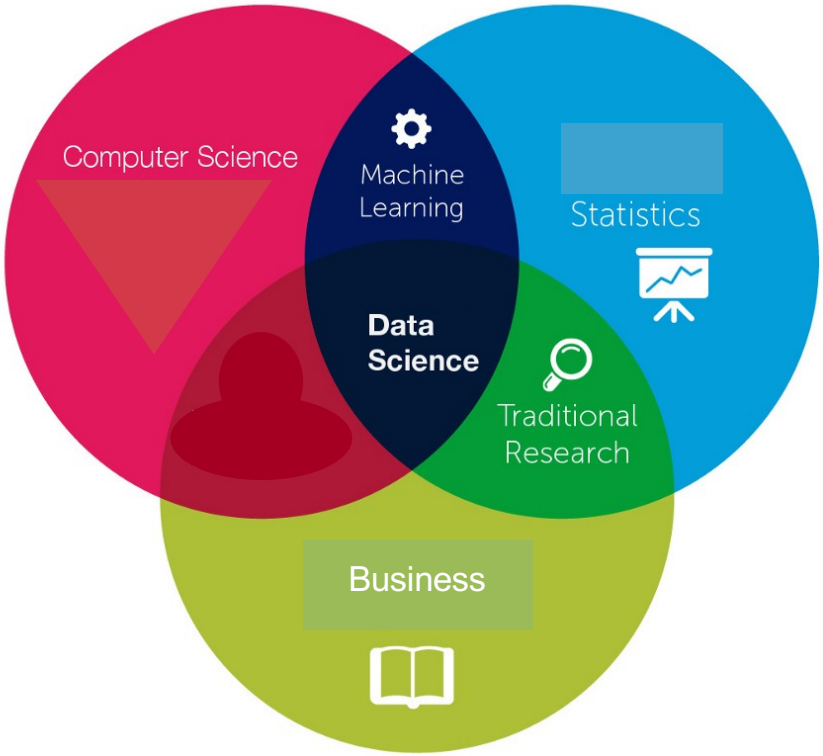
- Data Science
- Analytics
- What is the difference?

ANALYTICS vs. DATA SCIENCE

Analytics and Data Science combine tools and methods from

- Computer science
- Statistics
- Business

to find useful information from the data to solve a problem or to make an improvement



DATA ANALYTICS

Data Analytics professional is someone whose focus is on

- collecting
- summarizing
- analyzing

} data

to find answers to business questions

ANALYTICS vs. DATA SCIENCE

The difference is in the scope

Analytics

- Past performance
- Standard tools
- Traditional problems

Data Science

- Future performance
- Advance tools
- Big data

ANALYTICS vs. DATA SCIENCE -TOOLS

Data Analytics+

- Excel Add-ins
- Tableau, Power BI
- Python, R
- SQL, NoSQL
- HTML, CSS

Data Science

- Linux
- AWS, GCP, Azure
- Java Script
- Hadoop, Spark

DATA ANALYTICS

What are the Business questions?

BUSINESS QUESTIONS

- What happened?

- What will happen?
- What we want to happen?

BUSINESS QUESTIONS

- What happened?
- Why did it happen?
- What will happen?
- What we want to happen?

DATA ANALYTICS

What happened? -business case-

- Which products underperformed?
- Which were more profitable?
- What is our market share?
- What is our retention rate?
- Who are our most valuable customers?

DATA ANALYTICS

What will happen? -investment-

- What is the expected return?
- What is the probability of a loss?
- If there is a loss, how large can it be?
- What scenarios are possible?
- Major external risk in our sector?

DATA ANALYTICS

Analytics Levels

ANALYTICS LEVELS

What happened?	Descriptive Analytics
Why did it happen?	Diagnostic Analytics
What may happen?	Predictive Analytics

ANALYTICS LEVELS

What happened? — Descriptive Analytics

- Descriptive Stats
- Summary Tables (crosstabs, pivot tables)
- Data visualization
- Dashboards

Why did it happen? — Diagnostic Analytics

- Stratify

What may happen? — Predictive Analytics

- Prediction Models
- Classification Models
- Clustering methods

ANALYTICS LEVELS

- Descriptive Analytics
- Diagnostic Analytics
- Predictive Analytics
- Prescriptive Analytics

ANALYTICS LEVELS

Past performance	Today	Future performance
Historical data	observe & predict	results

Timeline

ANALYTICS LEVELS

Past performance Historical data	Today observe & predict	Future performance results
What happened?		What may happen?

INTRODUCTION

Past performance Historical data	Today observe & predict	Future performance results
What happened? Describe/summarize data		What may happen? scenarios

INTRODUCTION

Past performance Historical data	Today observe & predict	Future performance results
What happened?		What may happen?
Describe/summarize data		scenarios
Descriptive Stats		
Barplots, scatterplots, boxplots		Prediction Models
Line charts, Histograms		
Averages, std. deviations		
correlations		

INTRODUCTION

Past performance Historical data	Today observe & predict	Future performance results
What happened?		What may happen?
Describe/summarize data		scenarios
Descriptive Stats		
Barplots, scatterplots, boxplots		Prediction Models
Line charts, Histograms		prediction models
Averages, std. deviations		classification models
correlations		clustering methods
Descriptive Analytics		Predictive Analytics

INTRODUCTION

Past performance Historical data	Today Decisions	Future performance results
What happened?	What we want to happen?	What may happen?
Describe/summarize data		scenarios
Descriptive Stats		
Barplots, scatterplots, boxplots		Prediction Models
Line charts, Histograms		prediction models
Averages, std. deviations		classification models
correlations		clustering methods
Descriptive Analytics		Predictive Analytics

INTRODUCTION

Past performance Historical data	Today Decisions	Future performance results
What happened?	What we want to happen?	What may happen?
Describe/summarize data	What decisions are needed	scenarios
Descriptive Stats	to make things happen?	
Barplots, scatterplots, boxplots		Prediction Models
Line charts, Histograms		prediction models
Averages, std. deviations		classification models
correlations		clustering methods
Descriptive Analytics		Predictive Analytics

INTRODUCTION

Past performance Historical data	Today Decisions & predictions	Future performance results
What happened?	What we want to happen?	What may happen?
Describe/summarize data	What decisions are needed	scenarios
Descriptive Stats	to make things happen?	
Barplots, scatterplots, boxplots	Prescriptive Methods	Prediction Models
Line charts, Histograms	Simulation models	prediction models
Averages, std. deviations	Optimization models	classification models
correlations		clustering methods
Descriptive Analytics		Predictive Analytics

INTRODUCTION

Past performance Historical data	Today Decisions & predictions	Future performance results
What happened?	What we want to happen?	What may happen?
Describe/summarize data	What decisions are needed	scenarios
Descriptive Stats	to make things happen?	
Barplots, scatterplots, boxplots	Prescriptive Methods	Prediction Models
Line charts, Histograms	Simulation models	prediction models
Averages, std. deviations	Optimization models	classification models
correlations		clustering methods
Descriptive Analytics	Prescriptive Analytics	Predictive Analytics