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Methods And Algorithms For Identification And Control Of Non-Stationary Dynamic Objects

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Annotation: identification algorithms have been developed for large non-stationary objects, various methods for describing non-stationary dreiffs have been considered. The resulting algorithms, in general, are of a convergent nature, but are considered to be exact for linear dreyfian laws. Although these algorithms are not strictly justified and are not estimates of the approach speed, numerical examples testify to the fact that the proposed algorithms are performance-capable and efficient.
This article scientifically investigated the methods and algorithms for identifying and manipulating non-stationary dynamic objects.

Keywords: dynamic object, identification, handling styles, algorithm, application, innovation, non-stationary dynamic object identification.

INTRODUCTION

A huge number of works are devoted to the issue of identification, which differ not only in the types of objects that need to be identified, but also in the methods and algorithms of identification. These works place great emphasis on the identification of linear dynamic objects described by differential equations or difference equations with unknown coefficients. More recurrence algorithms are used among the various identification algorithms designed to assess the coefficients of equations in the data of observations, which allow it to be identified in the normal operation mode of the object.

MAIN PART

The principles of the formation of identification algorithms are closely related to the choice of an equation that uses the data of observations and an equation that approximates an object, the choice of the qualitative criterion of this approximation (the function of losses), and, finally, the choice of the method of optimizing the criterion. These principles were largely voluntary until the very last, and largely depended on the tastes and capabilities of the researcher. They were developed and decided on the basis of various heuristic feedback, in particular the convenience of working with selectable approximation equations, criteria and algorithms.
The issue of system identification, that is, the issue of determining the structure and parameters of systems according to observations, is considered one of the main issues of modern automatic control theory and techniques. This issue arises later in the study of the properties and identities of objects in order to control them, or in the creation of flexible systems in which an optimal controlling effect is produced on the basis of object identification. In essence, the methods of statistical processing of economic, biological, medical data lead to various options for the issue of identification.

In Normal operating mode, identification is used more often. In terms of observed incoming effects and outgoing magnitudes from the object, the parameters of the shuffling model are selected that provide the extremum of some criterion that characterizes the qualitative criterion of identification. Changing the parameters of the shuffling model is carried out using matching devices that implement identification algorithms.

As noted above, identification and management techniques are not widely used in theory and practice. With the use of non-stationary dynamic object identification and control techniques, a huge range of issues can be solved, which includes not only adjustment issues, but also the identification of optimal system operating conditions in general, Object Management in rapidly changing conditions, Object Management in the presence of intruders. Typically flexible systems are divided into identification and noidentification management systems. In the formation of such types of systems, systems with an internal model, systems with an étalon model and systems with Extreme Tuning are widely used. In the construction of independent systems, systems with independent modal control, independent interval control algorithms and an internal model are usually used. The theory of identification and control of non-stationary dynamic objects currently stands at its developmental stage. There are a lot of different points of view, directions and styles here.

The practice of applying flexible identification algorithms has found that algorithms of the simplest form – stochastic approximation – type algorithms-often turned out to be incapable of performance. The estimates of the parameters of the falling model given by these algorithms in most cases depended on the discretion in choosing the initial values, while the approximation of the algorithms was often very slow. Just as the recurrence is done in the style of Least Squares, the attempts to improve or optimize these algorithms at the expense of replacing the scalar enhancement coefficient with The Matrix and choosing the elements of this matrix have not always led to success. Such optimal algorithms, despite theoretical approximations and minimal asymptomatic dispersion, have in practice proved to be unapproachable in a number of cases.

This behavior of flexible identification algorithms was caused by the fact that the algorithms used do not meet the conditions that characterize specific identification problems. For example, algorithms like stochastic approximation are extremely versatile. They do not take into account both the existing preliminary information about interference and the existing preliminary information about the solution itself, that is, about the parameters of the object.

RESULTS

However, optimal recurrent algorithms in the least squares style are not always compatible with a priori information about the corresponding interference region and the parameters of the identified object. As a result, identification algorithms with the possibility of risk selection, in fact, often did not give reliable and reasonable results.

For this reason, the choice of identification algorithms in a grounded way, to be more precise – the question of formation has arisen. The solution of this issue is closely related to the possibility of accounting for the aprior information that we have at our disposal in the models that are used, quality criteria and identification algorithms. Since flexible identification algorithms are defined by the accepted shuffling model of the identifiable object and the qualitative criterion by which the identification assesses the proximity of the model and object, one-valued selection of the algorithm will be possible only in the way the shuffling model and Criterion are chosen in a one-valued way. Thus, the question of forming a flexible algorithm in a grounded way, hence a one-valued way, is first brought to the question of choosing a model to be shuffled and choosing an identification criterion.

Modern identification theory provides a wide range of options for the choice of models and qualitative criteria for identification, which are at the discretion of the researcher, as well as a large number of identification algorithms. Alas, there are no indications other than feedback on the choice of models, criteria and algorithms to be used.

DISCUSSION

The further development of the theory of informational identification is formed, on the one hand, from the justification of the construction of simplified prgnosing models that provide for them the possible minimum value of average losses and the simplification of optimal identification algorithms, and on the other hand - from the spread of the ideas of informational identification theory to both more complex linear In this, it becomes important to cover the case of identifying dynamical systems that do not have independence properties when there are interferences, a situation that lies in the foundation of the informational theory presented above. The informational approach also allows the formation of optimal algorithms in the non-stationary dynamical systems identification class as well. In the latter case, the form of identification algorithms will depend on nonstationality models, which can be extremely diverse.

A new class of control systems has been created that provides the possibility of solving the issue for the construction of high-quality control systems when knowledge about the dynamic characteristics of an object is weak or they have large and unpredictable variations. One of the main distinctive features of such systems is considered to be the etalon model, which describes the required quality. The quality of control required in dynamic object management systems is formed using the étalon model, which can be present both in a clear and non – obvious way in the system-in the form of the corresponding coefficients of the differential equation, the solution of this equation will have the desired values of the quality indicators of management.

CONCLUSION

In a flexible control system with a étalon model, the desired properties of the system (speed, stability reserve, etc.) are given by the étalon model. Incoming signals come from the entry of the model and the entry of the object control system. The reaction of the Model and object control system to these effects is compared and the error comes down to the control blog, which has a corrective filter. When the characteristics of some part of the system, such as an object, change, the error between the reactions of the model and the object increases. The error signal is used to change the correctable filter in such a way that these changes are compensated for.

A current LSM(least square method) is a regular LSM in a slippery time interval. It is applied to the identification of non-stationary objects, using not all informations about the object to calculate the coefficients of the model, but only the informations collected at the next time.

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