

# Marketing Problems Solution by Different GMDH Algorithms Using Excel Software

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**Abstract.** *In this paper is described the application of different inductive algorithms in Excel environment for solutions to marketing problems. Comparison of data mining algorithms for forecasting of brand sales, segmentation of product launches and their attributes, media analysis is considered. The results show that the GMDH approach can significantly decrease time needed for analysis and improve the quality of knowledge extraction for marketing problems solution.*

## Keywords

Inductive modelling, marketing, data mining, knowledge discovery, algorithm, Excel, software development.

## 1 Introduction

Currently solution to many marketing problems for the retailers and manufacturers require application of inductive modelling algorithms. There are collected large databases of marketing information, which include data about new products launches, corresponding media data for promotions and surveys of shoppers. The main issues which are usually needed to be addressed include analysis of influence of different factors on sales of the products, forecasting, media analysis and benchmarking of some products to existing brands. Current developments for analysis of marketing data are based on application of the regression analysis and segmentation techniques. Primarily the marketing mix approach is used to find relations in the data.

In this paper is shown how application of different GMDH algorithms can extend the set of problems which can be solved and improve the accuracy of current marketing problems solutions. Application of the GMDH approach allows us to find the new relationships between different kinds of data and automatically found interrelations in the data. Comparison of different GMDH algorithms and well-known methods for brands analysis and forecasting is provided.

For solution of these tasks, the special software system was created using VBA language in the Microsoft Excel environment. It allow us to significantly reduce the time needed for analysis and improve the accuracy of solutions for current projects. In the paper are shown the main parts of this data mining process.

The solutions which we get by application of GMDH in this system have big importance for different large companies and can be used at almost all stages of product development and for decision support. Currently GMDH algorithms were used for forecasting, sales and media analysis, segmentation of products and their attributes, product launch tracking and decision support. The GMDH Analogues Complexing algorithm gives us the only way to produce accurate long-term forecasts for small number of observations. The GMDH Objective Computer Clusterization algorithm was used for segmentation and Combinatorial algorithm found accurate models and fast solutions for marketing mix and forecasting problems. Comparison with Exponential smoothing and Box-Jenkins methods show that the GMDH method have an advantage in this area.

## 2 Theoretical Part

The aim of this research was to apply the well known inductive GMDH approach into friendly software environment and to extend the kinds of problems which can be solved for marketing data analysis.

The Group Method of Data Handling (GMDH) consists of a set of several algorithms: parametric, segmentation, analogues complexing, rebinarization and probability algorithms. The GMDH is based on sorting-out of gradually complicated models and selection of the best solution by minimum of external criterion characteristic. Not only polynomials but also non-linear, probabilistic functions or clusterizations are used as basic models to extract useful knowledge from data.

This self-organizing approach is different from deductive methods or networks used commonly for modeling on principle. It has inductive nature - solution to problems is based on sorting procedure by external criterion. Inductive GMDH algorithms gives possibility to find automatically existing relationships in data, select optimal structure of network and can increase the accuracy of existing algorithms. This is based on fact that external criterion characteristic have minimal value during complication of model structure. It also automatically solves the problem of inputs collinearity and fix the selected variables in output. The GMDH was applied in many countries for data mining and forecasting, systems modelling and optimization, segmentation and pattern recognition..

Several examples of different GMDH algorithms applications for marketing problems and their comparison with another commonly used methods are shown in the paper. The problems of forecasting of brand sales, segmentation of products launches and their attributes, media analysis are considered. For their solution the Combinatorial, Multilayered Iterational, Analog Complexing and OCC GMDH algorithms are compared with Exponential Smoothing and Box-Jenkins algorithms.

The developed system implements existing data mining algorithms to get a new insights from existing databases. In the paper is shown the structure of software and outputs for the problems mentioned above. The VBA language was used to create software system which can import data, then produce different reports and slides with charts. It will be available on the GMDH website <http://www.gmdh.net> soon. The simplicity of GMDH algorithms gives possibility to create not complex software, which produce good results.

## References

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