

Democracy Index as A Social Entropy Function

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Abstract

In thermodynamics, it is common to use a number of quantities to denote the properties of a system, at a given time, for example temperature, pressure, number of components ... Among them, which quantity depends only on the position and time of the system, not depends on the form of the process in it, is called the state function. Entropy is a thermodynamic state function, discovered by Rudolf Clausius in 1850. The Entropy function has two very basic properties: First, it denote the degree of freedom of the constructors, the degree of interaction of the components on other components in the system, that is, degree of personal expression of the components in the system. Second, the entropy value is always increasing in the isolating system. The general formula representing the entropy change is $\Delta S \geq 0$.

From there one can compare the evolutionary level of a system at two different times. At the same time, on the basis of comparing the value of the entropy function, it is possible to compare the evolutionary level of two systems (with equivalent structure).

Among social indicators (GDP per capita, democracy index DI, human development index HDI ...), only the democratic index DI covers both meanings of the entropy function, because it satisfies two properties of the this function:

* The first is the index DI represents the degree of democratic freedom of structural units (individuals) in the system (society).

* Secondly, the DI index always increases during social evolution (at least in 200 years past), that is, $DI \geq 0$. (<https://voxeu.org/article/democratic-transition>; <https://www.sv.uio.no/isv/english/research/news-and-events/news/2018/v-dem.html>) So, democracy index (DI) can be considered as the entropy function of society.

Thus, we can use the DI index to classify the evolution level of countries.

We divide the social evolution periods and level of evolution of a particular country based on the DI index (see as the social entropy function). On the basis of the DI 2019 (Wikipedia, EIU.com), the countries around the world are divided into four groups of institutions as follows:

Groups A, $DI > 8$, including countries with fully democratic institutions;
Group B, $DI: 8 \rightarrow 6$, including defective democratic countries; Groups C,
 $DI: 6 \rightarrow 4$, including countries with mixed institutions.
Groups D, $DI: 4 - 0$, include authoritarian states.

Because the society evolved in the direction of increasing the DI value, so it is possible to rank 4 groups of countries according to increasing evolutionary level as follows:

Group D \rightarrow Group C \rightarrow Group B \rightarrow Group A

In that order, most of the Nordic countries, North America, and Australia, belong to the group with the highest level of evolution. Most of the African countries are in Group D, the slowest evolutionary group. Countries that are not part of the capitalist system (socialist) are also included in this group D. Countries with high democracies, are formed by the natural evolution of society. New social forms created by humans (socialist) do not match the natural evolutionary laws of human society. In fact, they had been and beeing collapsed.

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