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USING LINEAR WEIGHTED COMBINATIONS IN MARKETING DATA ANALYSIS

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Annotation. The article outlines an approach to constructing linearly weighted combinations for market forecasting. In addition, approaches to specifying and calibrating additive models are given, which can be built on the basis of data obtained during market research or based on the results of the economic activities of an individual enterprise. Finally, the proposed directions for using this type of model are described.

Keywords: data analysis, marketing data, big data, massive data, forecasting, marketing analytics, action analysis, market activity, matrices, scalar values, predictive analytics, market forecast.

Linear-weighted combinations are used in cases where a single assessment of a phenomenon is required based on variables that make different contributions to the final result. In a single model, data of this type can only be used as a weighted combination, that is, using weighting coefficients that emphasize the overall contribution of the variables to the final result of the model. A linearly weighted combination allows you to take a number of significant vectors and multiply each of them by a scalar value and then sum them up in order to obtain the final result in the form of a single integral estimate (1).

$$y=a_1*x_1+a_2*x_2+a_3*x_3+\ldots+a_n*x_n; \quad (1)$$

The scalar values of the model can be a real-valued number, the vector values must have the same dimension. This kind of equation can be rewritten for operations with vectors. Considering that vector records can contain negative values.

As statistics accumulate, it is necessary to adjust scalar values in order to increase the accuracy of estimates or compare options for the course of processes in economic systems. In our study, we considered process analytics based on a five-factor model, which allows us to model and compare the processes under study.

In our model, the initial version of the scalars was taken based on the results of the assessments of objects of the same type (2).

$$a_1=0{,}36,\ a_2=0{,}24,\ a_3=0{,}08,\ a_4=0{,}12,\ a_5=0{,}2; \quad (2)$$

If we take a base vector with a certain set of values, we get a final vector that determines the state of the factors of the system under consideration (3).

$$x_1=\begin{bmatrix}1\\2\\1\end{bmatrix},\ x_2=\begin{bmatrix}4\\3\\2\end{bmatrix},\ x_3=\begin{bmatrix}1\\-1\\2\end{bmatrix},\ x_4=\begin{bmatrix}6\\3\\7\end{bmatrix},\ x_5=\begin{bmatrix}3\\4\\4\end{bmatrix}; \quad (3)$$

Taking into account the calculations performed, we obtain the following value of the final vector (4).

$$y=a_1*x_1+a_2*x_2+a_3*x_3+a_4*x_4+a_5*x_5=\begin{bmatrix}2{,}72\\2{,}52\\2{,}64\end{bmatrix}; \quad (4)$$

As practice accumulated and additional assessments were carried out, the coefficient values were adjusted (5).

$$a_1=0{,}32,\ a_2=0{,}21,\ a_3=0{,}12,\ a_4=0{,}18,\ a_5=0{,}17; \quad (5)$$

Taking this into account, the model result for the same vector of values will change (6).

$$y=a_1*x_1+a_2*x_2+a_3*x_3+a_4*x_4+a_5*x_5=\begin{bmatrix}2{,}87\\2{,}37\\2{,}92\end{bmatrix}; \quad (6)$$

From the point of view of predictive analytics and performance assessment, the accuracy of modeling has changed and the analytics of process activity in the system under consideration has become more accurate (Figure 1).

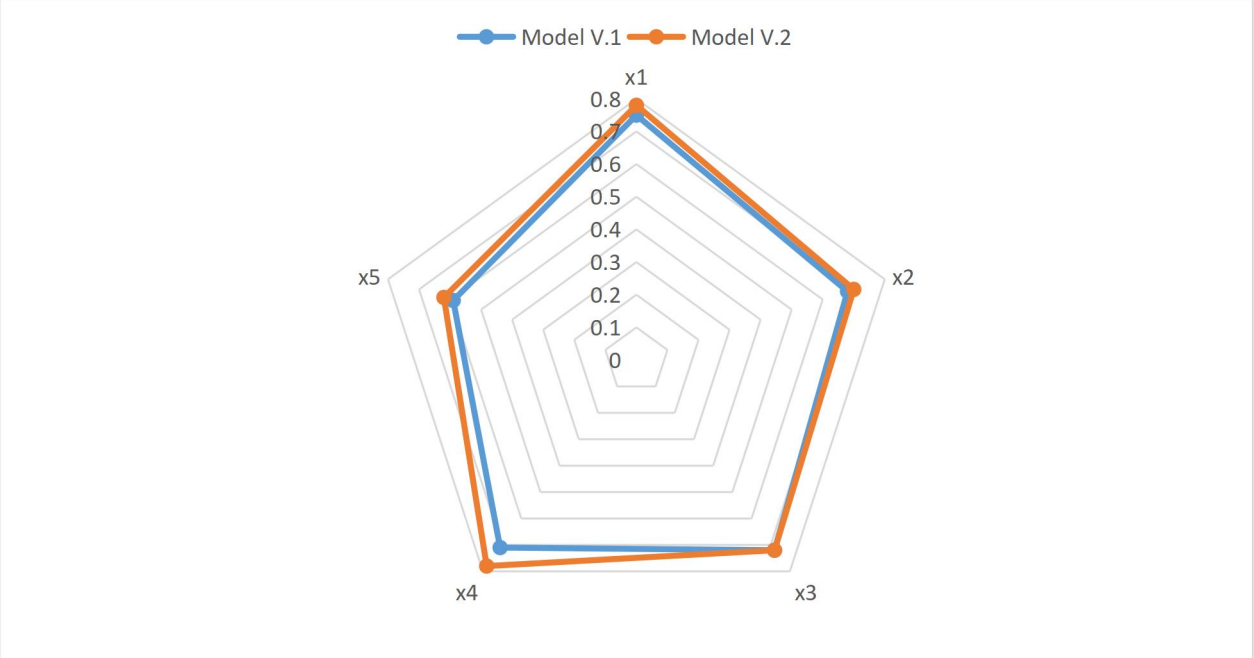

Figure 1. Comparison of the accuracy of estimates made using variant 1 and variant 2 of the model under consideration

In the practical implementation of linear-weighted combinations for evaluating large data sets, it is advisable to implement them in the form of multiplication of vectors and matrices.

Taking this into account, we can highlight the main directions for using linear-weighted models:

– the data that results from the model predicts the outcomes of processes and is calculated based on a linearly weighted combination of regressors and scalar values;

– when undergoing dimensionality reduction procedures, based on the selection of components and increasing their dispersion;

– use of input data taking into account scalar values for subsequent nonlinear transformation within neural networks.

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author's contribution

Rahel Dzmitry Mikhailovich – examined using linear weighted combinations in marketing data analysis, article formation.

ИСПОЛЬЗОВАНИЕ ЛИНЕЙНО-ВЗВЕШЕННЫХ КОМБИНАЦИЙ ПРИ АНАЛИЗЕ РЫНОЧНЫХ ДАННЫХ

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Аннотация. В статье изложен подход к построению линейно-взвешенных комбинаций при рыночном прогнозировании. Кроме этого приводятся подходы к уточнению и калибровке аддитивных моделей, которые могут быть построены на основании данных, полученных в ходе исследований рынка или по итогам хозяйственной деятельности отдельного предприятия. В завершении описываются предполагаемые направления использования такого типа моделей.

Ключевые слова: анализ данных, маркетинговые данные, большие данные, массив данных, прогнозирование, маркетинговая аналитика, анализ действий, рыночная активность, матрицы, скалярные значения, прогнозная аналитика, рыночный прогноз.