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ANALYSIS OF THE ALGORITHM FOR DETERMINING CATTLE CASCADE

Xaniyev N.M
Muhammad al-Xorazmiy nomidagi Toshkent
axborot texnologiyalari universiteti Samarqand filiali
xaniyevnurislam@gmail.com

Abstract

Currently, special attention is paid to automation processes in all industries. One of the pressing problems in the veterinary sector is also the automation of the activities of specialists. This article considers the issue of controlling information flows based on an algorithm for detecting errors in the detection of animal diseases. The study proposes a method for the detection of complex diseases based on analytical indicators. This allows veterinarians to detect the disease early.

Keywords: Animal diseases, early detection of the disease, method of integrated analysis based on analytical values, automation, artificial testing, evaluation by criteria.

Introduction

A job in the field of technology is a job that ensures that any problem is solved on a computer. The composition, structure, expression of the necessary data for the implementation of the set goal has been established, and if the links between them are clearly expressed, the question is posed.

The issue of determining the degree of disease of animals is an urgent issue. That's why any science-based methodology for assessing the disease is of interest.

Disease level is a complex indicator that describes the disease status of animals and the quality of disease management in animals, which is expressed in its disease equivalent, but is not limited only to the consequences of the disease [1, 2].

A successful analysis of an animal disease can be made only based on the following basic conditions:

1. The analysis is based on the results of observation of animals for as long as possible.
2. Analysis Time Animals must accurately reflect the actual state of illness.
3. For the purpose of analysis, only those indicators that are most important from the point of view of disease affiliation are used. And this will be solved only by assessing not only the disease condition of animals, but also its state of health.
4. The person conducting the analysis must have relevant disease statistics, the attribution of which to the disease of infected animals must be confirmed in the context of the period of analysis [3, 4].

We can significantly strengthen the approach to disease analysis by combining calculations on quantitative (disease) indicators in our analysis. But the methods that exist do not provide such opportunities for analysts.
The approach to disease analysis, described below, provides an opportunity to analyze the disease, not only adapting to the country, period, but also adapted to the specific aspects of the animal, taking into account the mentioned shortcomings.
The idea of applying it to animal disease analysis was born in the work as a way to deal with not only statistical, but also linguistic biases, i.e., biases in natural languages. If the probability of illness is said to be "low," and the values of this or that indicator are "satisfactory," then it will be necessary to look for formalisms and methods of quantifying such considerations for the purpose of expressing in strictly mathematical language what exactly is meant. It is necessary not only to understand, but also to draw scientific conclusions with the help of the obscure statements received.
In medicine it is quite widely used to determine the degree of disease. But in the practice of economic analysis in our country, veterinarians these methods are not used. However, work in this direction abroad is increasing every year [5, 7].
We decided to describe it twice in order for the content of our method to be perfectly understood:
in a simplified and full-fledged view that bypasses the use of obscure sets.

II. Method of Complex Disease Analysis Based on Analytical Values
Stage 1 (Collections). We include the following main sets of cases and sets of parts, which are described in natural language:
A. The Complete Set **of Disease Status G** is divided into five parts, as follows:
Complete Set **G** is divided into 3 sets:
G1 – Part set "High risk of the disease",
G2 – "Moderate disease" part set,
G3 – "Low-Level Illness" Part Set.
Here and hereinafter we consider that G-score accepts values from zero to one on tariff.
B. A complete set of its values for a **voluntary individual disease or management** indicator **Xi is** divided into five parts:
Bi1 - "Low level of indicator XI",
Bi2 - "Average level of Indicator XI" part set,
Bi3 - Part set "High level of Indicator XI",
This means that animal status (E) and disease level (G) are determined by the values of these X indicators [8, 9].

$$G = < X_1, X_2, ..., X_N >$$

$X = \{X_i\}, \quad i = 1,n, \quad X_i - X$ Types (groups) of indicators

$X_i = \{B_{ij}\}, \quad i = 1,n, j = \overline{1,M}$ (where M=3).

$B_{ij} - X_i$ type X is the j-type linguistic value of the indicator, i.e., the $B_{ij} - X_i$ j-linguistic value of the indicator.

Here and hereafter we may refer to:

1. Separately, the increase in indicator XI was correlated with the decrease in disease which is associated with an improvement in the condition of the animals under consideration. If the opposite current is observed for this indicator, then during the analysis it is necessary to replace it with the opposite one.

2. An additional condition regarding the compatibility of B and G is satisfied: if all indicators **have a partial set level Bij** in accordance with classification during the analysis , the disease status is classified as **Gj**. The fulfillment of this condition depends, on the one hand, on the quantitatively correct classification of the levels of indicators. The fulfillment of this condition affects on the quantitative correct classification of the levels of indicators on the one hand (see the next step 5 of the method), and on the other hand, on the correct determination of the importance of the indicator in the evaluation system (see the next step 3 of the method).

Stage 2 (Indicators). According to expert analysts, we construct a set of separate indicators X = {Xi} with a total number of N, which affect the assessment of animal disease on the one hand, and on the other hand assess the worker and disease aspects of animals that are different in nature (avoiding the repetition of indicators in terms of their importance for analysis).

Stage 3 (Complacency). We assign each indicator to Xi according to its level of importance for analysis. To assess this level, all indicators should be placed in descending order of their importance in such a way that the following rule is fulfilled[10, 11].

$$r_1 \geq r_2 \geq \ldots r_N . \tag{1}$$

Let's take an example. The disease status causes harm to animals.

If the system of indicators is structured in descending order of importance, then the importance of indicator i should be determined according to Fishburn's rule [12, 13]:

$$r_i = \frac{2(N-i+1)}{(N-1)N} . \tag{2}$$

The Fishburn rule embodies the fact that about the importance of indicators nothing is known except (1). In this case, (2) the assessment corresponds to the maximum value of the entropy of the information uncertainty contained about the object being applied.

If all indicators have the same level of importance (a system with an equal advantage), then

$$ri = 1/N. \tag{3}$$

Stage 4 (Classification of disease level). We construct the classification of the current value of the calibre level indicator as a criterion for dividing this set into partial sets (Table 1):

Table 1 Table of classification of the current value of the index

G	G-value range	Partition Collections Name
$g\,g_1$	$0.7 < g < 1$	**G1** - " High degree of the disease "
$g\,g_2$	$0.3 < g < 0.6$	**G3** - " Moderate disease "
$g\,g_3$	0<g< 0.3	**G5** - " Low-level disease "

Stage 5 (Classification of Indicator Values).
We construct the classification of the current values of x indicators as a criterion for dividing the full set of their values **into partial sets of the form B (Table 2):**

Table 2 Criteria for partition in the form B

Indicator name	Criteria for partitioning into sets		
	Bi1	Qi2	Qi3
X1	X1<B11	b11< x1<b12	b12< x1
…	…	…	…
XI	xi<bi1	bi1< xi<bi2	Bi2< XI
…	…	…	…
HN	xN<bN1	bN1< xN<bN2	bN2< xN

Stage 6 (Evaluation of indicators levels). We carry out an assessment of the current levels of indicators and place the results in Table 3.

Table 3 Rating of performance levels

Indicator name	Current Value
X1	x1
…	…
XI	XI
…	…
HN	xN

X_i – this is the i-type "term" of the X exponent, and its current values $\{x_{ij}\}$ – have a set of -. According to Table 2, i = 1,N , j = 1,3.

Stage 7 (Division of indicator levels into classes). We divide the current values of x into classes according to the criteria in Table 2. The result of the classification is expressed in Table 4:

λ_{ij} – is the result of classification.

Table 4 Separation of indicator levels into classes

Indicator name	Results of classification by partition sets		
	Bi1	Qi2	Qi3
X1	λ_{11}	λ_{12}	λ_{13}
…	…	…	…
XI	λ_{i1}	λ_{i2}	λ_{i3}
…	…	…	…
HN	λ_{N1}	λ_{N2}	λ_{N3}

If bi(j-1)< xi<bij, then $\lambda_{ij=1}$, otherwise $\lambda_{ij=0}$ (the value does not fall within the chosen classification range).

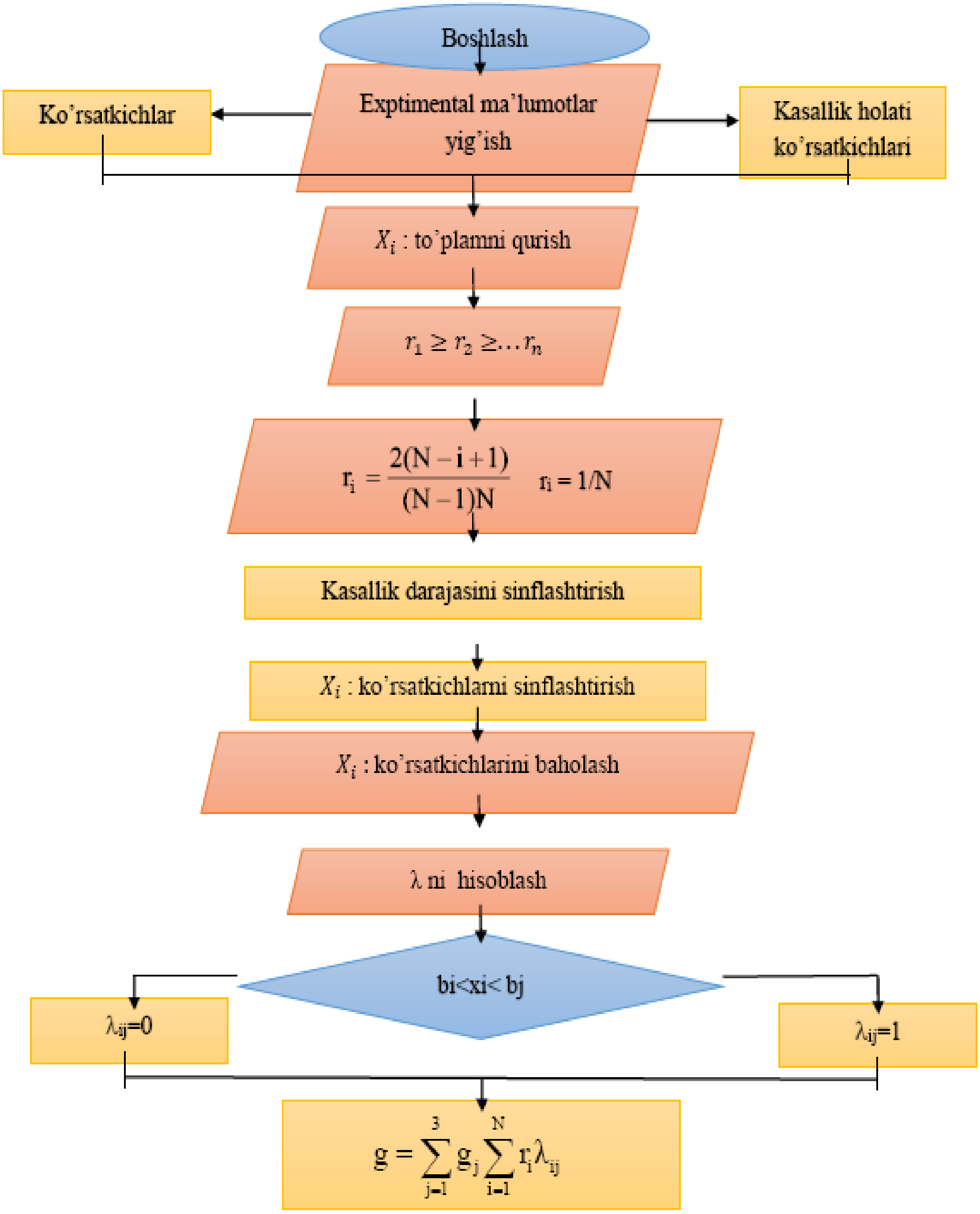
Stage 8 (assessment of disease level). Now we perform the formal arithmetic procedure for assessing the degree of illness:

$$g = \sum_{j=1}^{3} g_j \sum_{i=1}^{N} r_i \lambda_{ij} \, , \tag{4}$$

here

$$g_j = 0.9 - 0.2(j-1) \, , \tag{5}$$

λ_{IJ} is determined according to Table 4, and RI is determined by formulas (2) or (3).
(4) and (5) The main content of the formulas is as follows. In assessing the state of the animal disease level *G* (the internal sum in (4), we first estimate the weights of one or another part of the set in B. These weights are then *involved in an external sum to determine the mean value of the indicator g, where gj is the average estimate of g obtained from the corresponding intervals of Table 2 in step 4 of the method.*



Cattle cash register determination algorithm block scheme

III. Conclusion

Mathematical methods related to the field of veterinary medicine - criteria for determining the condition of research objects related to health problems, a set of methods and algorithms for the assessment, analysis and formation of a set of quantitative signs are analyzed.

A diagnosis is made based on the experience taken using the application of regression modeling. At the same time, the mathematical hardware is sorted between the incoming data and the desired solution, which means that there is no need to establish a relationship without spending excessive time to create and validate mathematical models.

The software helps quickly and accurately diagnose animal diseases. This is very important for the health of animals, as fast diagnosis provides a quick treatment time.

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