

Entropy In Machine Learning

Supervised learning This process involves training a statistical model using labeled data, meaning each piece of input data is provided with the correct output. For instance, if you want a model to identify cats in images, supervised learning would involve feeding it many images of cats (inputs) that are explicitly labeled "cat" (outputs). The term "supervised" refers to the role of a teacher or supervisor who provides this training data, guiding the algorithm towards correct predictions. In machine learning, supervised learning (SL) is a type of machine learning paradigm where an algorithm learns to map input data to a specific output In machine learning, supervised learning (SL) is a type of machine learning paradigm where an algorithm learns to map input data to a specific output based on example input-output pairs

The goal of supervised learning is for the trained model to accurately predict the output for new, unseen data. This requires the algorithm to effectively generalize from the training examples, a quality measured by its generalization error. Supervised learning is commonly used for tasks like classification (predicting a category, e.g., spam or not spam) and regression (predicting a continuous value, e.g., house prices).

Cross-entropy In information theory, the cross-entropy between two probability distributions p and q , over the same underlying set

== Steps to follow ==

Entropy Entropy is a thermodynamic state variable that quantifies the probabilistic distribution of accessible microstates in a system. It has far-ranging applications in chemistry and physics, in biological systems and their relation to life, in cosmology, economics, and information systems including the transmission of information in telecommunication. The term and the concept are used in diverse fields, from classical thermodynamics (where it was first recognized), to the microscopic description of nature in statistical physics, and the principles of information theory. The term and the concept Entropy is a thermodynamic state variable that quantifies the probabilistic distribution of accessible microstates in a system

It is proportional to the expectation of the q -logarithm of a distribution.

Introduction to entropy A more physical interpretation of thermodynamic entropy refers to spread of energy or matter, or to extent and diversity of microscopic motion. In thermodynamics, entropy is a numerical quantity that shows that many physical processes can go in only one direction in time. The word 'entropy' has entered popular usage to refer to a lack of order or predictability, or of a gradual decline into disorder. For example, cream and coffee can be mixed together, but cannot be "unmixed"; a piece of wood can be burned, but cannot be "unburned". For example, cream and In thermodynamics, entropy is a numerical quantity that shows that many physical processes can go in only one direction in time

Machine learning (ML) is a subfield of artificial intelligence within computer science that evolved from the study of pattern recognition and computational learning theory. In 1959, Arthur Samuel defined machine learning as a "field of study that gives computers the ability to learn without being explicitly programmed". ML involves the study and construction of algorithms that can learn from and make predictions on data. These algorithms operate by building a model from a training set of example observations to make data-driven predictions or decisions expressed as outputs, rather than following strictly static program instructions. The environment is typically stated in the form of a Markov decision process, as many reinforcement learning algorithms use dynamic programming techniques. The main difference between classical dynamic programming methods and reinforcement... The thermodynamic concept was referred to by Scottish scientist and engineer William Rankine in 1850 with the names thermodynamic function... If a movie that shows coffee being mixed or wood being burned is played in reverse, it would depict processes highly improbable in reality. Mixing coffee and burning wood are "irreversible". Irreversibility is described by a law of nature known as the second law of thermodynamics, which states that in an isolated system (a system not connected to any other system) which is undergoing change, entropy increases over time.

Tsallis entropy It is proportional to the expectation of the q -logarithm In physics, the Tsallis entropy is a generalization of the standard Boltzmann–Gibbs entropy. In physics, the Tsallis entropy is a generalization of the standard Boltzmann–Gibbs entropy

Ensemble learning trains two or more machine learning algorithms on a specific classification or regression task. The algorithms within the ensemble model are generally referred as "base models", "base learners", or "weak learners" in literature. These base models can be constructed using a single modelling algorithm, or several different algorithms... A branch of artificial intelligence Entropy is central to the second law of thermodynamics, which states that the entropy of an isolated system left to spontaneous evolution cannot decrease with time. As a result, isolated systems evolve toward thermodynamic equilibrium, where the entropy is highest. "High" entropy means that energy is more disordered or dispersed, while "low" entropy means that energy is more ordered or concentrated. A consequence of the second law of thermodynamics is that certain processes are irreversible. To solve a given problem of supervised learning, the following steps must be performed: == Overview ==

List of datasets for machine-learning research Although they do not need to be labeled, high-quality unlabeled datasets for unsupervised learning can also be difficult and costly to produce. High-quality labeled training datasets for supervised and semi-supervised machine-learning algorithms are usually difficult and expensive to produce because of the large amount of time needed to label the data. Datasets are an integral part of the field of machine learning. Major advances in this field can result from advances in learning algorithms (such as deep learning), computer hardware, and, less intuitively, the availability of high-quality training datasets. used in machine learning (ML) research and have been cited in peer-reviewed academic

journals. Datasets are an integral part of the field of machine learning These datasets are used in machine learning (ML) research and have been cited in peer-reviewed academic journals

A subfield of soft computing == How can machine learning be categorized? == Supervised learning algorithms search through a hypothesis space to find a suitable hypothesis that will make good predictions with a particular problem. Even if this space contains hypotheses that are very well-suited for a particular problem, it may be very difficult to find a good one. Ensembles combine multiple hypotheses to form one which should be theoretically better.

Ensemble learning In statistics and machine learning, ensemble methods use multiple learning algorithms to obtain better predictive performance than could be obtained from In statistics and machine learning, ensemble methods use multiple learning algorithms to obtain better predictive performance than could be obtained from any of the constituent learning algorithms alone

Reinforcement learning Reinforcement learning is one of the three basic machine learning paradigms, alongside supervised learning and unsupervised learning. In machine learning and optimal control, reinforcement learning (RL) (also known as approximate dynamic programming) is concerned with how an intelligent In machine learning and optimal control, reinforcement learning (RL) (also known as approximate dynamic programming) is concerned with how an intelligent agent should take actions in a dynamic environment in order to maximize a reward signal

Entropy (information theory) Given a discrete random variable. The In information theory, the entropy of a random variable quantifies the average level of uncertainty or information associated with the variable's potential states or possible outcomes. the entropy is formally identical to Shannon's formula. This measures the expected amount of information needed to describe the state of the variable, considering the distribution of probabilities across all potential states. Entropy has relevance to other areas of mathematics such as combinatorics and machine learning

Entropy does not increase indefinitely. A body of matter and radiation eventually will reach an unchanging state, with no detectable flows, and is then said to be in a state of thermodynamic equilibrium. Thermodynamic entropy has a definite... The concept was introduced in 1988 by Constantino Tsallis as a basis for generalizing the standard statistical mechanics and is identical in form to Havrda–Charvát structural α -entropy, introduced in 1967 within information theory. A subfield of computer science p A branch of science An applied science Unlike a statistical ensemble in statistical mechanics, which is usually infinite, a machine learning ensemble consists of only a concrete finite set of alternative models, but typically allows for much more flexible structure to exist among those alternatives. Many organizations, including governments, publish and share their datasets, often using common metadata formats (such as Croissant). The datasets are classified, based on the licenses, into two groups: open data and non-open data. While supervised learning and unsupervised learning algorithms respectively attempt to discover patterns in labeled and unlabeled data, reinforcement learning involves training an agent through interactions with its environment. To learn to maximize rewards from these interactions, the agent makes decisions between trying new actions to learn more about the environment (exploration), or using current knowledge of the environment to take the best action (exploitation). The search for the optimal balance between these two strategies is known as the exploration-exploitation dilemma.

Outline of machine learning In 1959, Arthur Samuel defined machine learning as a "field of study that gives computers the The following outline is provided as an overview of, and topical guide to, machine learning:. study of pattern recognition and computational learning theory

The datasets from various governmental-bodies are presented in List of open government data sites. The datasets are ported on open data portals. They are made available for searching, depositing and accessing through interfaces like Open API... History == Application of statistics An academic discipline

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