

< AI & Equality >

Terminology Handout

< AI & Gender Terminology Handout > 1
do.¹



Artificial Intelligence (AI), a term coined by emeritus Stanford Professor John McCarthy in 1955, was defined by him as “the science and engineering of making intelligent machines”. Much research has humans program machines to behave in a clever way, like playing chess, but, today, we emphasize machines that can learn, at least somewhat like human beings

Artificial intelligence (AI): A broad discipline with the goal of creating intelligent machines, as opposed to the natural intelligence that is demonstrated by humans and animals. It has become a somewhat catch all term that nonetheless captures the long term ambition of the field to build machines that emulate and then exceed the full range of human cognition.²

Autonomous systems can independently plan and decide sequences of steps to achieve a specified goal without micro-management. A hospital delivery robot must autonomously navigate busy corridors to succeed in its task.

In AI, autonomy doesn't have the sense of being self-governing common in politics or biology.³

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Algorithm: An unambiguous specification of how to solve a particular problem.⁴

An **algorithm** lists the precise steps to take, such as a person writes in a computer program. AI systems contain algorithms, but often just for a few parts like a learning or reward calculation method. Much of their behavior emerges via learning from data or experience, a sea change in system design that Stanford alumnus Andrej Karpathy dubbed Software 2.0.⁵



¹ AI-Definitions-HAI.pdf
<https://hai.stanford.edu/sites/default/files/2020-09/AI-Definitions-HAI.pdf> ² State of AI Report 2020
<https://www.stateof.ai/>

³ AI-Definitions-HAI.pdf

⁴ State of AI Report 2020

⁵ AI-Definitions-HAI.pdf

Computer vision: Enabling machines to analyse, understand and manipulate images and video.⁶

< AI & Gender Terminology Handout > 2

The Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)

is an international treaty that requires countries to eliminate discrimination against women and girls in all areas and promotes women's and girls' equal rights. It is a part of international human rights law and often described as the international bill of rights for women.⁷

Deep Learning is the use of large multi-layer (artificial) neural networks that compute with continuous (real number) representations, a little like the hierarchically organized neurons in human brains. It is currently the most successful ML approach, usable for all types of ML, with better generalization from small data and better scaling to big data and compute budgets.⁸

Deep learning (DL): An area of ML that attempts to mimic the activity in layers of neurons in the brain to learn how to recognise complex patterns in data. The “deep” in deep learning refers to the large number of layers of neurons in contemporary ML models that help to learn rich representations of data to achieve better performance gains.⁹

Gender refers to the socially constructed identities, attributes and roles of persons in relation to their sex and the social and cultural meanings attached to biological differences based on sex. The meaning of such socially constructed identities, attributes and roles varies across societies, communities and groups and over time. This often results in hierarchical relationships between women and men and an unequal distribution of power and rights, favouring men and disadvantaging women and affecting all members of society. The social positioning of women and men is affected by political, economic, cultural, social, religious, ideological and environmental factors.¹⁰

Gender-based discrimination includes any distinction, exclusion, or restriction due to gender that has the effect or purpose of impairing or nullifying the recognition, enjoyment, or exercise of human rights and fundamental freedoms. Direct discrimination occurs when a difference in treatment relies directly on distinctions based exclusively on characteristics of an individual related to the sex and gender, which cannot be justified objective and reasonable grounds (e.g., laws excluding women from serving as judges). Indirect discrimination occurs when a law, policy, programme or practice appears to be neutral, but has a disproportionate negative effect on women or men when implemented (e.g., pension schemes that exclude, for instance, part-time workers, most of whom are women).¹¹

⁶ State of AI Report 2020

⁷ [Convention on the Elimination of All Forms of Discrimination Against Women \(CEDAW\) for Youth](https://www.unwomen.org/en/digital-library/publications/2016/12/cedaw-for-youth)
<https://www.unwomen.org/en/digital-library/publications/2016/12/cedaw-for-youth> ⁸ AI-Definitions-HAI.pdf

⁹ State of AI Report 2020

Gender equality¹² refers to the equal rights, responsibilities and opportunities for people of all sexes and gender identities. Equality does not mean that women and men will become

the same but that their rights, responsibilities and opportunities will not depend on whether they are born male, female or outside those binary categories. Substantive or de facto equality, as required by the Convention on the Elimination of All Forms of Discrimination against Women, does not mean guaranteeing women treatment that is identical to that of men in all circumstances. Rather, it recognizes that non-identical treatment of women and men, based on biological as well as socially and culturally constructed differences between women and men, is required in

certain circumstances to achieve equality

¹⁰ Definitions from publications authored by the Office of the United Nations High Commissioner for Human Rights (OHCHR). These definitions are also used by other international organisations such as UNICEF.

¹¹ OHCHR

¹² CEDAW General recommendation No. 28 – The Core Obligations of States Parties under Article 2 of the Convention on the Elimination of All Forms of Discrimination against Women, para 22, CEDAW/C/GC/28, 16 December 2010.

< AI & Gender Terminology Handout > 4



of opportunities and results. This is sometimes referred to as affirmative action or temporary special measures.

Gender stereotype is a generalized view or preconception about attributes or characteristics of what ought to be possessed by women and men, or the roles that are or should be performed by men and women¹³.

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Human-Centered Artificial Intelligence is AI that seeks to augment the abilities of, address the societal needs of, and draw inspiration from human beings. It researches and builds effective partners and tools for people, such as a robot helper and companion for the elderly.¹⁴

Human rights are rights inherent to all human beings, whatever our nationality, place of residence, sex, national or ethnic origin, colour, religion, language, or any other status. We are all equally entitled to our human rights without discrimination. Universal human rights are often expressed and guaranteed by law, in the forms of treaties, customary international law, general principles and other sources of international law.¹⁵

¹³ See: <https://undocs.org/en/a/hrc/35/10>.

¹⁴ AI-Definitions-HAI.pdf

¹⁵ <https://www.ohchr.org/EN/Issues/Pages/WhatareHumanRights.aspx>



< AI & Gender Terminology Handout > 5

cultural backgrounds from all regions of the world, it set out, for the first time, fundamental human rights to be universally protected. It has over time been widely accepted as the fundamental norms of human rights that everyone should respect and protect. The UDHR, together with the International Covenant on Civil and Political Rights and its two Optional Protocols, and the International Covenant on Economic, Social and Cultural Rights, form the so - called International Bill of Human Rights.¹⁸

Intelligence might be defined as the ability to learn and perform suitable techniques to solve problems and achieve goals, appropriate to the context in an uncertain, ever-varying world. A fully pre-programmed factory robot is flexible, accurate, and consistent but not intelligent.¹⁶

International human rights law, composed of a series of international human rights treaties and other instruments, have conferred legal form on inherent human rights and developed the body of international human rights. The Universal Declaration of Human Rights (UDHR)¹⁷ is a milestone document in the history of human rights. Drafted by representatives with different legal and

Intersectionality: the consequence of two or more combined grounds of discrimination. The concept also addresses the manner in which these combined factors contribute to creating layers of inequality¹⁹. Intersectionality is interconnected nature of social categorisations such as race, class, and gender as they apply to a given individual or group, regarded as creating overlapping and interdependent systems of discrimination or disadvantage²⁰.

¹⁶ AI-Definitions-HAI.pdf

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<https://www.ohchr.org/EN/UDHR/Pages/UDHRIndex.aspx>

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¹⁸

<https://ohchr.org/EN/ProfessionalInterest/Pages/InternationalLaw.aspx>

¹⁹Ohchr.org. (2017). Gender discrimination, racial discrimination and women's human rights. [online] Available at:

<https://www.ohchr.org/EN/NewsEvents/Pages/GenderNormsAndRacism.aspx>. ²⁰ Global Research Council (2019).

< AI & Gender Terminology Handout > 6

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Machine Learning (ML) is the part of AI studying how computer agents can improve their perception, knowledge, thinking, or actions based on experience or data. For this, ML draws from computer science, statistics, psychology, neuroscience, economics and control theory.²¹

Model Once an ML algorithm has been trained on data, the output of the process is known as the model. This can then be used to make predictions.

Machine learning (ML): A subset of AI that often uses statistical techniques to give machines the ability to "learn" from data without being explicitly given the instructions for how to do so. This process is known as "training" a "model" using a learning "algorithm" that progressively improves model performance on a specific task.²²

Model: Once a ML algorithm has been trained on data, the output of the process is known as the model. This can then be used to make predictions.²³

Narrow AI are intelligent systems for one particular thing, e.g., speech or facial recognition. Human-level AI, or Artificial General Intelligence (AGI), seeks broadly intelligent, context-aware machines. It is needed for effective social chatbots or human-robot interaction. ²⁴

Natural language processing (NLP): Enabling machines to analyse, understand and



manipulate language.²⁵

²¹ AI-Definitions-HAI.pdf

²² State of AI Report 2020

²³ State of AI Report 2020

²⁴ AI-Definitions-HAI.pdf

²⁵ State of AI Report 2020

< AI & Gender Terminology Handout > 7

< R >



Race²⁶: A dynamic system of historically-derived and institutionalized ideas and practices;

not a thing that people have or are, but rather actions that people do; a system of social distinction that creates, responds to, and reinforces human difference; and not the work of individuals alone, but a product of society.

Race can sort people into groups according to perceived physical and behavioral human characteristics that are often imagined to be negative, innate, and shared; associate differential value, power, and privilege with these characteristics, establish a hierarchy among the different groups, and confer opportunity accordingly;

emerge when groups are perceived to pose a threat (political, economic, or cultural) to each other's world view or way of life; and/or justify the denigration and exploitation (past, current, or future) of other groups while exalting one's own group to claim an innate privilege.

Race can also allow people to identify with groupings of people on the basis of presumed, and usually claimed, commonalities including

several of the following: language, history, nation or region of origin, customs, religion, names, physical appearance, and/or ancestry group;

when claimed, confer a sense of belonging, pride, and motivation; and/or be a source of collective and individual identity.

Reinforcement learning (RL): An area of ML concerned with developing software agents that learn goal-oriented behavior by trial and error in an environment that provides rewards or penalties in response to the agent's actions (called a "policy") towards achieving that goal.²⁷

²⁶ from "Doing Race: An Introduction," *Doing Race: 21 Essays for the 21st Century*, Moya & Markus, 2010

²⁷ State of AI Report 2020

< AI & Gender Terminology Handout > 8

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learning does not require labels, sometimes making its own prediction tasks such as trying to predict each successive word in a sentence; **reinforcement learning** lets an agent learn action sequences that optimize its total rewards, such as winning games, without explicit examples of good techniques, enabling autonomy.²⁹

Supervised learning: A model attempts to learn to transform one kind of data into another kind of data using labelled examples. This is the most common kind of ML algorithm today.³⁰

Transfer learning: An approach to modelling that uses knowledge gained in one problem to bootstrap a different or related problem, thereby reducing the need for significant additional training data and compute.³¹



Sex is the sum of biological and physiological characteristics that typically define men and women, such as reproductive organs, hormonal makeup, chromosomal patterns, hair-growth patterns, distribution of muscle and fat, body shape, and skeletal structure. This workshop will often refer to women, men and others to include binary and non-binary self-identifications of sexual identity.²⁸

²⁸ [EPFL Key Terminology](#)

²⁹ [AI-Definitions-HAI.pdf](#)

³⁰ [State of AI Report 2020](#)

³¹ [State of AI Report 2020](#)

< AI & Gender Terminology Handout > 9

In **supervised learning**, a computer learns to predict human-given labels, such as dog breed based on labeled dog pictures; **unsupervised**



Unsupervised learning: A model attempts to learn a dataset's structure, often seeking to identify latent groupings in the data without any explicit labels. The output of unsupervised learning often makes for good inputs to a supervised learning algorithm at a later point.³²

³²State of AI Report 2020