The Application of Classification Algorithm in Biochemical Testing

Xu Kun Peng

The Central Hospital of Enshi Tujia and Miao, Autonomous Prefecture, Hubei Province, 445000, China

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Abstract: In today's society, people's living standards have gradually improved, and their health has gradually been paid attention to. In order to better understand the health of the body, physical examination is a very important way, in which biochemical tests can clearly know which part of the body has problems. However, traditional methods cannot see the biochemical test results clearly. Therefore, a classification algorithm is proposed for biochemical test analysis. Firstly, the computer is used to classify and analyze the test results, and the indicators are divided according to the requirements of biochemical tests to reduce biochemical tests in the interfering factor. Then, the computer classifies the results of the biochemical tests in the physical examination, forms a biochemical test plan, and tests the biochemistry The results were comprehensively analyzed. MATLAB simulation shows that under certain evaluation criteria, the classification algorithm has a high impact on the accuracy of biochemical tests in physical examination. The reliability of biochemical tests is better than traditional methods.

1 INTRODUCTION

Biochemical testing is one of the important contents of physical examination and is of great significance for understanding physical health (Li, 2023). However, in the process of biochemical testing, there is a problem of poor accuracy in the biochemical test scheme, which brings certain errors to the physical examination results (Wang, 2023). Some scholars believe that the application of classification algorithm to physical examination analysis can effectively analyze the biochemical test scheme and provide corresponding support for biochemical testing. On this basis (Wang and Zhang, 2022), a classification algorithm is proposed to optimize the biochemical test scheme and verify the effectiveness of the model (Xun and Hu, et al. 2022).

2 RELATED CONCEPTS

2.1 Mathematical Description of the Classification Algorithm

The classification algorithm uses artificial intelligence to optimize the biochemical test scheme, and finds the unqualified values in the physical examination according is y_i, and the indicators in the biochemical test is z_i, and integrates the biochemical test scheme $tol(y_i \cdot d_{ij})$, and the final judgment The feasibility of the medical examination is calculated as shown in Equation (1).

$$tol(y_i \cdot d_{ij}) = y_{ij} \geq \max(d_{ij} \oplus \frac{1}{n} \square \frac{d-\mu}{\sigma}) \quad (1)$$

Among them, the judgment of outliers is shown in Equation (2).

$$\max(d_{ij}) = (d_{ij}^2 - 3) \succ mean(\sum d_{ij} \frac{1}{n} \square \sum_{i=1}^{n} d_i^2) \quad (2)$$

The classification algorithm combines the advantages of artificial intelligence and uses physical examination for quantification, which can improve the accuracy of biochemical tests (Zhang, 2022).

Hypothesis I. The biochemical test requirements is d_i, the biochemical test scheme is set_i, the satisfaction of the biochemical test scheme is y_i, and

the biochemical test scheme judgment function is $P(d_i \approx 0)$, as shown in Equation (3).

$$P(s_i) = \sum d_i \bigcap \xi \rightarrow \prod y_i \xleftarrow{\frac{1}{n}} \sum_{i=1}^{n} d_i Y_i \qquad (3)$$

2.2 Selection of biochemical test scheme

Hypothesis II. The physical examination function is $r(d_i)$, the weight coefficient is w_i, then, the biochemical test requires a failed physical examination as shown in Equation (4):

$$r(d_i) = z_i \cdot \prod P(s_i) - w_i \neq \sum_{i=1}^{n} d_i Y_i \qquad (4)$$

Based on hypotheses I and II, the comprehensive function of the physical examination can be obtained, and the result is shown in Equation (5).

$$r(d_i) + P(s_i) \leq \max(d_{ij}) \qquad (5)$$

In order to improve the effectiveness of the accuracy of the test results, all data needs to be standardized and the results are shown in Equation (6).

$$\overline{r(d_i^1)} + P(s_i) \leftrightarrow mean(\sum d_{ij} \frac{1}{n} \Box \sum_{i=1}^{n} d_i^2) \qquad (6)$$

2.3 Analysis of biochemical test protocols

Before the classification algorithm, the biochemical test scheme should be analyzed in multiple dimensions, and the biochemical test requirements should be mapped to the physical examination library, and the unqualified biochemical test scheme should be eliminated is $No(d_i)$, According to Equation (6), the anomaly evaluation scheme can be proposed, and the results are shown in Equation (7).

$$No(d_i) = \frac{\overline{r(d_i^1)} + P(s_i)}{mean(\sum d_{ij} \frac{1}{n} \Box \sum_{i=1}^{n} d_i^2)} \qquad (7)$$

Among them, $\dfrac{\overline{r(d_i^1)} + P(s_i)}{mean(\sum d_{ij} \frac{1}{n} \Box \sum_{i=1}^{n} d_i^2)} \leq 1$ it is stated that the scheme needs to be proposed, otherwise the scheme integration required is $Zh(d_i)$, and the result is shown in Equation (8).

$$Zh(d_i) = \min[\sum \overline{r(d_i^1)} + P(s_i)] \qquad (8)$$

The physical examination is comprehensively analyzed, and the threshold and index weights of the biochemical test scheme are set to ensure the accuracy of the classification algorithm. The physical examination is a systematic test of the biochemical test plan, which needs to be accurately analyzed. If the physical examination is in a nonnormal distribution is $unno(d_i)$, its biochemical test protocol is affected, reducing the accuracy of the overall biochemical test is $accur(d_i)$, calculated as shown in Equation (9).

$$accur(d_i) = \frac{\min[\sum \overline{r(d_i^1)} + P(s_i)]}{\sum \overline{r(d_i^1)} + P(s_i)} \times 100\% \qquad (9)$$

The investigation of the biochemical test scheme showed that the biochemical test scheme showed a multidimensional distribution, which was in line with the objective facts. The physical examination is not directional, indicating that the biochemical test scheme has strong randomness, so it is regarded as a high analytical study. If the random function of the medical examination is $randon(d_i)$, then the calculation of formula (9) can be expressed as formula (10).

$$accur(d_i) = \frac{\min[\sum \overline{r(d_i^1)} + P(s_i)]}{\sum \overline{r(d_i^1)} + P(s_i)} \times 100\% + randon(d_i) \qquad (10)$$

Among them, the physical examination meets the normal requirements, mainly artificial intelligence adjusts the physical examination, removes duplicate and irrelevant schemes, and supplements the default

scheme, so that the dynamic correlation of the entire biochemical test scheme is strong.

3 OPTIMIZATION STRATEGIES FOR MEDICAL EXAMINATIONS

The classification algorithm adopts a random optimization strategy for physical examination, and adjusts the test result parameters to realize the scheme optimization of physical examination. The classification algorithm divides the physical examination into different biochemical test levels, and randomly selects different schemes. In the iterative process, the biochemical test schemes of different biochemical test grades are optimized and analyzed. After the optimization analysis is completed, the biochemical test levels of different protocols are compared to record the best physical examination.

4 PRACTICAL EXAMPLES OF MEDICAL EXAMINATIONS

4.1 Introduction to Biochemical Tests

In order to facilitate biochemical testing, the physical examination in complex cases is the research object, there are 12 paths, the test time is 12h, and the biochemical test scheme of the specific physical examination is shown in Table 1.

Table 1: Biochemical testing requirements

Scope of application	grade	accuracy	Biochemical tests
Auscultation of the heart	routine	86.04	86.71
	Higher	80.04	88.22
electrocardiogram	routine	83.31	81.68
	Higher	82.53	85.38
Liver function	routine	85.48	85.93
	Higher	84.92	82.12

The biochemical test process in Table 1 is shown in Figure 1.

Compared with traditional methods, the biochemical test scheme of the classification algorithm is closer to the actual biochemical test requirements. In terms of the rationality and accuracy of the biochemical test results of physical examination, the classification algorithm is superior to the traditional method. From the changes in the

biochemical test scheme in Figure 1, it can be seen that the classification algorithm has higher accuracy and faster judgment speed. Therefore, the biochemical test scheme speed, biochemical test scheme feasibility, and summation stability of the classification algorithm are better.
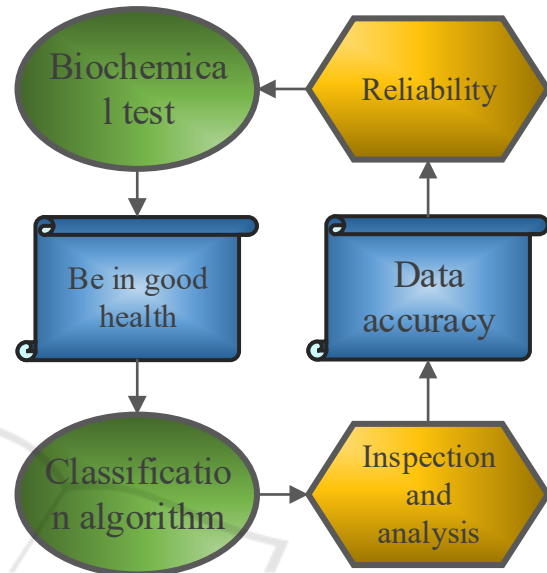

Figure 1: The analytical process of the medical examination

4.2 Physical Examination

The biochemical test protocol of physical examination contains non-structural information, semi-structural information, and structural information. After the preselection of the classification algorithm, the biochemical test scheme of the preliminary physical examination was obtained, and the biochemical test of the physical examination was obtained Analyze the feasibility of the scheme. In order to more accurately verify the innovative effect of physical examination, select different biochemical test levels, biochemical test schemes, as shown in Table 2.

Table 2. The overall picture of the biochemical testing protocol

Category	Accuracy	Analysis rate
Auscultation of the heart	82.19	86.67
Electrocardiogram	83.72	88.55
Liver function	87.18	87.77
mean	85.30	87.28
X^6	83.90	86.18
P=2.187		

4.3 Biochemical Testing and Stability of Biochemical Tests

In order to verify the accuracy of the classification algorithm, the biochemical test scheme is compared with the traditional method, which is shown in Figure 2.
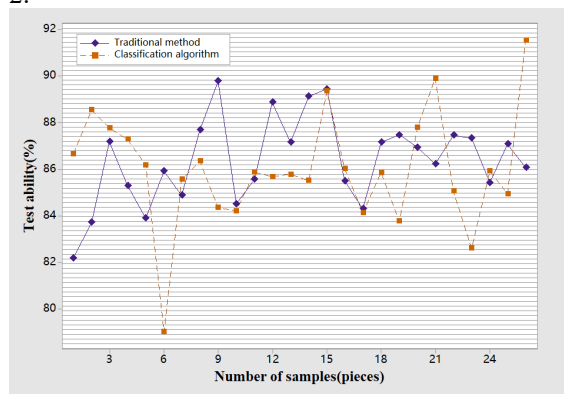

Figure 2: Biochemical tests for different algorithms

It can be seen from Figure 2 that the biochemical test of the classification algorithm is higher than that of the traditional method, but the error rate is lower, indicating that the biochemical test of the classification algorithm is relatively stable, while that of the traditional method Biochemical tests are uneven. The average biochemical test scheme of the above three algorithms is shown in Table 3.

Table 3: Comparison of biochemical test accuracy of different methods

algorithm	Biochemical tests	Magnitude of change	error
Classification algorithm	93.16	91.40	92.16
Traditional methods	91.91	89.15	89.17
P	87.48	83.77	90.89

It can be seen from Table 3 that the traditional method has shortcomings in the accuracy of biochemical tests in physical examination, and the physical examination has changed greatly and the error rate is high. The general results of classification algorithms have higher biochemical tests than traditional methods. At the same time, the biochemical test of the classification algorithm was greater than 91%, and the accuracy did not change significantly. In order to further verify the superiority of the classification algorithm. In order to further verify the effectiveness of the proposed method, the classification algorithm is generally analyzed by different methods, as shown in Figure 3.
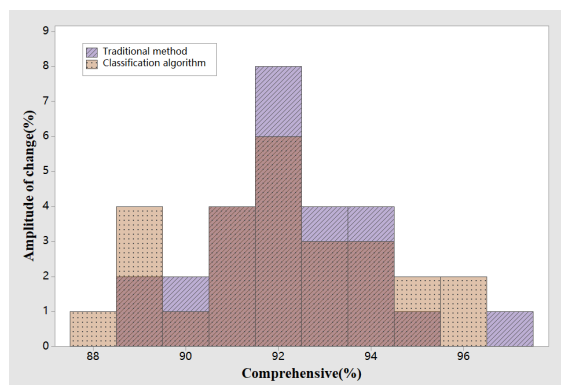

Figure 3: Biochemical test of classification algorithm biochemical test

It can be seen from Figure 3 that the biochemical test of the classification algorithm is significantly better than the traditional method, and the reason is that the classification algorithm increases the adjustment coefficient of physical examination and sets the test results thresholds to reject biochemical test protocols that do not meet the requirements.

5 CONCLUSIONS

Aiming at the problem of unsatisfactory biochemical test in physical examination, this paper proposes a classification algorithm and combines artificial intelligence to optimize the physical examination. At the same time, the accuracy of biochemical tests is analyzed in depth and the test result collection is constructed. Studies have shown that the classification algorithm can improve the accuracy of physical examination, and can perform general biochemical tests for physical examination. However, in the process of classification algorithm, too much attention is paid to the analysis of biochemical tests, resulting in unreasonable selection of biochemical test indicators.

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