INFS5700
Introduction to Business Analytics

Week 1: Business Analytics in Context

(T2 2022)

Details and Office Hours

Dr. Jacky Mo
Room: Quad 2119
Phone: +61 2 9065 1481
Email: ce.mo@unsw.edu.au

Jacky's consultation time – Thursday 12pm-1pm (**by appointment**)

- It will be conducted via 'Weekly Consultation Channel' on Teams
- Best way to communicate with Jacky: Email
- If no reply from Jacky for 2 business days, email again.

Course Materials

- *Knowledge Activities*
  - Recommended Textbook - Business Analytics: A Management Approach
  - Good Charts: HBR Guide to Making Smarter, More Persuasive Data Visualizations
  - Articles/Videos from Harvard Business Publishing
- *Problem Solving Activities*
  - SAS Virtual Analytics activity books that students will need to work through to be prepared for class
  - Power BI workshop activities
  - Several cases that will be analysed in and out of class

Course Aims

- *Equip students with the foundations and business knowledge needed for a career in business analytics.*

- *Develop skills to produce business insights and make data driven decisions, in particular use of SAS Viya Visual Analytics and Microsoft Power BI.*

Course Learning Outcomes

- Critically evaluate the role of data in supporting management decision-making and gaining competitive advantage.
- Discuss and evaluate Business Analytics framework, techniques and tools used in gathering, analysing and managing data and apply them to enhance decision making.
- Examine datasets using visual analytic techniques and communicate findings using dashboards and data driven visual reports.
- Analyse the ethical impact of big data and analytics on responsible business practices

Course Schedule

Week	Topics	Activities	Assessment
1	Business Analytics in Context	Digital Business Transformation workshop	Individual Assignment Released
2	Data Visualization and Communication 1	SAS VA workshop 1	-
3	Data Visualization and Communication 2	SAS VA workshop 2	-
4	Data Visualization and Exploration 1	Power BI workshop 1	Individual Assignment Due
5	Data Visualization and Exploration 2	Power BI workshop 2	Team Assignment Released
6	Break week	Self-study	-
7	Business Analytics Methodology	BAM workshop	-
8	Design Thinking for Business Analytics	Design thinking workshop	-
9	Analytics and Ethics	Analytics & ethics workshop	-
10	Course review	Course review and exam preparation workshop	Team Assignment Due

Assessments (1)

Assessment Task	Weighting	Occurrence
Individual Assignment	15%	Week 4
Team Assignment	30%	Week 10
Final Exam	55%	University Exam Period
Total	100%	

Assessments (2)

In order to pass this course, you must:

- attain an overall mark of at least 50%;
- attain a satisfactory performance in each component of the course (A mark of 45 percent or higher is normally regarded as satisfactory); and
- achieve satisfactory attendance to lectures and tutorials.

Individual Assignment (15%)

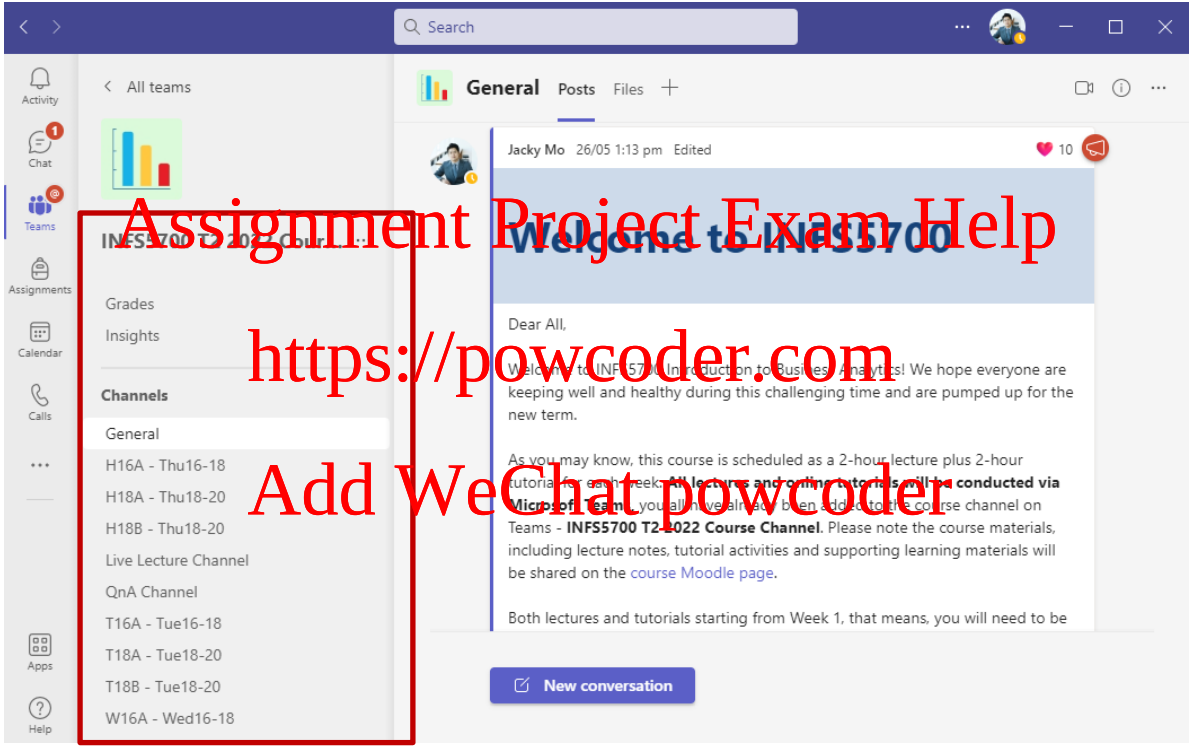
- Details of the assignment will be provided in Week 1
- Due date: 4pm Friday, 24th June (week 4)
- Designed to test ability to explore and critically evaluate the current and potential usage of analytics (e.g., opportunities, limitations, challenges associated with business analytics).

Team Assignment (30%)

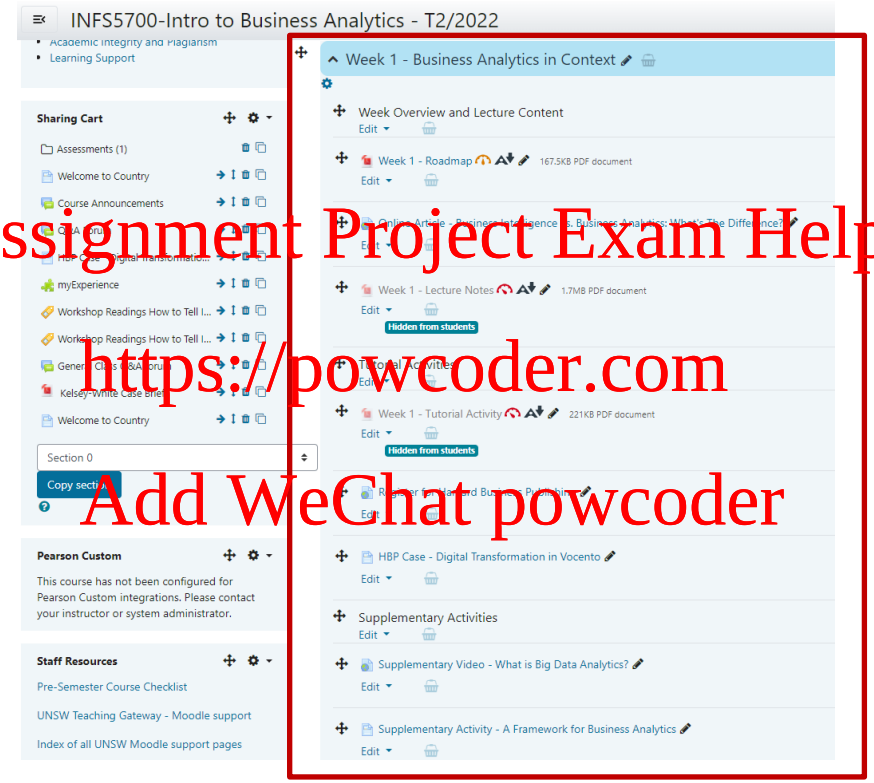
- Industry Sandbox Group Project – real-world challenges proposed by industry experts from Microsoft Australia
- Details of the project will be provided by Microsoft Australia team in week 5: Tuesday 28 June 6-8pm (This session will be recorded)
- Due date: 4pm Monday, 1st August (week 10)

Microsoft

Communication Channel for INFS5700



Communication Channel for INFS5700



The world's most valuable resource is no longer oil, but data

The Economist

May 6, 2017

The Skills Companies Need Most in 2018 – And The Courses to Get Them

Published on January 2, 2018

Paul Petrone | + Follow
Editor, LinkedIn Learning
201 articles

2,510 99 2,018

Rank	Skill
1	Cloud and Distributed Computing
2	Statistical Analysis and Data Mining
3	Middleware and Integration Software
4	Web Architecture and Development Framework
5	User Interface Design
6	Software Revision Control Systems
7	Data Presentation
8	SEO/SEM Marketing
9	Mobile Development
10	Network Information Security

What is Business Analytics?

Type in any key terms come into your mind in relation to business analytics

Go to www.menti.com and use the code **4376 9135**

Word Cloud Live Results

Definition of Business Analytics

According to a succinct and widely adopted definition provided by *Davenport and Harris* (*2007*):

Business analytics is concerned with

“the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions”.

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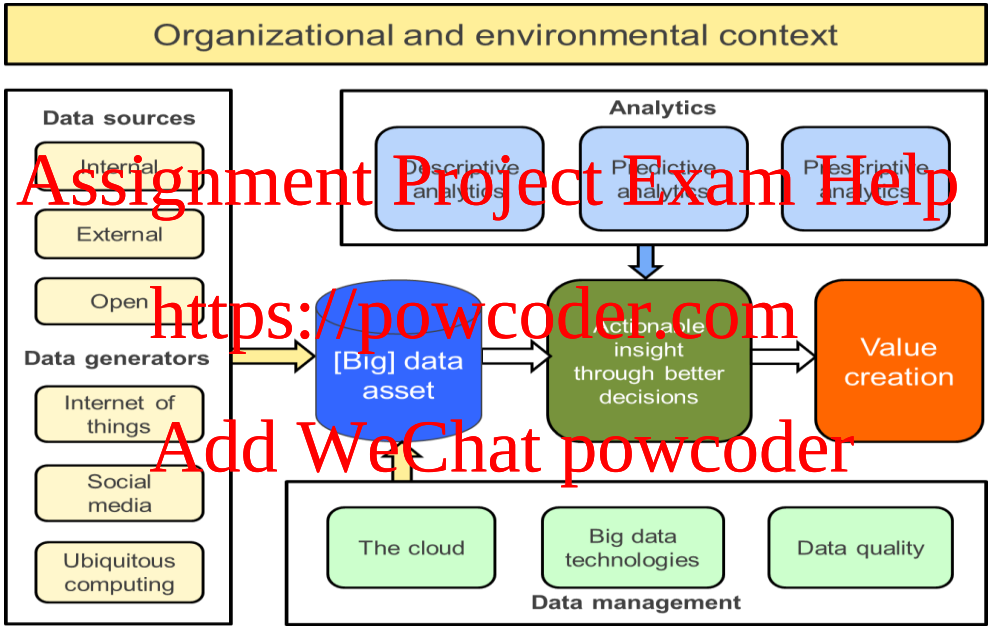
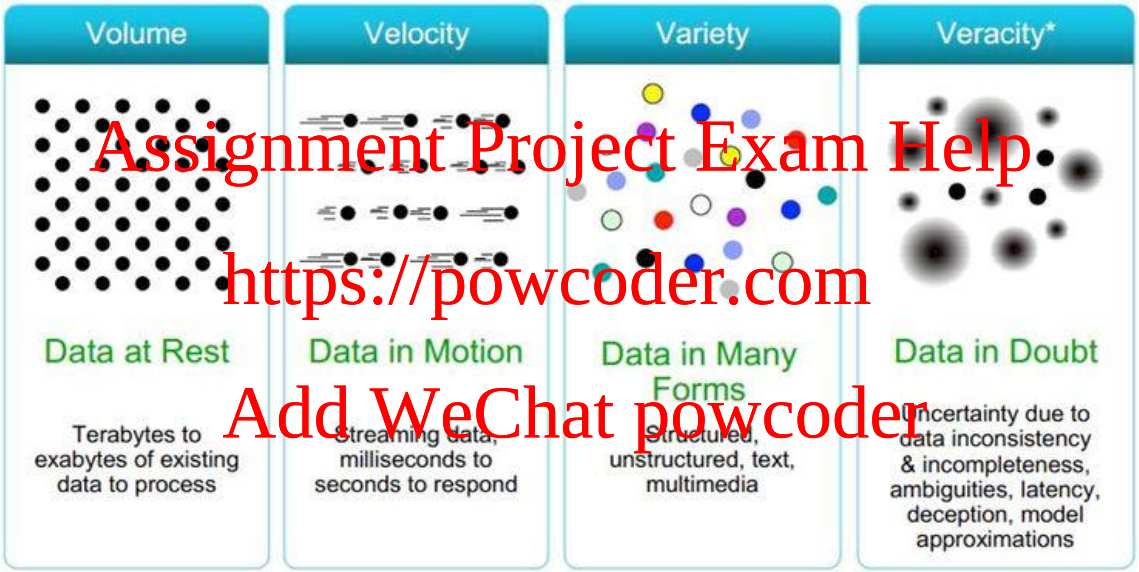
Overview of Business Analytics

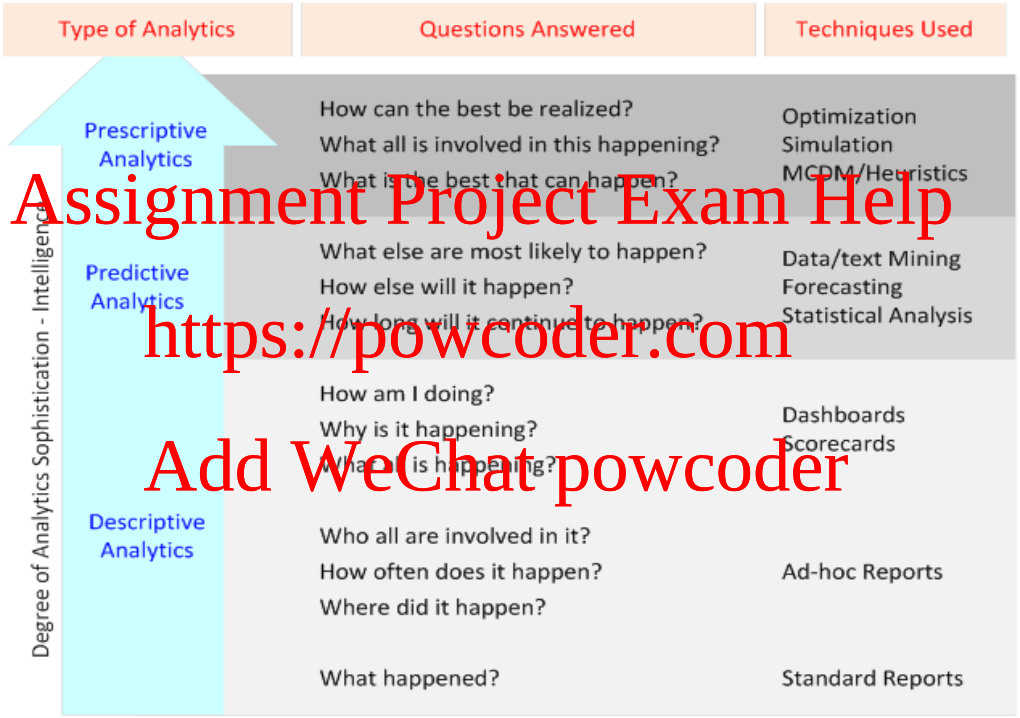


Adopted from "Business Analytics: A Management Approach"

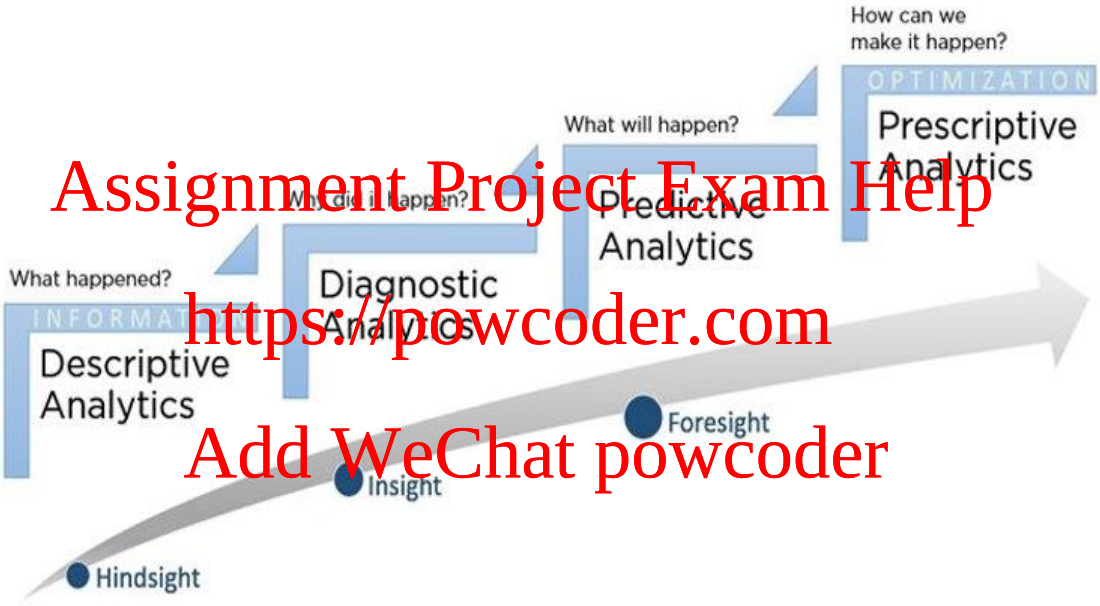
The Four V's of Big Data



Types of Business Analytics (1)



Types of Business Analytics (2)



Descriptive Analytics

- The conventional/simplest form of data analytics.
- It seeks to provide a depiction or "summary view" of facts and figures that based on historical data.
- Simply tell "what is" and describe relationships, do not tell managers what to do.
- Example:
  - Summarizing past events such as regional sales, customer attrition, or success of marketing campaigns.
  - Tabulation of social metrics such as Facebook likes, Tweets, or followers.

Predictive Analytics

- It uses information from past to predict trends and behaviour patterns.
- It characterized by techniques such as data mining, predictive modelling, machine learning and AI.
- Example:
  - Identify customers that are likely to abandon a service or product.
  - Send marketing campaigns to customers who are most likely to buy.

Prescriptive Analytics

- It seeks to determine the best solution or outcome among various choices, given the known parameters.
- Specific techniques used include optimization, simulation and decision-analysis methods.
- Example:
  - Determine the best set of prices and advertising frequency to maximize revenue.
  - Offer doctors recommendations in the best possible treatment for a patient.

Exercise: Retail Sales Decisions

Most department stores clear seasonal inventory during the sales season (e.g., Financial year sales, Christmas sales). What insights can be derived by using each of the following analytics?

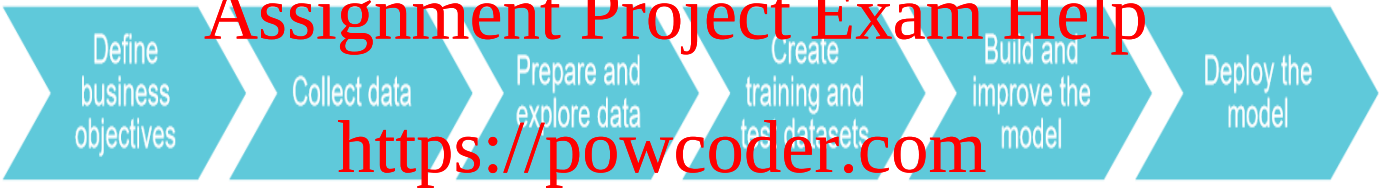
- **Descriptive analytics**: ?

- **Predictive analytics**: ?

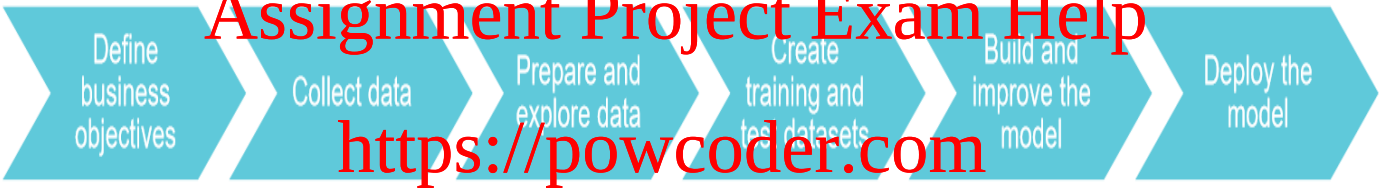
- **Prescriptive analytics**: ?

Difference between Descriptive, Predictive and Prescriptive Analytics

The Analytics Process

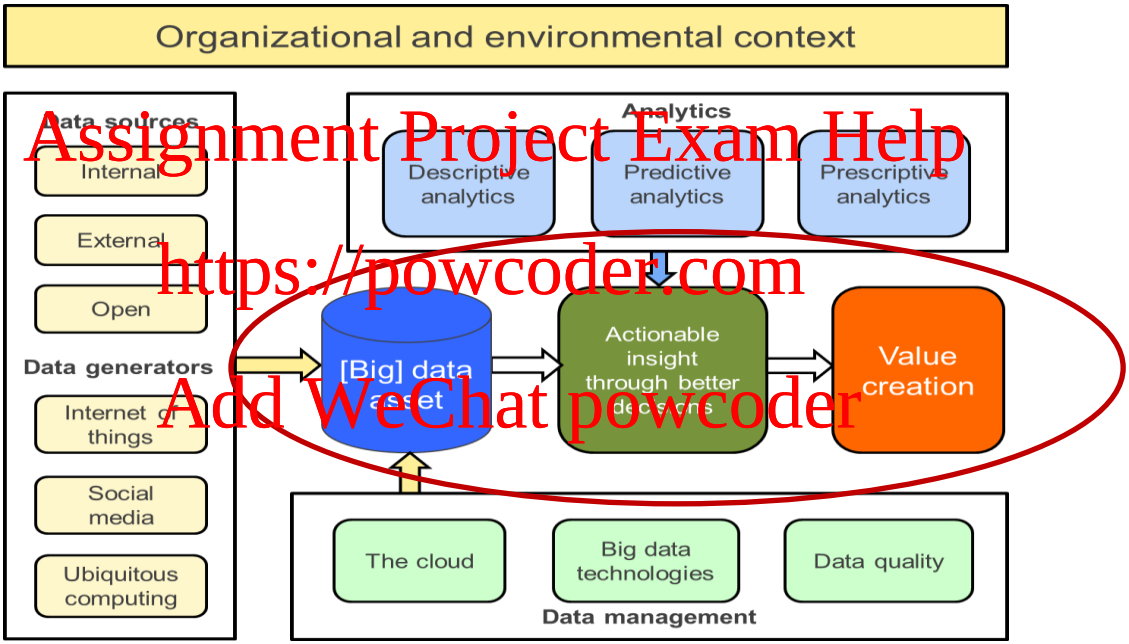


The Analytics Process

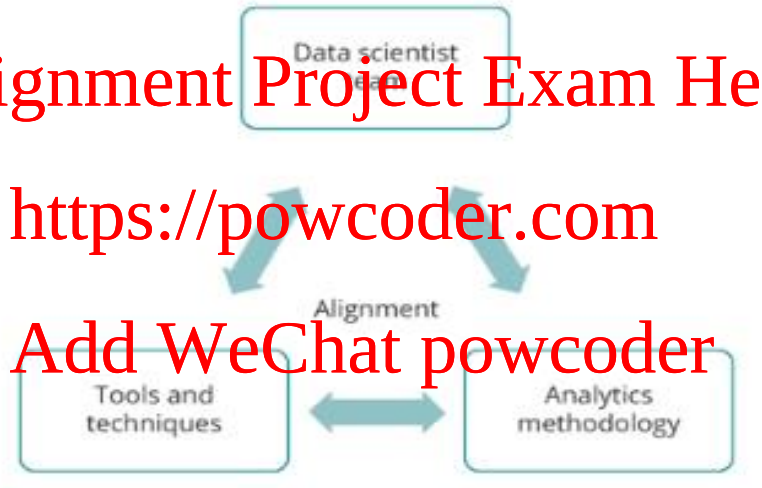


Q1: Why are we split data into training and test dataset when developing a model?

A framework of Business Analytics in Context

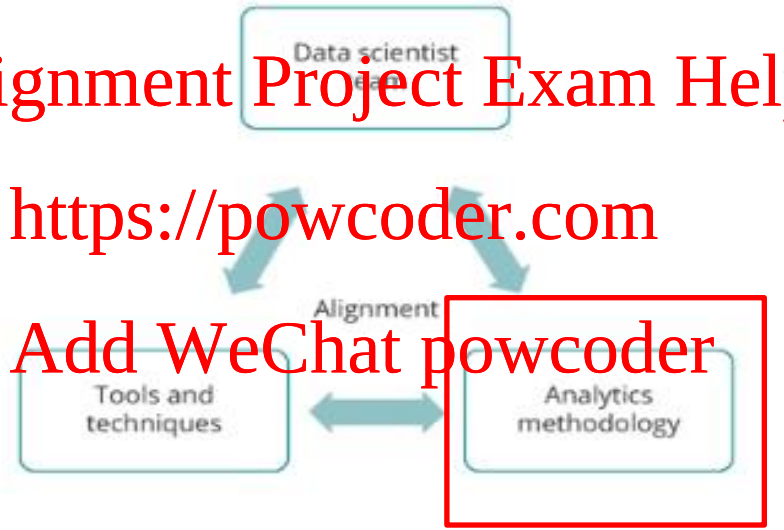


Core Elements of A Business Analytics Development Function



Adopted from “Business Analytics: A Management Approach”

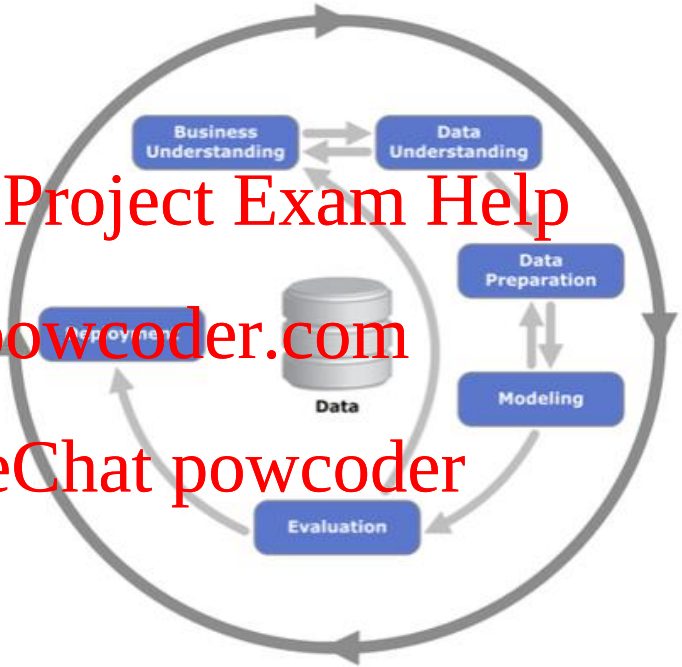
Core Elements of A Business Analytics Development Function



Adopted from "Business Analytics: A Management Approach"

Analytics Methodology

Cross-Industry Standard Process for data mining (CRISP-DM)



Phases of the CRISP-DM reference model (Chapman et al. 2000, p.13)

CRISP-DM Reference Model

Step 1: Business Understanding

Step 2: Data Understanding

Step 3: Data Preparation

Step 4: Model Building

Step 5: Testing and Evaluation

Step 6: Deployment

Accounts for 80% of total project's time

The process is highly repetitive and experimental

Step 1: Business Understanding

- What is the problem/opportunity?
- What is your goal?
- Define the business objective (are they your objectives?)
  - Understand Customer Better
  - Improve Customer Satisfaction
  - Understand performance of digital marketing spend
  - Improve customer service
  - Or …

?

Step 1: Business Understanding

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Business Objectives Need to be Actionable (good examples)

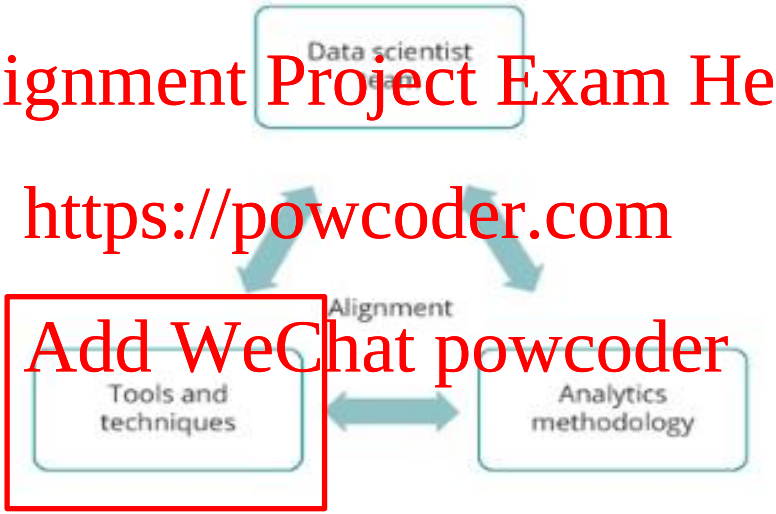
- Improve the response rate for a direct marketing campaign
- Increase the average order size
- Determine what drives customer acquisition
- Identify the risk students of the course
- Choose the right message for the right groups of customers
- Target a marketing campaign to maximize incremental value
- Recommend the next, best product for existing customers
- Segment customers by behavior

Translate Business Objectives to Business Analytics tasks

Exercise:

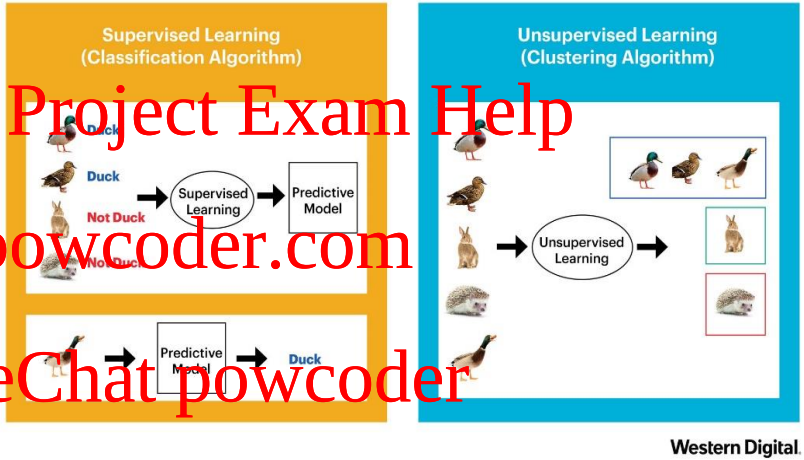
- *The problem*
  - Too many students dropped from the course
- *Your goal/objective*
  - Improve the retention rate of the course
- *Objective for your business analytics task?*

Core Elements of A Business Analytics Development Function

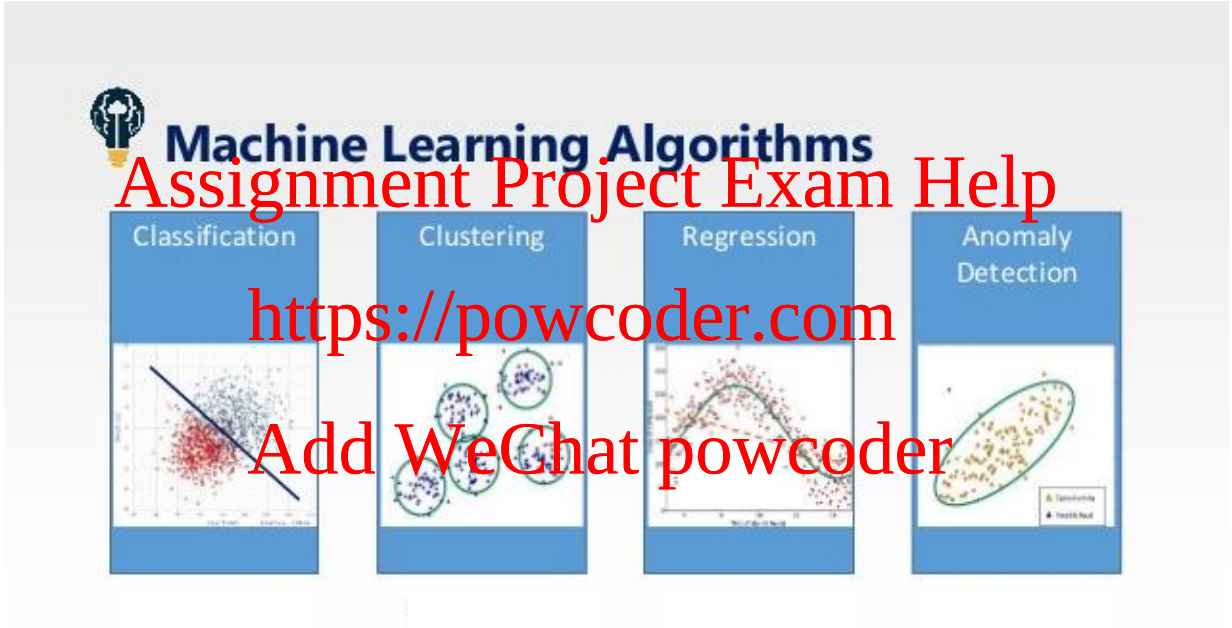


Modelling Techniques

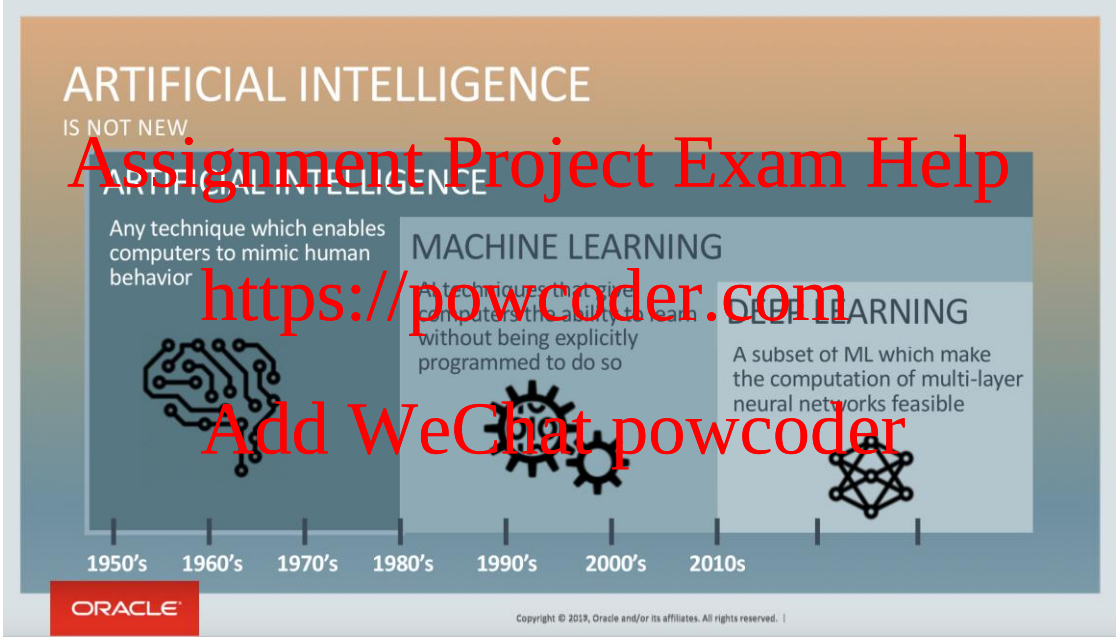
What is key difference between Supervised and Unsupervised learning?



Supervised vs. Unsupervised Learning



AI, Machine Learning, and Deep Learning

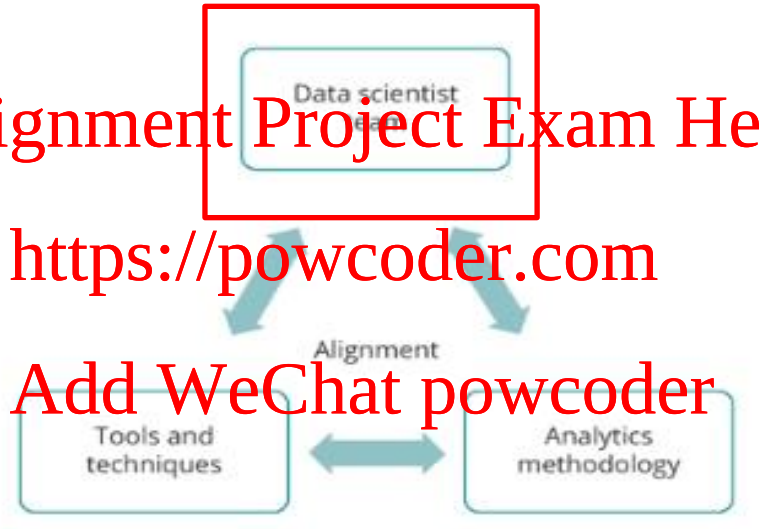


Modelling Techniques Examples

Technique	Definition and usage
Unsupervised learning	
k-means clustering	k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean. It is a common unsupervised learning approach to clustering data (e.g., customer segmentation).
Principal components analysis (PCA)	PCA is a way of reducing the number of dimensions in a dataset. It is a useful aid to data visualization and exploration when there is a large number of variables to be analysed.
Supervised learning	
Linear regression	The most common form of regression model. One or more input variables (continuous and categorical) are used to predict a continuous output; for example, what amount of charges is likely to be incurred for an individual's health insurance policy?
Logistic regression	Logistic regression is used to make predictions in a dataset in which there are one or more independent variables that determine a dichotomous outcome (e.g., will this customer churn?). The binary model can be extended to a multinomial model to predict an output with more than two classes.
Artificial neural networks (ANNs) and deep learning	Artificial neural networks (ANNs) are a family of models inspired by biological neural networks (the central nervous systems of animals, in particular the brain) which are used to estimate or approximate functions that can depend on a large number of inputs and are generally unknown. Neural networks may be more effective than linear and logistic regression when the feature space is large. Training ANNs require substantial computing resources but as computing has become cheaper and more available ANNs have become more popular. ANNs are a core part of the 'deep learning'.
Support vector machines (SVMs)	A support vector machine (SVM) is a classifier formally defined by a separating hyperplane. Given labelled training data (supervised learning), the algorithm outputs an optimal hyperplane which is used to categorize new examples. SVMs are used in a wide range of prediction and classification applications.

Technique	Definition and usage
Text analysis	
Natural language processing	Natural language processing (NLP) is the ability of a computer program to make sense of human speech and text. The NLP family includes techniques such as sentiment analysis and latent Dirichlet analysis.
Sentiment analysis	Sentiment analysis is used to extract subjective information behind a series of words. It is used to gather an understanding of the attitudes, opinions and emotions expressed within a text (particularly online and social media mentions).
Topic modelling	A popular form of topic modelling uses Latent Dirichlet analysis (LDA), a generative statistical model that allows a corpus of text documents to be explained by unobserved (i.e., latent) topics that explain why some parts of the data are similar. Each document in a corpus is modelled as a finite mixture over an underlying set of topics. LDA can be applied to social media data such as tweets to identify the underlying topics driving the content of the tweets.
Other	
Social network analysis (SNA)	Social network analysis (SNA) is used to make visible hidden network structures. Networks are modelled as nodes (individual actors, people, or things within the network) and connecting ties (relationships or interactions). SNA can be used to understand how customers are connected to each other and which ones are influential in forming opinion.
Simulations	A computer simulation uses an abstract model of a system to reproduce the behaviour of that system. Simulations are useful in areas such as logistics, cash-flow forecasting, and marketing strategies.
Geospatial and mapping applications	Data that are tagged with geospatial coordinates (e.g., latitude/longitude) or with postal codes are visualized and analysed. Geospatial mapping can be used to plan the location of new stores based on customer location, to understand customer demographics based on socioeconomic analysis of postal code.

Core Elements of Business Analytics Development Function



Data Scientist:

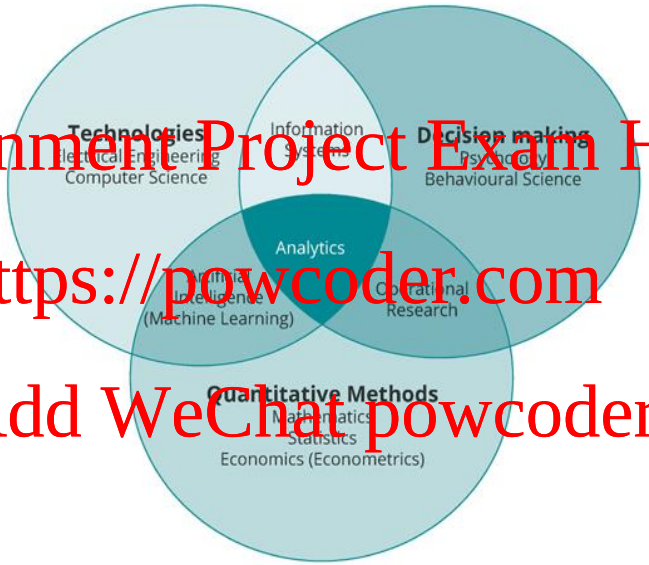
The Sexiest Job of the 21st Century

Meet the people who can coax treasure out of messy, unstructured data

by Thomas H. Davenport and D.J. Patil

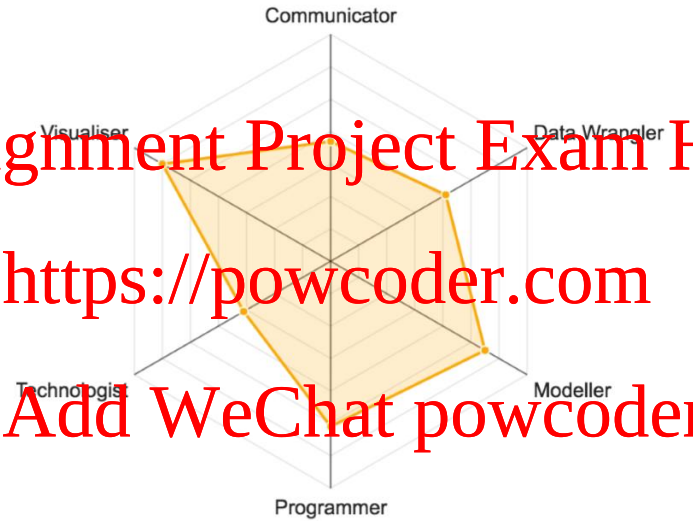
When Jonathan Goldman arrived for work in June 2006 at LinkedIn, the business networking site, the place still felt like a start-up. The company had just under 8 million accounts, and the number was growing quickly as existing members invited friends and colleagues to join. But users weren't seeking out connections with the people who were already on the site at the rate executives had expected. Something was apparently missing in the social experience. As one LinkedIn manager put it, "It was like arriving at a conference reception and realizing you don't know anyone. So you just stand in the corner sipping your drink—and you probably leave early."

Data Scientists



Adopted from “Business Analytics: A Management Approach”

Profile of the Data Scientist



Data scientist attributes (Mango Solutions 2019)

Data Scientist Tasks

	Task	%
1	Basic exploratory data analysis	67
2	Conduct data analysis to answer research questions	61
3	Communicate findings to business decision-makers	58
4	Data cleaning	53
5	Develop prototype model	49
6	Create visualizations	47
7	Identify business problems that can be solved with analytics	44
8	Feature extraction	42
9	Organize and guide team projects	40
10	Implement models/algorithms into production code	38
11	Collaborate on code projects (read/edit others' code, using the git repository)	38
12	Teach/train others	31
13	Communicate with people outside your company	30
14	ETL (extract, transform, load)	29
15	Plan large software projects or data systems	28
16	Develop dashboards	28
17	Set up/maintain data platforms	24
18	Develop data analytics software	21
19	Develop products that depend on real-time data analytics	18
20	Use dashboards and spreadsheets (made by others) to make decisions	15
21	Develop hardware (or work on software projects that require expert knowledge of hardware)	4

(Adopted from Suda 2017, p.46)

Business Analytics Applications

- Marketing analytics

- HR analytics

- Finance analytics

- Procurement analytics

How NAB uses machine learning to find faked loan docs

By Ry Crozier
Jan 23 2020
7:08AM

0 Comments

RELATED ARTICLES

Volt Bank adds IBM fraud protection into online banking platform

Finally reveals details of fraud-related use case.

NAB has finally revealed the nature of a fraud-related machine learning use case, with the algorithm being used to detect people that file fake documentation in support of loan applications.

Chief data officer Glenda Crisp first disclosed the fraud-related use case at AWS Summit in Sydney back in May 2019, but largely declined to discuss it.

"We've been able to do some interesting things around fraud and I don't like to talk about this too much," she said at the time.

Business Analytics Challenges

Ranking	Item	Description
1	Managing data quality	assuring data quality aspects, such as accuracy, data definitions, consistency, segmentation, timeliness, etc.
2	Using analytics for improved decision making	linking the analytics produced from big data with key decision making in the business
3	Creating a big data and analytics strategy	having a clear big data and analytics strategy that fits with the organisation's business strategy
4	Availability of data	the availability of appropriate data to support analytics (does the data exist?)
5	Building data skills in the organisation	the training and education required to upskill employees in general to utilise big data and analytics
6	Restrictions of existing IT platforms	existing IT platforms/architecture may make it difficult to migrate to and manage big data and analytics
7	Measuring customer value impact	can the real impact on the customer of managing big data be measured?
8	Analytics skills shortage	difficulty in acquiring the mathematical, statistical, visualisation skills for producing analytics
9	Establishing a business case	can 'tangible' benefits of big data be demonstrated (e.g., revenue increment)?
10	Getting access to data sources	accessing appropriate data sources to produce and manage big data (can the data be accessed?)
11	Producing credible analytics	are the analytics produced from big data likely to be credible and trusted by the organisation?
12	Building a corporate data culture	e.g., are data and analytics taken seriously enough by the leaders at a strategic level in the business?
13	Making time available	will people have enough time to work with big data and analytics, over and above the 'day job'?
14	Managing data processes	managing the complexity of big data processes (e.g., generating, storing, cleaning data and producing analytics)
15	Technical skills shortage	difficulty in acquiring technical/IT skills for managing big data and operationalising analytics

Ranking	Item	Description
16	Overcoming resistance to change	is there buy–in and engagement around the benefits of big data (the' so what?')? Can barriers to change be overcome?
17	Managing and integrating data structures	data held in different business silos, systems, and segmented in various ways is difficult to structure for analysis
18	Managing data security and privacy	ensuring that data is stored securely, only available to intended recipients, and anonymised as needed
19	Data visualisation	ability to display and visualise the data to communicate insights clearly within the organisation
20	Managing data volume	does the organisation have effective ways (systems) for storing and managing large volumes of data
21	Data ownership	who owns the big data? Inside (e.g., which department) and outside of an organisation (e.g., Government, partners)
22	Managing costs	ability to manage the costs associated with big data
23	Defining the scope	difficulty in defining the scope of big data projects in the organisation (where does it start and stop?)
24	Defining what 'big data' is	difficulty in defining what 'big data' actually is
25	Securing investment	ability to secure the investment needed to build big data and analytics (infrastructure, skills, training, etc.)
26	Manipulating data	being able to process the data to produce analytic insight
27	Legislative and regulatory compliance	compliance with laws such as the Data Protection Act 1998/2003
28	Using the data ethically	using the data in an ethical way and ensuring all areas of the organisation are using it in acceptable ways
29	Performance management	ability to develop key indicators for big data and analytics performance reporting
30	Safeguarding reputation	e.g., reputation and brand damage caused by inappropriate use of data, data leakage, selling data
31	Working with academia	can the organisation build relationships and work effectively with academia?

Adopted from "Business Analytics: A Management Approach"

Business Analytics Strategy

Next Topic: Data Visualization & Communication

- SAS Viya

Questions?