

Analysis and Research on Skill Improvement and Algorithm Optimization Based on VB.NET

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Abstract: This paper expounds the related technologies of the development and application of VS development environment, .NET framework and skills promotion platform, analyzes the practical significance of this platform research and development, discusses the development and function description of courseware module, experiment module, design module, document module, Information Query module, etc., and forecasts and analyzes the application effect and prospect of the platform. The difference of operation between the selection method and the bubble method is fully compared and analyzed. Among 8 groups of data, the time consumption of 6 groups of data using the selection method is lower than that using the bubble method. Through the data analysis, from the cycle number or stability of the optimization, the use of bubble method is better; from the time-consuming optimization, the use of selection method is better than the use of bubble method to carry out this study. This platform has been applied in practice and its functions are optimized and upgraded in professional course teaching.

1. Introduction

The teaching practice of computer major is strong, the professional content is updated quickly, and the amount of information is large. Especially, there are many documents related to professional courses. Teachers and students need to find and process relevant course information manually. Therefore, it is very important to develop relevant software platforms to intelligently manage and query course information. For teachers engaged in professional teaching, there are many types and contents of course materials, and it is relatively difficult to query related courseware, homework, experiment, design, report and other documents, which requires research and development of related platforms for scientific management and application.

The "Skills Promotion Platform" studied in this paper is different from other platform systems. The existing related information platform is mainly used by a certain unit to manage personnel information or product information, which is quite different from the professional curriculum management function studied in this paper. The skill promotion platform studied in this paper is to manage courseware PPT, homework, experiment, curriculum design, report, student information and other documents in professional course teaching from the perspective of teachers and students.

Through the application of this platform and scientific information management, the work efficiency and learning effect of teachers and students can be improved.

2. VS Environment and VB.NET Technology

This platform is developed by applying VB.NET software in VS development environment (Visual Studio) combined with common database technology. VS is a product of Microsoft Corporation. VS supports VB, VC#, VC++, V F# and other development languages.

VB.NET is developed from VB. Its main features are: object-oriented; Support the inheritance, overload, virtual and other characteristics of the class; Powerful function, standard interface, strong code structure and so on.

The .NET framework is Microsoft's software platform, dedicated to rapid application development, platform independence and network transparency, and provides a cross-language environment, including common language runtime, service framework and application templates (Windows and Web templates). [1-4]

3. Function and Significance of R&D

This skill promotion platform is very practical in function. Through the platform, students can conduct preview or self-study, knowledge review, homework submission and feedback, document management, information contact between teachers and students, etc., which is conducive to improving learning efficiency, skills promotion, information management of professional teachers and student information statistics, etc.

With the development of specialty and technology, the workload of teachers is gradually increasing, and the teaching-related content involved is also wider. It is relatively difficult to manage and search the course materials by traditional methods. The skill promotion platform studied in this paper not only improves students' learning efficiency, but also enables professional teachers to manage course documents efficiently, thus improving work efficiency.

Computer teachers can use this platform to change teaching methods. According to the platform steps, they can make and optimize courseware, analyze and process documents, organize experimental design, correct experimental assignments and reports, etc., and get familiar with the progress of each step in time. Through the practical application and information feedback of the system, this platform has good practical significance, which is worth optimizing, upgrading and popularizing.

4. Process of R&D and Module Function

The research and development of this platform reflects the advantages of VS environment and the characteristics of VB.NET software. The main functional modules are PPT courseware, experimental exercises, curriculum design, homework management, information inquiry, etc. The main interface of the system is shown in Figure 1, and each sub-form has unique functions. PPT courseware module includes PPT content, PPT display area, PPT editing, PPT modification, PPT playing, etc. The experiment module includes the practice list, experiment classification, experiment purpose and content of each chapter of professional courses. The course design module includes the design list, design objectives, design contents and steps of each chapter of professional courses. Homework management module includes homework statistics, list, report template, etc. The information query module includes experimental homework query, design query, score retrieval and so on. This platform realizes the scientific management of the course, which is beneficial to students' learning efficiency and teachers' work efficiency.



Figure 1: The system main interface.

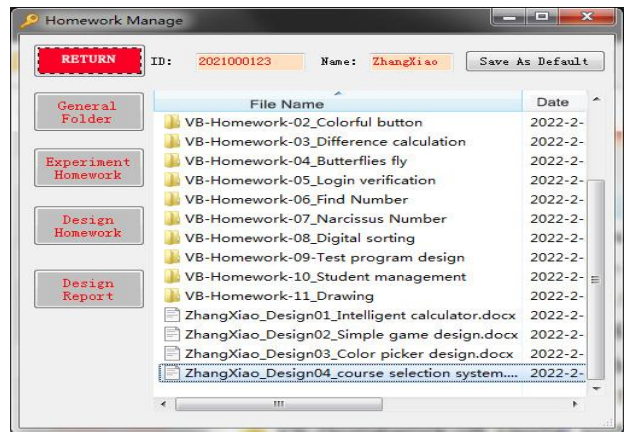


Figure 2: The homework management module.

The display window of the homework management module is shown in Figure 2. The homework management module can carry out statistics and management on experimental homework, design homework, the report, basic information of students, etc., which is beneficial for teachers and students to search, manage and maintain the operation, etc.

Some related codes are as follows:

```
Private Sub btnManage_Click( ) Handles btnManage.Click
    If (Len(txt_no.Text) <= 9) Or (IsNumeric(txt_no.Text) = False) Or _
    (Len(txt_name.Text) <= 1 Or (Asc(Mid(txt_name.Text, 1, 1)) >= 0) _
    Or (Asc(Mid(txt_name.Text, 2, 1)) >= 0) Then
        MsgBox("Wrong student number or name!"):Exit Sub
    End If
    Dim b_path As String
    b_path = Application.StartupPath & "\" & txt_no.Text & "_" & txt_name.Text
    If Directory.Exists(b_path) = True Then
    Else
        Directory.CreateDirectory(b_path)
    End If
    wb.Navigate(b_path, False)
End Sub
```

```
Private Sub myWork_Load( ) Handles MyBase.Load
    FileOpen(1, Application.StartupPath + "\vip\info.txt", OpenMode.Input)
    Dim myNo$ = vbNullString:Dim myName$ = vbNullString
    Do While Not EOF(1)
        Input(1, myNo):Input(1, myName)
    Loop
    FileClose()
    txt_no.Text = InputBox("Enter the student id: ", "student id ", myNo)
    txt_name.Text = InputBox("Enter name:", "name", myName)
End Sub
```

```
Private Sub btnInfo_Click( ) Handles btnInfo.Click
    Dim myconn As New OleDb.OleDbConnection("Provider=Microsoft.Jet. OLEDB.4.0;Data
Source=myDATA.mdb;")
    Dim mystr As String="SELECT Student number, name, gender, major, class FROM
Students order by Major asc, class asc, student number asc" 'desc
    Dim myadapter As New OleDb.OleDbDataAdapter(mystr, myconn)
```

```

Dim mydataset As New DataSet
myadapter.Fill(mydataset, "Students")
DataGridView1.DataSource = mydataset.Tables("Students")
For i = 0 To mydataset.Tables("Students").Columns.Count - 1
    DataGridView1.Columns(i).Width=80:DataGridView1.Columns(i).
SortMode=DataGridViewColumnSortMode.NotSortable
Next (i)
End Sub

```

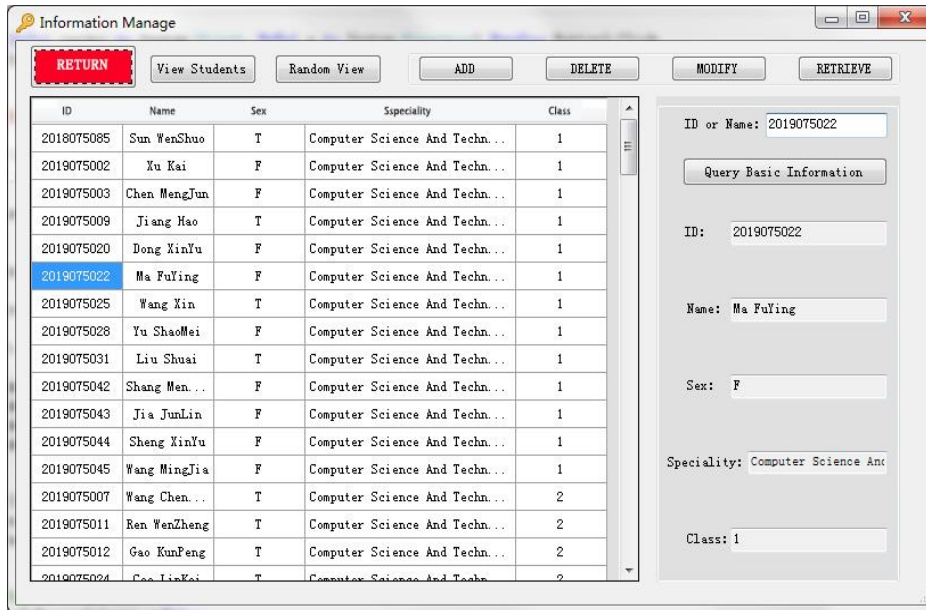


Figure 3: The information management module.

The display form of the information management module is shown in Figure 3, which realizes the management and processing of courses, homework, student information.

5. Advantages and Practical Value of System

The UI design of this platform is beautiful, the form is concise, the function is practical, the operation is convenient, the code is readable, and the human-computer interaction is good. For teachers of professional courses, even if they are not familiar with computer operation, they will quickly master the use methods and steps of this system. Teachers of specialized courses can use this system to manage course information, homework information, experiment information and student information in time, so as to improve work efficiency. Students can use this system to study by themselves, inquire and manage homework, and so on, so as to improve their interest and efficiency. This system has good practical application value, which can make teachers and students scientifically manage all kinds of information of courses, save work and study time of teachers and students, and improve efficiency.

6. Algorithm Optimization Analysis

In this paper, eight groups of data are selected, initially 60 people, and each group of data gradually increases by 20 people. According to the running results of the algorithm, the bubble method is better than the selection method in terms of cycle times, but the selection method is better than the bubble method in terms of time consumption, as shown in Table 1.

Table 1: The algorithm running difference table.

| Group | Number Of People | Cycles (Selection Method) | Time Consuming (Selection Method) | Cycles (Bubble Method) | Time Consuming (Bubble Method) |
|-------|------------------|---------------------------|-----------------------------------|------------------------|--------------------------------|
| 1 | 60 | 1830 | 12 | 857 | 14 |
| 2 | 80 | 3240 | 44 | 1473 | 46 |
| 3 | 100 | 5050 | 116 | 2357 | 122 |
| 4 | 120 | 7260 | 265 | 3622 | 283 |
| 5 | 140 | 9870 | 532 | 4907 | 530 |
| 6 | 160 | 12880 | 941 | 6038 | 993 |
| 7 | 180 | 16290 | 1625 | 7559 | 1472 |
| 8 | 200 | 20100 | 2833 | 9870 | 2942 |

Fully compare and analyze the running differences between the selection method and the bubble method. Among 8 groups of data, 6 groups of data take less time to use the selection method than the bubble method, and 2 groups of data take slightly more time to use the selection method than to use the bubble method. Among the data with less than 200 people, the selection method is more suitable for the best results, as shown in Figure 4. For the data with more than 200 people, and using multi-thread parallel computing at the same time, the selection method can also be used to optimize the results.

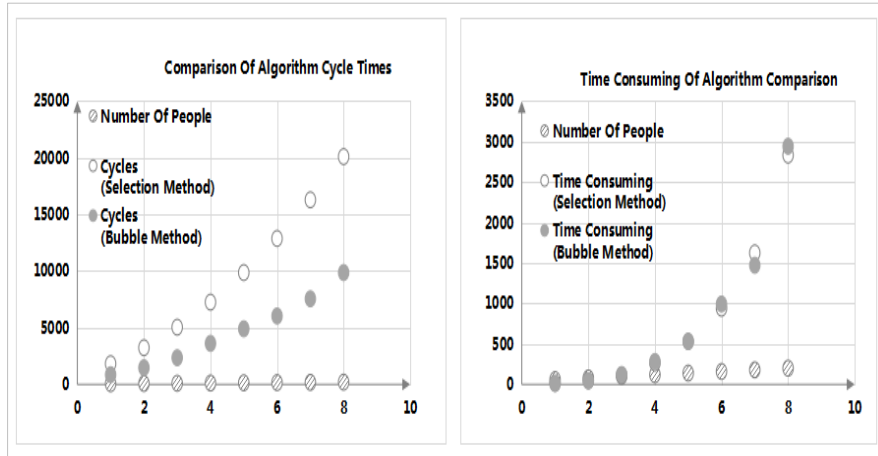


Figure 4: The optimization comparison of algorithms.

From another point of view, if we mainly use the test method of data samples to compare and analyze the algorithms, there are some limitations. The running speed of hardware, the difference of processors, etc. will also affect the results. Aside from data samples, time complexity can be used to measure the excellent differences of algorithms.

$T(n)$ is used for running time, big O is used for time complexity, and A , B and C are used for constants. Remove the low-order and constant parts, and the remaining high-order part is the time complexity. The time complexity of choosing the best case and the worst case is shown in formula (1), and it is also its average time complexity:

$$T(n) = An^2 + Bn + C = O(n^2) \quad (1)$$

It is slightly different from the selection method. The best and worst time complexity of the bubble algorithm are different. The best case is the positive sequence case, and there are $(n-1)$ times of cyclic comparison, and there is no data exchange. The time complexity is shown in formula (2):

$$T(n) = n - 1 = O(n) \quad (2)$$

The worst case of bubble algorithm is reverse order, and its time complexity is the same as that of the formula (1), and it is also its average time complexity. Compared with the time complexity, the bubble method is more stable than the selection method.

To sum up, which algorithm is better requires users to choose the best one according to specific index requirements. From the aspect of cycle times, it is suitable to use bubble method, from the aspect of time consumption, it is suitable to use selection method, and from the aspect of stability, it is suitable to use bubble method. Of course, users can further analyze and optimize from the aspects of exchange times and space complexity. ^[5]

7. Conclusions

This paper explains the characteristics and advantages of VS development environment and VB.NET development technology, analyzes the role and significance of this "skill promotion platform", details the specific functions of PPT courseware, experimental exercises, curriculum design, homework management, information inquiry and other modules, and expounds the development process of some core modules. Through data analysis and algorithm operation comparison, the selection method is better than the bubble method for the research of this topic in terms of time consumption. Which algorithm is better requires users to choose the best one according to specific index requirements. The popularization and application of this platform can improve students' learning efficiency, enhance students' interest in learning, and improve the curriculum management level of professional teachers. ^[6]

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References

- [1] Jin Qi. Deep analysis of Visual Basic.NET language [J]. *Journal of Shanghai University of Electric Power*, 2009, 25(04): 405-408.
- [2] Yang Lili, Li Xiuying. Design and Development of Educational Administration System Based on .NET [J]. *Software Guide*, 2011, 10(03): 128-129.
- [3] He Wenguang, Zhou Ke, Xiong Gangqiang, Wang Yaomin. Research on dynamic marking technology of VB.NET programming questions [J]. *Research and Exploration in Laboratory*, 2017, 36(11): 122-125.
- [4] Wei Lishun. Design and Implementation of Regional Electricity Consumption Forecasting System Based On UML Modeling [D]. Hefei: Master Thesis of Hefei University of Technology. 2011.
- [5] Xie Xiaoling, LI Shan. Analysis and Comparison of Commonly Used Sorting Algorithms [J]. *Modern Computer*, 2020, (25):71-74.
- [6] Zhu Xiangcai, Hu Yong, Xu Jian. Research on the Digital Information Platform of Teaching Professional Documents Based On VB [J]. *Management Informationization in China*, 2013, 16(20): 112-113.