Emergent Humanism in Artificial Intelligence

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Gentili Signore e Signori

It is my distinct honor and pleasure to be incorporated today in your (from now on **our**) Academy. I was given the opportunity to participate, along the years, in the international meetings as a member of the *Barcelona Economic Network*, sharing significant scientific activities and leisure moments, and now, thanks to you great Friends, I can live and enjoy this **kairós**, the right moment to be incorporated as an Academician.

Thank you!

1. A Novel Perspective for AI

Artificial Intelligence (AI) is widely reported as a transversal and transformational technological breakthrough that now pervades many aspects of our society, by mainly impacting education, work and enterprises. As it is rapidly developing and changing, more than often is prospectively referred as a *menace* to humans. The advent of *Generative AI (Gen-AI)* strongly changed the paradigms, giving the opportunity to simply use several platforms and tools also for free access. With *Gen-AI* it is possible to generate apparently fresh content in the form of texts, images, and videos. Apart from delicate questions related to the privacy of data,

the intellectual property and the associated rights, *Gen-AI* permits to use the power of *Deep Learning* (DL) to emulate artists, writers, till fake but credible political messages conveyed through the social media. Actually, this novel paradigm changed the perspective of AI whose main implications are far outside mere technology. In this lecture, I will argue on the present changing characteristics of AI that can be reformulated from the perspective of an *emergent humanism*. During the presentation, I will give some specific examples of early precursors already found in the literature and in the art of the last century that anticipate some of the contemporary AI.

AI basically consists of Deep Learning (DL), a relatively recent evolution of Machine Learning (ML), which finds its roots in the earlier Neural Network (NN) approach. This paradigm exploits the availability of huge amounts of data (commonly referred to as *big data*), of high computational power, as the processing of data is moved to the *cloud*, and of novel advanced algorithms that become more flexible and amenable to the present AI age. In this presentation, we will introduce AI and DL from the perspective of the traditional modelling approach. Brain engineering, financial analysis and health signal processing are just some examples of significant applications of DL.

As all those scientific fields should be looked at as collectively producing information which drives uncertain decisions and predictions (e.g. the same nature of meteorological data, medical images or financial time series), there is an additional need for incorporating *uncertainty* in the models. This was the favorite research direction of *Barcelona Economic School*. Along this vein, some innovative aspects of *Fuzzy Logic* that seem appropriately fitting AI progress will be discussed.

After having defined the context of AI as an evolution of ML and DL and having highlighted the internal structure in terms of complex NNs, the concept of *Generative AI (Gen-AI)* and *Large Language Models (LLMs)* is proposed. Then, these contemporary tools are interpreted in terms of a new humanistic perspective of AI that may embrace topics seemingly so diverse from technology. The foundational concept here proposed is that both in the literature and in the arts, the revolutions of the last century showed some elements now founding AI.

2. Models and Abstraction

No different aspect of our universe, from physical and chemical behavior to solar system drift and big bang consequences, till to the nano-world can be interpreted without making use of the concept of *abstraction*. Abstraction implies to replacing the specific aspect analyzed by a model, which is useful as it shares similar properties but has simpler structure. Both formal and intellectual models, as well as material models, represent a strong

peculiarity and necessity of the scientific procedure. Scientific models are certainly useful and represent the standard in our disciplines, although they have clearly some clearly limitations.

To abstract a model that can substitute or just represent reality, or a subpart of it (e.g., a system) for example in order to make experiments on it, we analyze the events for a long time and try to extract the underlying rules that relates causes and effects, possibly by considering the interactions of many variables. Our models can be expressed in terms of systems of differential equations (i.e., Maxwell Equations, Newton Dynamic Laws, Caianiello Mnemonic Equation, Grad-Shafranov Plasma Equations, and so on), or mechanical, electric, thermic apparatuses, as some centuries ago. In general, high-level rules deriving from very abstract problems are not amenable to experiments that can suggest the model is truly appropriate. In this case, the high-level representation should be broken down in subparts that can be related to specific aspects of the problem. However, by reducing the scale of analysis, we need then to understand what happens at the boundaries between the subparts; this implies that the success of tests carried out in subparts could not be generalized in terms of behavior of the whole system.

To frame an abstract model, in any case, we can act only after data have been collected, and the immediate implications of these data have been interpreted. Generic problems are usually approached from the factual to the abstract. Some general considerations influence the selection of data at the beginning of the abstraction's procedure. The data then lead to more precise generalizations, which in turn suggest further experiments and progress in understanding the specific problem is made by successive excursions from data to abstractions and vice versa. Both in economics and engineering, models can be of help to studying a phenomenon in an unfamiliar field by representing it in a more knowledgeable field. As an example, during the 18th and 19th centuries, the importance of Newtonian dynamics dominated physics and thus the electrical problems were often approached via mechanical models. After the electricity century, with the work of Ampère, Faraday and Maxwell, and with the explosive growth of the large-scale electrical industries, the development of electrical models outstripped mechanical ones.

In any case, the model is invariably built after the observation of data from experiments and the theoretical expression of a phenomenon through equations needs a continuous experimental validation.

3. Data-Driven Approaches

We can affirm that the use of models and the building of more formal theories is invariably based on data. In other words, if we can build models starting from observations and then use models to mimic reality, then we

can expect to directly extract the “significance” of reality by just using both a quantitatively and qualitatively sufficient amounts of data. Today, we are facing the big data era, where data is distinct from any information content. A big dataset includes a great number of examples with a large number of attributes. Furthermore, these data are often unstructured or semi-structured. Data are continuously flowing and affecting our daily world. In genetics, lot of data come from sequencing DNA; images and chemical measurement are coming from the various space programs; financial data are daily stored and processed to make predictions of volatility; our personal data and our vital statistics are acquired from various kind of sensors, also wearable. The Internet of Things (IoT) and the further Io Human T (IoHT) promises to generate Terabyte of data. Robots are acquiring and processing industrial and environmental data for interpreting and learning external events. We are living in the so-called “*dataism*” era, where data seems pervasively influence our life. According to Brooks’ philosophy, in a world of increasing complexity, relying on data can reduce cognitive biases and "illuminate patterns of behavior we haven't yet noticed". From a scientific perspective, the dataism implies that having at our disposal lot of data, we can find the “modes” of behavior of a complex system without having to build a reference model.

4. Deep Learning as an alternative to modelling

The problem of extracting relevant information from a multivariate time-series, for example for the identification, classification, prediction or feature extraction is a practical example of data analysis through the use of models. This kind of problem has interest in research and in different science domains. The emergence of the IoT as a novel information technology and the ubiquity of sensor networks, in particular, have determined a resurgence of interest on ML and its use in the processing of multivariate time-series analysis. DL techniques can be considered as a development of ML, based on NNs. NNs imply the use of many hidden layers (deepness) of neurons to generate a lower dimensional projection of the input space: an example of input is given by the signals generated by the network of sensors in monitoring applications. The successive hidden layers can generate effective high-level abstraction of the raw data. The high number of neurons and links reminds the brain networks and allows the storage of the characteristic features of the underlying input-output mapping. The automatic extraction of features without human intervention is of high interest for supporting prediction and clinical diagnoses and for highlighting latent aspects hidden to standard visual interpretation. For example, in medical imaging, small irregularities in tissues may be a precursor to tumors and can be detected in the successive levels of abstractions of DL network. DL methods can be well described within the historical perspective of NN studies.

5. The architectural basis of AI: Neural Networks

Through ML, networks or computers develop the ability to autonomously learn and interact with their environment. By exploiting the available data they learn optimal behaviors without the need of a specific programming step. NN are machines explicitly designed to possess this ability. NNs are collection of elementary processing nodes suitably arranged in various topological architectures. The elementary node of the network is referred to as neuron and includes a linear part taking a weighted linear combination of its inputs and a nonlinear part where a selected nonlinear function transforms the input in the final output of the node. The inputs of the neuron come from other neurons and its output is fan out to other nodes. Neurons are organized hierarchically and often the nodes are structured in layers. This is reminiscent of the organization of pyramidal neurons in the mammalian brain.

NNs are adaptive systems that are trained aiming to derive an optimal representation of the weights' matrices. The training is carried out through a specific "learning" procedure. The learning can be supervised (SL), unsupervised (UL), or semi-supervised (SSL). The goal of learning procedures is to derive optimal representations that minimize or achieve a small error. In UL, the NN is asked to autonomously extract some underlying statistical regularities from the available data. In SSL, a pre-stage of UL is used to facilitate the following SL procedure. In the case of availability of both labeled and unlabeled data, these procedures can help to extract additional information on the problem under analysis.

A high number of free parameters increases the descriptive complexity of NN, approximately related to the number of bits of information required to describe a NN. The complexity of NN limits generalization ability. Unsuccessful generalization performance reduces the impact of the NN approach and can harm large scale applications.

6. Deep Topologies of NNs and Learning

DL methods iteratively modify more sets of parameters by minimizing a loss/cost function aiming to define an optimal set. However, the performance of DL, and more generally, ML and NN approaches strongly depends on the quality of available data or the careful selection of a representation suitable for the task at hands. Most of the efforts in designing the processing chain are thus devoted to data pre-processing or domain transformation. A large part of the current appeal of DL techniques derives from the possibility of acquiring data representations that are not model-based but totally data-driven. This circumvents the need to hand-designed features. The hierarchically organized learned features are often richer and more powerful than the ones suitably engineered. DL is indeed

a methodology whose main objective is to design learning algorithms and architectures for extracting multiple level representations from data. The representation is both hierarchical and distributed, as the relevant characteristics of a problem emerge gradually in successive levels (or layers) as a collective result similarly to shallow NNs. These representations facilitate the pattern recognition tasks sometimes without the need of any feature engineering but just autonomously extracting them from the available data. Indeed, the successive latent representations are able to disentangle potential confounding factors in the input data, also reducing their complexity.
The present strong resurgence of interest in the NN approach is related to the following evidences:
1) General availability of large database (big data) coming from international initiatives and worldwide collaboration on projects;
2) Availability of big computing power mainly associated with cloud computing and novel GPU extensions;
3) Availability of novel algorithms and processing architectures, or advanced paradigms of computation, like quantum computing.

Indeed, as previously noted, the capacity of a NN chain is related to the number of free parameters whose estimation calls for large datasets. In turn, to process big data, powerful computing is needed.

7. Generative AI (Gen-AI) and Linguistic Models

Convolutional Neural Networks (CNN) are an alternative type of DNN that allow to model both time and space correlations in multivariate signals, like images, but are also used for *Large Language Models (LLMs)*. They are attractive as they explicitly consider and take advantage of the invariances in the input data that constrain somehow the learning procedure. CNN are instrumental in *Gen-AI*, specifically in image generation. Generative models are at the basis of *ChatGPT* and *Midjourney*, platforms specialized in language interpretation and generation, or *Alexa*, working as a personal assistant.

The *AI chatbot* operates on the foundation of *LLMs* trained on vast amounts of data to produce human discernible writings. They are also able to generate images from text and vice versa. In topologies like *Generative Adversarial Networks (GANs)*, the sub-section working as a generator is often built on CNN architectures that learn how to generate lifelike images.

Gen-AI starts with a foundation model, i.e., a DL model capable of acting as a basis for various kinds of applications. Among the foundation models, *LLMs* are able to generate text.

The training of such models is very costly and is typically carried out on groups of GPUs, but through the concept of *Transfer Learning*, it is possible to reduce the training to a final block of neurons.

Although being only a specific development of *DNN*, *Gen-AI* and the corresponding foundation models devised in *LLMs* actually allow us to

develop some consideration on the novel importance of AI in humanistic fields, particularly literature and arts.

8. Treatment of Uncertainty: Fuzzy Logic and related Evolution

One of the main difficulties with AI and learning systems is related to the management of approximations and uncertainties in the data, e.g., the exact morphology of objects in a scene acquired by a camera, the blurring on remote sensed images or the meaning of words in the context of a sentence. To face this important eventuality, the approach of AI is to use more data, what implies in turn more resources, in terms of work needed to generate fresh cases, of computational complexity and of energy.

However, in the early sixties of last century, *Lofti Zadeh* and the *School of Economics of Barcelona* headed by *Jaime Gil-Aluja* proposed to the international community a new way to manage uncertainties, whose basic idea is to left the binary description in favor of the graded simultaneity of fuzzy logic.

In this lecture, without discussing the well known concepts, I wish just to mention two recent advancement of fuzzy logic that seem appropriate to the AI models, namely the *intuitionistic* and the *hesitant fuzzy sets*.

Intuitionistic fuzzy systems and *hesitant fuzzy systems* are two extensions of classical fuzzy logic, designed to handle situations of uncertainty and ambiguity more flexibly. Intuitionistic fuzzy systems (IFSs) are based on introducing three distinct parameters for each element: the membership degree, the non-membership degree, and an indeterminacy degree. The latter represents the residual uncertainty and is calculated as the difference between one and the sum of the first two values. Unlike classical fuzzy logic, where the membership and non-membership degrees always add up to one, IFSs leave room for uncertainty. This characteristic makes them particularly useful in decision-making problems, risk analysis, medical diagnosis, and pattern recognition, where it is not always possible to precisely define the membership of an element within a given set.

The *Hesitant Fuzzy Systems (HFS)* address uncertainty with a different perspective. Instead of assigning a single membership value to an element, these systems allow for a set of membership values for the same element. This approach is especially useful in cases where multiple opinions or divergent evaluations exist regarding a certain concept. For example, if multiple experts need to express a judgment on a particular element, each of them might provide a different value. In a HFS, rather than choosing a single value, all suggested values are considered, allowing for a more accurate representation of uncertainty and variability in opinions. This type of modeling is primarily applied to opinion aggregation in complex decision-making processes, multi-criteria evaluation, and preference management in uncertain contexts.

The main differences between the two approaches lie in how they represent uncertainty. In IFSs, indeterminacy is explicitly modeled through the third parameter, while in HFSs, uncertainty is represented by the presence of multiple membership values for a single element. While the former are better suited to situations where information is incomplete or vague, the latter are particularly useful in contexts where multiple possible assessments exist, and none can be considered definitive.

9. Emergency of Humanism in AI

It is now clear that the present (and future) revolution of AI, based on the previously described approaches, is presenting itself as a strong challenge for the whole society but also for various humanistic fields, leaving to technology an underlying role that needs not to be not disclosed to most of us. AI is rapidly transforming work, structurally changing health systems, clinics, economic and financial world, although still posing subtle questions on the stability of democracy.

However, the *humanism* is pre-eminently rooted in literature, arts, philosophy and culture. All of these need a rethinking, in terms of both their role, functions and fruition. In what follows, it will be argued that important recent developments AI are related to the humanism: this can modify our perspective when looking at those apparently worrying evolution.

In this lecture, I will take inspiration from some pioneeristic analysis, interpretations, and predictions carried out in the middle of previous century by important writers, artists and phylosophers.

10. Italo Calvino and the automatic writing

Intelligent machines can modify the art of writing? Calvino introduced the term "*mestiere di scrivere*", thus giving a specific (artisanal) connotation to the work of writers. In particular, in his book ***Cibernetica e fantasmi*** (1967), a collection of writings reporting the texts of some conferences given in Europe, he reflects on the role that literature can play in the future era of intelligent machines. He asked on the potentials of machines to replace poets and writers:

«*avremo la macchina capace di sostituire il poeta e lo scrittore? Così come abbiamo già macchine che leggono, macchine che eseguono un'analisi linguistica dei testi letterari, macchine che traducono, macchine che riassumono, così avremo macchine capaci di ideare e comporre poesie e romanzi? Quello che interessa non è tanto se questo problema sia risolvibile in pratica – perché poi non varrebbe la pena di costruire una macchina così*

complicata, – quanto la sua realizzabilità teorica, che ci può aprire una serie di congetture insolite.»

He conjectured some answers by making hyphoteses that seem to anticipate some present developments of Large Language Models (LLM). Indeed, the daily use of platforms like ChatGPT and Bert is modifying not only the "mestiere" of writing but also reversing the perspective author-reader. If the *author* is a machine probably based on the easy availability of big data and AI algorithms, the reader is assuming more and more the role of content creator, by learning how appropriately use the received text.

In particular, as it has been suggested in a recent book of Andrea Principe e Massimo Sideri, **Il visconte cibernetico** (2023), paraphrasing Calvino's book, **Il visconte dimezzato**, there are a number of different answers to our questions proposed from technological LLM platforms coming from a huge of different sources, sometimes not certified. The *machine-author* can use data on the network to generate potential information: here it is the role of the *user-reader*, that extract the only parts of relevant interest which are *pertinent* to what he asked for. We can say that humans can have the role of controlling and converting AI by favoring the emergence of a correct meaning. The knowledge extraction is left to the human subject that can select the responses and fine tune them. In other words, the creative process is again left to humans but through a different perspective. The truly innovative element is the *dynamics* of the automatic writing, as the raw answers point out in a matter of seconds. It is evident that one character of humanism here is to certify the reliability of sources and to avoid any manipulations of words and concepts.

It is possible to hypothesize that the *critical thinking* is subdivided in two complementary parts: the ability to make correct questions and the evaluation and correct use of the answers. The main question regards now the complexity of thinking: can the use of tags, keywords and tokens limit the research space favoring simplified responses? Will humans be able to go out from the prescriptive schemes of LLMs? Can the use of ChatGPT and other platforms really limit human creativity?

Today, we are facing a totally novel approach to generation of contents. Many authors are worried regarding the development of critical thinking and the limitations of human creativity. Actually, Calvino spoke of the mathematical literature, that raises from the concept of automatic language as the birth of novel narration tools. He argued that the writer is writing texts that are combination of a limited number of words, taken from a wide vocabulary, capable of exiting one of many possible options. That's why the generation of texts through Generative AI, and LLMs, is nothing different. In other words, the shape of the questions we can raise are finite on their own, and the development of automatic ways to write

down just make us informed that mixing words and numbers are similar things. Is that a limit for creativity and imagination?

"La fantasia popolare non è sconfinata come un oceano, ma non bisogna per questo immaginarla come un serbatoio d'una capacità determinata: a pari livello di civiltà, così ***come le operazioni aritmetiche****, anche le* ***operazioni narrative*** *non possono essere molto diverse presso un popolo o un altro: ma quello che sulla base di questi procedimenti elementari viene costruito può presentare* ***combinazioni, permutazioni e trasformazioni*** *illimitate. Questo è vero soltanto per le tradizioni narrative orali oppure può essere sostenuto per la letteratura nella sua estrema varietà di forme e complessità?"*

The model proposed by Calvino reduced the human inspiration to a repeated series of attempts to mix words according to some prescriptive rules, previous examples or protocols (let's think to a poem like a sonnet, which has a predefinite structure, or at the dadaism or surrealism manifesto). Modern AI seems to be able to practically implement the idea of a combinatorial literature proposed by Raymond Queneau in ***Cent mille milliards de poèmes*** (1961), that allowed to generate 100k billions of sonnets. Here the big numbers of AI are already present, as they imply a reading of 200 millions of years.

Of course, the quality of the "product" is anything but guaranteed, notwithstanding the approach carried out in those speculative works anticipates the potentiality of intelligent machines that are able to manipulate words and texts by using the availability of huge sources. The network is a modern labyrinth in which everyone can find the proper direction, and the same way to go out of it. The contemporary reader is deciphering the labyrinth through a personal interpretation; similarly, the end-user of the platforms of *Gen-AI* can receive an output to a specific questions (e.g., a text on a specific subject) which is simply one of the individual solution to the search of the maze exit.

11. Roland Barthes essays as precursor of Gen-AI and LLM

Roland Barthes is considered to be the father of the philosophic theory referred to as *Structuralism*. *Structuralism* is the study of linguistic applied to the underlying structure of the communications' means in society that, in turn, give contextual meaning at the language of narrative, language, and text. He defined the structuralism as a mix of semiotics and linguistics, by decomposing the text in elementary blocks. Conventions affects literary efforts more than originality: it is not difficult to read this approach at the light of contemporary versions of LLMs, where conventions can be associated to the available data in the cloud, limiting originality to re-interpretation.

In his essay, *The Death of the Author* (1967), the role and the authority normally afforded to who write a text is destabilized. The responsibility of attributing the meaning to a text is given to the reader who create a cogent narrative. Barthes focused on the analysis of language in sentence structure. Accordingly, "*Death of the Author*" is a literary theory that argues that the meaning of a text is determined by the reader's interpretation rather than the author's intention.

In this sense, the use of generative platforms like a *ChatGPT* reflect the same concept: there is no more a singular, authoritative figure producing a text, and the same chronologically displayed interrogations of the LLM output different texts on the same subject. In addition, the use of LLMs as in structuralism allows the emergence of multiple meanings and perspectives from a generated text, so hiding any potential author intents.

It is possible to see in this literary revolution and in this essay a metaphor of the present linguistic which is widespreadly mediated by the Gen-AI, that shows a novel humanistic perspective.

A similar interpretation has been given before the advent of modern AI. In a recent paper, Adrien Robertson interrogates Barthes' theory in the context of a user-generated text. He considered as an ideal case the Nintendo's best-seller game *Legend of Zelda: Twilight Princess*, by considering the ways in which players, working in a network of bloggers, forge an interpretation of narrative units. Also in this precursor case, the technology impacts on the same concept of writing and generating context.

12. James Joyce and the Finnegan's Wake: the challenge of an AI interpretation

No literary writings have been controversial as the ones of the Irish writer James Joyce. LLMs and Gen-AI have also been challenged from Joyce's oeuvres along the two main perspectives of understanding and interpreting those complex texts and to generate similar writings. In particular, the last book, *Finnegan's Wake* is considered one of the most difficult reading in the whole literature escaping interpretation by stimulating a wide number of studies.

Systems of automatic language analysis have been used to help giving insights on the book. In Wang, the complex text has been fed to a ChatGPT that, after training, was asked to generate a similar text, supported by the human author. The nonsenses and the tricks used by Joyce in the book to joke the reader have been reinterpreted by a machine that discovered the need of understanding the text not only as usual, but also from right to left, in vertical so simulating languages different from English.

This complex exercise can clarify that AI can simulate basically every human writings fully canceling the concept of authorship, as earlier anticipated by Calvino and Barthes. It represents the seed of what is

argued in this lecture. Starting from technological systems, Gen-AI learns one of the most relevant human abilities, i.e., managing language and extracting meaning from contexts. If one looks at this possibilities from a reversed perspective, it is possible to plastically see the emergence of humanism in AI.

13. The relevant example of Abstract Art

Modern art replaced the figurative representation in paintings through novel ways of description of the reality. The decomposition of scenes around us and of the objects there detected, in agreement with our natural human vision pipeline (as proposed in neuroscience studies), can be traced back to elemental blocks. Lines, colors, geometric figures, and so on, represent a sort of dictionary of images, for example artists' paintings. If one looks at the oeuvres of Kandinsky, Mondrian, Pollock, Picasso, and other artists, it is easy to see a systematic deconstruction of what we expect to find in a scene.

Those paintings force a more complex way to process what we are seeing, that involve a top-down approach combined with the traditional bottom-up procedure evoked by a figurative painting. AI methodologies based on *Convolutional Neural Networks* are specifically designed to follow the above approach: they build progressively the scene by decomposing it in more successive nonlinear layers.

Indeed, through suitable *encoder-decoder* architectures and through *Transformers* it is possible to generate paintings similar to the one of each author, once trained on the digital representations of the true oeuvres. This is achieved by randomly reconstructing a painting by using the elemental blocks extracted in the training phase.

14. Antoni Gaudì's AI

Many recent works proposed AI-based systems that refer to the work of the acclaimed architect Antoni Gaudì. The marvel of Gaudì realization has been inspired by nature and its different functional forms and shapes. In particular, the nature's suggestions have helped to solve structural and design issues, e.g., ventilation systems that mimic sea sponges and corals (biomimicry). The morphology of Gaudì's creations is based on the use of specific modular blocks delimited by curves, shaped in irregular forms, and colored of shades and tonalities derived from a natural palette. This original way to reproduce nature in sculptures and buildings lies on creativity that has been at the origin of novel AI applications enriched with increased efficiency, innovation, and sustainability.

As a relevant example, the *IBM Watson Gen-AI* was taught about the history and style of Gaudì and the architectures of Barcelona through a

huge number of images, literary works, articles, and even music. As a result, *IBM Watson* helped to unveil some critical insights on patterns in Gaudí's work, say crabs, spiders, and flies, in a unique harmonic context. They have thus built a four-meter-tall sculpture (with a surface made of over 1200 unique aluminum parts) that is evidently reminiscent of Gaudí's, although entirely new.

Although these studies testify the unique aesthetic appeal of human-created designs, AI-generated designs demonstrate significant potentially competitive results

As of today, AI faces challenges in replicating the distinctive aspects of human design styles, but these findings shed light on the role AI could play as a tool in architectural design, offering diverse design solutions and driving innovation.

This last example confirms the existence of a thread between humanism and AI, that suggest, on one hand, studying AI through the lens of humanism, and, on the other hand, reveal the objective emergence of humanism in AI at the light of the previous human history.

15. Conclusions (?)

The development of AI, mainly based on DL techniques for the management of big data of different nature is at the basis of the current AI's rise, including LLMs and Gen-AI. This is because of the DL's relative easiness to create disruptive models in a wide range of vertical applications. AI has today the potential to address some of the biggest challenges that society faces. Some relevant examples of AI applications based on DL can be easily found. As shown in this lecture, the smart processing of human language gives machines the ability to read, understand, and generate natural "human" language. AI-enhanced education is, however, the main prospective field of interest to us all as may open to every citizen, particularly young people, the possibilities to live this revolutionary age endowed with the correct instruments to manage them. Looking at the literature, at the music and at the arts, it is possible to have an ethical perspective of a humanized technology.

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