UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Big Data Analytics for Decision Making

2223-2-F5701R043

Course title

Big Data Analytics for Decision Making Process

Topics and course structure

In the last decade, we have witnessed extensive investments in business infrastructure, which have improved the ability to collect data throughout the enterprise. Virtually every aspect of the business is open to data collection and often even instrumented for data collection: operations, manufacturing, supply-chain management, customer behaviour, marketing campaign performance, workflow procedures, etc.
Information is now widely available on external events such as market trends, industry news, and competitors' movements. This broad availability of data has led to increasing interest in methods for extracting useful information and knowledge from data—the realm of data science.
However, extracting knowledge from data is far from straightforward and involves technical and non-technical users. On the one side, technicians can program (o train) algorithms to collect, process and analyse data; on the other side, business and domain experts are essential to guide to approach the right questions, bearing in mind the business characteristics and domain peculiarities.
Big data analytics solutions are designed to support business decisions and decision-making in such a context.

This course aims at providing knowledge about the paradigm shift behind the shift toward data-driven organisations, some (essential) technical competencies to understand the characteristics of big data analytics solutions (with labs), and finally to provide real-life examples of how big data analytics have been used to support a different kind of business decisions.
The course is organised as follows.

1. Introduction to BI and Big Data Analytics
   -- Data Driven organization and Decision Making;
   -- Big Data: Characteristics, opportunities and criticalities;

-- Understanding data driven organisations
-- The value of knowledge – digital economy and data driven decision making
-- The Structure and subsequent evolution of BI and Big Data Analytics systems

2. The Evolution of BI Architectures (towards Big Data)
   -- Decision Models on the basis of business functions
   -- Definition, selection and metrics for computing directional indicators (KPI – CSF)

3. The Big Data Lifecycle
   -- Phases, methodologies and the value for business purposes (Data as value)
   -- Models for data quality evaluation – structured data vs (unstructured) Big data (Lab: openrefine)
   -- Models and techniques for data analysis – how to use data for fact-based decision making
   -- Visualisation models for decision making – selecting the proper model for each stakeholder – data story telling and indicators (Lab: Tableau)

4. Getting value for Big Data Analytics
   -- Understanding Machine learning: suvervised/unsupervised/metrics
   -- ML tasks: classification/prediction/clustering
   -- Basics of model evaluation

5. Examples of Business Problems and Big Data Analytics solutions

Objectives

According to the professional profile that the Degree Course intends to build, we consider that knowing how the key elements of a big data analytics project in a business context is a valuable resource for those who will deal with changing and unstable quality work contexts, as a specialist in HR, both in the field of work organization and training and professional updating.

As learning goals, the course aims at providing knowledge in deeply understanding the key (business, process, and management) elements of a big data analytics solution in a business setting, along with a basic knowledge of the technical issues involved.

The course aims to promote the following transversal skills:
• critical thinking
• ability to analyze and synthesize
• problem-solving
• team work

Methodologies

The course includes lectures alternating with active teaching methodologies (exercises, planning, case analysis) to allow students to relate to the topics covered by presenting and exploring their points of view. During the course, we plan to invite testimonials who are involved in bodies directly involved in structuring policies and training actions related to the world of work.

Educational materials (online, offline)
• Slides;

• Study cases;
• Complementary and in-depth didactic material distributed during the lessons

Online and offline teaching materials

slide ed additional materials provided by teacher (according to bibliography)

Programme and references for attending students

a) Provost, Foster, and Tom Fawcett. Data Science for Business: What you need to
the teachning includes a homework, aimed at evaluating the competencies of the student in terms of (i) teamwork, (ii) understanding the data and defining a way to approach the problem, (iii) discussing the solution identified and realised to the final user. The evaluation of the homework will affect the student's final score

know about data mining and data-analytic thinking. " O'Reilly Media, Inc.", 2013,
-- Cap 1 Introduction: Data-Analytic Thinking
-- Cap 2 Business Problems and Data Science Solutions
-- Cap 10 Representing and Mining Text
b) Vikto Mayer-schonberger, Kenneth Cukier. "Una rivoluzione che trasformerà il nostro modo di Vivere e già minaccia la nostra libertà". Tutti i capitoli
c) Mezzanzanica and Mercorio, "Big Data as Fuel of Skill Intelligence", available at
https://link.springer.com/referenceworkentry/10.1007/978-3-319-63962-8_276-2
d) Alex Pentland, "Fisica Sociale", Chapters 5 and Appendix A
e) Gozzo, Pennisi, Asero, Sampugnaro. "Big Data e processi decisionali" Cap. 1

Programme and references for non-attending students

a) Provost, Foster, and Tom Fawcett. Data Science for Business: What you need to know about data mining and data-analytic thinking. " O'Reilly Media, Inc.", 2013,
-- Cap 1 Introduction: Data-Analytic Thinking
-- Cap 2 Business Problems and Data Science Solutions
-- Cap 10 Representing and Mining Text
b) Vikto Mayer-schonberger, Kenneth Cukier. "Una rivoluzione che trasformerà il nostro modo di Vivere e già minaccia la nostra libertà". Tutti i capitoli
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https://link.springer.com/referenceworkentry/10.1007/978-3-319-63962-8_276-2
d) Alex Pentland, "Fisica Sociale", Chapters 5 and Appendix A
e) Gozzo, Pennisi, Asero, Sampugnaro. "Big Data e processi decisionali" Cap. 1

Assessment methods

Exams are arganised as follows
-- a written, aimed at assessing the competencies of the student in terms of (i) concepts and methodologies

acquired (ii) abilities in setting up and identifying key elements of a BDA process and (iii) abilities to summarise pros/cons of the techniques introduced
-- oral examination (optional, on demand)

Office hours

on appointment

Programme validity

two academic years

Course tutors and assistants

Sustainable Development Goals