



BIG DATA AND AUTOMATIC LEARNING ALGORITHMS: KNOWLEDGE, INFORMATION, POWER

Enrollment year	2021/2022
Academic year	2023/2024
Regulations	DM270
Academic discipline	SPS/08 (SOCIOLOGY OF CULTURE AND COMMUNICATION)
Department	DEPARTMENT OF POLITICAL AND SOCIAL SCIENCES
Course	COMMUNICATION, INNOVATION, MULTIMEDIA
Curriculum	PERCORSO COMUNE
Year of study	3°
Period	1st semester (02/10/2023 - 15/12/2023)
ECTS	6
Lesson hours	36 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	COSTA PAOLO (titolare) - 6 ECTS
Prerequisites	<p>Understanding the topics covered in the course does not assume specific computer skills. Being familiar with Microsoft Excel or other programs dedicated to the production and management of spreadsheets can help. Therefore, it is suggested that less experienced students preliminarily train themselves by means of one of the several online training opportunities (e.g.: Coursera, Udemy, ...) or by taking advantage of the countless tutorials available on YouTube. Some basic knowledge of statistics is also useful: character, distribution, arithmetic mean, mean square deviation, etc.</p>
Learning outcomes	<p>By the end of the course, the student must:</p> <p>(a) understand the basic concepts related to interpretive models of economic and social reality based on the digital paradigm (numerical representation of the world and computability), big data (the large aggregations of data flowing in real time from multiple sources) and new artificial intelligence techniques (machine learning and generative</p>

artificial intelligence);
(b) be able to assess the main sociopolitical, legal, cultural and ethical implications of such models;
(c) be able to apply prompt design logic and techniques in the use of some generative artificial intelligence platforms (ChatGPT, Midjourney).

Course contents

The course is divided into three parts: an introductory part, an in-depth part, and a workshop.

The introductory part (6 lectures, total of 12 hours) allows to share the basic vocabulary necessary for understanding the object of the teaching: difference between data, information and knowledge; concept of database and database management system (DBMS); difference between relational and non-relational databases; elements of the history of artificial intelligence; machine learning algorithms; difference between machine learning and deep learning, large language models and generative artificial intelligence, etc.

The in-depth part (6 lectures, total of 12 hours) explores the nature of the phenomenon and its historical roots, highlighting the factors driving its pervasiveness: the explosion of big data, the "dataization" of experience and the spread of the principle of computability in the main domains of economic and social life. In particular, three domains in which the big data paradigm is enabling the most significant changes are considered:

- Information and journalism
- Marketing and advertising
- Bioinformatics, medical diagnostics and pharmaceutical research

The laboratory part (6 meeting, total of 12 hours) is organized around the specific area of generative artificial intelligence and the applications available today for the use of large language models. In particular, the lab offers students the opportunity to train in the main techniques of prompt engineering, collaborating with artificial intelligence to produce original and meaningful content (text, images, audio and video).

Teaching methods

The course is organized into:

- face-to-face lectures (supported by ongoing checks done with Wooclap);
- analysis of case studies;
- guided exercises;
- group project work.

PowerPoint or PDF presentations, made available to students in the teaching section on the KIRO platform, are used to conduct the lectures. These materials are released in a format that complies with the principles of accessibility for users with disabilities (header structure, reading order, alternative text for images, self-descriptive links). Attendance at lectures and tutorials is strongly recommended. However, video recordings of individual lectures are made available to students who cannot attend lectures.

Reccomended or required readings

A reference bibliography related to the topics covered is provided at the end of each lecture. The following is a list of monographs that are useful for further study of the course topics as a whole:

- Hannah Fry, Hello World. Essere umani nell'era delle macchine, Bollati Torino, Boringhieri, 2019 (ed. originale Hello World. How to Be Human

in the Age of the Machine, London, Black Swan, 2019)

- Astrid Howe, Artificial Intelligence for Beginners: An Introduction to Machine Learning, Neural Networks, and Deep Learning, Astrid Howe, 2023.
- Helga Nowotny, Le macchine di Dio. Gli algoritmi predittivi e l'illusione del controllo, Roma, LUISS University Press, 2022 (ed. originale In AI We Trust. Power, Illusion and Control of Predictive Algorithms, Cambridge, Polity Press, 2021).
- Stuart J. Russell, Peter Norvig, Intelligenza artificiale. Un approccio moderno, Milano, Pearson, 2021 (ed. originale Artificial Intelligence: A Modern Approach. Global Edition, London, Pearson Education, 2021).
- Toby Walsh, Machines Behaving Badly: The Morality of AI, Cheltenham, The History Press, 2022.
- Toby Walsh, Faking It. Artificial Intelligence in a Human World, Cheltenham, The History Press, 2023.

It should be noted that the above texts are not intended as compulsory readings, to be taken for exam preparation, but as useful sources of further study.

Assessment methods

The examination consists of an individual oral test, lasting about 15-20 minutes, designed to evaluate the competencies acquired with regard to the course content. The test covers at least three separate topics related to the different subjects covered. The final grade is based on the degree of depth and understanding of the topics presented and the ability to integrate the knowledge acquired during the course. The final grade will be assigned according to a grading scale of 0 to 30, distributing the weight of the individual questions equally. During the test, the student may make use of multimedia materials to support his or her argument (pictures, movies, graphs, PowerPoint presentations or similar). Only students who are unable to attend class are offered the option, as an alternative, to take the exam by presenting an oral paper - possibly accompanied by multimedia support (PowerPoint or similar) - on the following monograph:

Luciano Floridi, Etica dell'intelligenza artificiale. Sviluppi, opportunità, sfide, Milano, Raffaello Cortina Editore, 2022 (ed. originale rivista, The Ethics of Artificial Intelligence. Principles, Challenges, and Opportunities, Oxford, Oxford University Press, 2023).

Further information

Sustainable development goals - Agenda 2030

A discussion of risks and opportunities associated with the spread of quantitative paradigms and algorithmic systems with reference to Goals 5 (Gender Equality), 10 (Reduced inequalities) and 16 (Peace, justice and strong Institutions) is planned as part of the teaching.

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