

MODERN METHODS FOR SOLVING PROBLEMS WITH MISSING OBJECTIVE INPUT DATA

Вінницький національний технічний університет

Анотація

У статті аналізуються основні сучасні підходи вирішення задач що характеризуються відсутністю об'єктивних вхідних даних. Проаналізовано їх основні переваги та недоліки.

Ключові слова: *нечітка логіка, суб'єктивні дані, невизначеність.*

Abstract

The article analyzes the main modern approaches to solving problems characterized by the absence of objective input data. Their key advantages and disadvantages are examined.

Keywords: *fuzzy logic, subjective data, uncertainty.*

In the modern world, problems that can conditionally be called as a problems with missing objective input data are becoming common. These are mostly problems related to forecasting certain processes or models and processing subjective data, such as customer reviews.

Methods for solving such problems are become more popular in contemporary scientific discourse. In particular, Bayesian methods may be appropriate for use. However, despite it's flexibility in modeling, these methods have significant drawbacks. For example, choosing the model structure and computation methods requires a high level of expertise from an engeniер, and the quality of results largely depends on the correct selection of the prior distribution.

In such cases, the method of imputing missing data, which combines normalizing flows and Monte Carlo methods, is often proposed. According to available data, using normalizing flows allows for accurate estimation of data distribution density, facilitating higher-quality imputation of missing values. However, at the same time, the effectiveness of MCFlow algorithms may depend on the choice of hyperparameters, requiring additional experiments for optimization, which usually turns into a lengthy and financially expensive process.

A large number of studies indicate the effectiveness of using fuzzy logic methods for solving problems related to missing objective input data. The scientific community discusses the prospects for further development of fuzzy logic, particularly in industrial processes. Fuzzy logic methods are widely used in applied fields and situations involving various types of uncertainty, where such uncertainties cannot be clearly formalized using probability theory and mathematical statistics methods. These uncertainties may be caused by the inability to mathematically define parameter values and their belonging limits precisely, the incompleteness of requirements, or uncertainty regarding the impossibility of certain events occurring.

Fuzzy logic methods are rapidly developing today. There are practices of mathematical modeling of processes not only under conditions of knowledge uncertainty (fuzzy sets, linguistic variables, fuzzy decision-making rules) but also under conditions of fuzzy behavior (fuzzy conclusions) and fuzzy interaction or roles.

Based on the above, it becomes clear that the problem of the inability to obtain objective data for calculations exists in various fields of science and technology. When solving such problems, fuzzy logic methods are increasingly relied upon, demonstrating high efficiency. However, the methods of incorporating fuzzy logic into each specific model are highly variable and require in-depth analysis and research to determine the optimal method for improving an existing mathematical model.

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Зьора Іван Євгенійович - аспірант, асистент кафедри програмного забезпечення, Вінницький національний технічний університет, м. Вінниця, e-mail: ivan.zora@gmail.com.

Хошаба Олександр Мирославович - к.т.н, доцент, доцент кафедри програмного забезпечення, Вінницький національний технічний університет, м. Вінниця, e-mail: pzmag2022@gmail.com.

Ivan Zora - Postgraduate Student, Assistant of the Department of Software, Vinnytsia National Technical University, Vinnytsia, e-mail: ivan.zora@gmail.com.

Oleksandr Khoshaba - Ph.D., Associate Professor, Associate Professor of the Department of Software, Vinnytsia National Technical University, Vinnytsia, e-mail: pzmag2022@gmail.com.