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The philosophical problems of the scientific objectivity of the application of quantitative methods in the social sciences

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Abstract

The paper shows that in the last 10-15 years, with the development of information technologies, modern science has gained the possibility of a wider display of scientific reality based on the analysis of a significant body of data, which increased the accuracy of observations in science and technology by several orders of magnitude and allowed to form a fundamentally new direction in the field of approbation of scientific research related to obtaining data from quantitative and attribute data. Under these conditions, it becomes necessary to rethink the methodological foundations for conducting theoretical and empirical research in terms of applying the basic prerequisites for conducting them, obtaining advanced theories and verifying the results obtained. Obtained on with many results, the researcher can use, however, the hypothesis obtained using artificial intelligence technologies may include deliberately false dependencies. This problem cannot be solved only by developing methodologies for interpreting the results obtained, by developing the competence of researchers in the field of quantitative methods in the social sciences. The value of setting hypotheses about the existence of private dependencies, and, more significantly, the problem of evaluating and verifying hypotheses in social sciences is changing. All this affects the philosophical basis of the cognitive component of the social sciences and leads to the need to rethink them in the aspect of transforming research methods of the last 10-20 years, increases the value of philosophical analysis in the social sciences.

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Keywords

Philosophical analysis, social sciences, quantitative methods, scientific hypotheses, cognitive component.

Introduction

Scientific objectivity is a key characteristic of research in any branch of science. These problems are especially characteristic of the social sciences, where the possibilities of applying the methods of quantitative analysis have long been limited by the capabilities of computational algorithms. The development of quantitative methods not only expanded the research methodology in the social sciences, but also gradually replaced some of the approaches based on the philosophical method to obtaining new knowledge, standardizing approaches to generalizing new knowledge, formulating and testing hypotheses.

In the context of the development of quantitative methods, the increase in the possibilities of processing information in the social sciences, including these processes have intensified, despite the increase in research capabilities, new methodological problems have arisen related to the scientific objectivity of the reflection of quantitative indicators of social phenomena and processes.

The modern paradigm of scientific research involves the continuous improvement of research methods and tools for obtaining new knowledge. However, the improvement of the technological aspects of acquiring new knowledge goes beyond the framework of existing methodological approaches to the determination of scientific objectivity, since it substantially changes the very method of obtaining new knowledge, which is less and less dependent on the initial attitudes of researchers. All this is the reason for the need to revise the approach to the scientific objectivity of knowledge obtained by this method.

Main content

With regard to the reflection of quantitative indicators in the social sciences, the problem of applying quantitative methods, finding their place and the methodology for their interaction with other types of analysis, primarily philosophical, requires solving methodological problems in the field of transformation of scientific knowledge, the need to take these processes into account in modern research.

From the moment the first model ideas in the social sciences were proposed, these methods have traditionally been used with a significant number of restrictions. In the future, in the development of statistical methods of analysis, the emergence of the possibility of using multidimensional or fuzzy statistical algorithms for the formation of new scientific knowledge, generalized results obtained for special cases were used. For example, the effectiveness of individual pedagogical technologies or methods of motivating employees.

However, modern quantitative methods and the development of information technology allows us to process repeatedly increasing volumes of information, as well as to find relationships for a significant number of cases. Thus, the development of artificial intelligence systems allows researchers to use algorithms to find more complex relationships between phenomena and processes, specify only the most general framework of hypotheses, and in some cases not specify them at all. All this, on the one hand, expands the boundaries of research, since it reduces the subjective factor in the formulation of hypotheses, but on the other hand, it greatly increases the complexity of interpretation and does not allow the existing methodology of inductive conclusions to be applied in the social sciences.

The development of technologies for collecting, summarizing and analyzing large amounts of data at present, using such information processing methods as neural networks and genetic algorithms, makes the process of knowledge formation less dependent on the hypothesis of the researcher,

according to which only a certain segment of information is involved, and increases the complexity of interpretation the results obtained. In particular, the modern opportunities for obtaining new knowledge allow us to classify objects of observation not only not knowing the potential number of groups, but also grouping signs, to approach the search for factors of cause and effect unorthodox, find the hidden structure of phenomena and determine complex, multidimensional relationships between them, which are not obvious from the standpoint theoretical research, determine the characteristics of processes from a variety of positions and using both streaming data and data in the longest term, to recognize stable patterns in data of various nature from the most diverse branches of science and technology, as well as operating not only quantitative, but also graphic and attributive signs.

All these, and many other possibilities transform the approaches to conducting scientific research, increasing the importance of competence in the field of general scientific methods in the field of quantitative analysis. So, when applying these technologies in the socio-economic sciences, it has already made it possible to unambiguously put an end to the proof of some basic concepts that have not received proper empirical confirmation, and, on the other hand, to become the basis of a new scientific search for those cases where the incompatibility of existing widespread theoretical representations from objective reality. Such evidence is primarily attributed to the whole being, made assumptions about the effectiveness of using various tools for regulating socio-economic development - from Rybchinsky's theorem and proof of the Leontyev's paradox to later proof of the profitability of "coupon" sales, the loss-making of which has been repeatedly proved theoretically.

The aforesaid allows, on the other hand, to consider approaches to the application of the demarcation of science and "not science" proposed by K. Popper, including the refutation of previously existing assumptions that any theory that claims to be scientific should be inferred from experience. So, according to the conclusion of this philosopher, observation is always selective and purposeful, therefore, it proceeds from the fact that when conducting scientific research it is not necessary to operate with really existing objects, and a significant number of conclusions can be obtained based on simplified models and abstract concepts. In particular, the theory of demarcation by K. Popper has become one of the key ideas that share theoretical and empirical research in modern philosophy of science in terms of the methodology for their implementation. Its further development was associated with the search for restrictions on the use of the postulate that the scientific objectivity of new knowledge is determined by the possibility of their refutation. The development of the approach associated with the use of data mining technologies poses new questions related to the development of research methodology.

First, such questions include the methodological determination - whether the acquisition of new knowledge using data mining tools is empirical: both in a broad interpretation in the methodology of scientific research and in a narrow way with respect to the method of obtaining results. Thus, according to the most general definition, empirical research assumes a significant influence of the totality of the researcher's views on existing phenomena and processes, including those developed under the influence of previous studies. However, the technology of obtaining new knowledge from data implies a certain freedom from previously obtained attitudes, while the degree of this freedom and the possibility of applying the empirical research methodology to this approach is a significant area for further study from the perspective of the development of philosophical and methodological aspects of determining their scientific objectivity.

The application of technologies for obtaining new knowledge based on the analysis of large amounts of data makes it possible to study phenomena and processes not only by a list of goals and hypotheses, but allows the widespread use of one set of data when researching different objects,

obtaining additional results, and so on. The stages of interpretation and verification of new knowledge are similar. That is, when using these tools to obtain new knowledge, the role of the researcher is transformed, his personal position in relation to the subject of research, and these changes relate primarily to both the process of setting hypotheses and the process of interpreting the results. On the one hand, in conditions where the use of technology allows a set of actions to study a phenomenon or process, the breadth of the formulation of research problems is less dependent on the background of the researcher. On the other hand, the scientific objectivity of the obtained scientific knowledge to a greater extent depends on the possibility of interpreting the results that were previously standardized using econometric methods that are widely used in science.

Obtained with many results, the researcher can use, however, hypotheses obtained using artificial intelligence technologies may include knowingly false dependencies. Moreover, this problem cannot be solved only by developing a methodology for interpreting the results obtained, developing the competence of researchers in the field of quantitative methods in the social sciences.

Conclusion

The methodology of conducting theoretical research is primarily associated with the concept of testing theoretical models with empirical results in order to search for opportunities and limitations of their use as new knowledge. However, when new knowledge is mainly obtained through quantitative research, one should consider the methodological aspects of assessing the scientific reliability of new knowledge in conditions where the verification of results is carried out using the same tools as their creation. All these questions require further study both in terms of rethinking quantitative research in science as a whole, and in terms of applying to its individual areas, and also touches on the philosophical basis of the cognitive component of social sciences, and leads to the need to rethink them in terms of transforming research methods of the last 10 -20 years, increases the value of philosophical analysis in the social sciences.

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Философские проблемы научной объективности применения количественных методов в социальных науках

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Аннотация

В работе показано, что современная научная мысль в последние 10-15 лет с развитием информационных технологий приобрела возможности более широкого отображения научной реальности, основанной на анализе значительного массива данных, что на несколько порядков увеличило точность наблюдений в науке и технике, и в том числе позволило сформировать принципиально новое направление в области апробации научных исследований, связанных с получением данных из количественных и атрибутивных данных. В этих условиях возникает необходимость переосмысления методологических основ проведения теоретических и эмпирических исследований в части применения основных предпосылок их проведения, получения развитых теорий и верификации полученных результатов. Полученные на при большом количестве результатов, исследователь может использовать, однако полученные с помощью технологий искусственного интеллекта гипотезы могут включать заведомо ложные зависимости. Данная проблема не может решаться только путем развития методологии интерпретации полученных результатов, развитием компетентности исследователей в области количественных методов в социальных науках. В том числе изменяется ценность постановки гипотез о наличии частных зависимостей, и, что более значимо, проблема оценки и верификации гипотез в социальных науках. Все это затрагивает философскую основу познавательного компонента социальных наук, и приводит к необходимости их переосмысления в аспекте трансформации

исследовательских методов последних 10-20 лет, трансформирует ценность философского анализа в социальных науках.

Для цитирования в научных исследованиях

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Ключевые слова

Философский анализ, социальные науки, количественные методы, научные гипотезы, познавательная компонента.

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