Research on Tourism Information Intelligent Evaluation Based on DL and FTA

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Abstract: In this paper, we mainly use the techniques of deep learning and neural network, the methods of FTA and Dijkstra, the software of vb.net and Python to process the tourism data, and develop the intelligent evaluation system of tourism information, including the comprehensive analysis of Tourism Information, tourism route optimization, FTA intelligent evaluation functions. The use of the platform will gradually improve the scientization of tourism management.

1. Introduction

With the development of information technology, Deep Learning, FTA(Fault Tree Analysis) and other technical methods, tourism management has gradually become technical, scientific and intelligent.At present, the functions of the tourism-related management systems in use are mostly routine information management based on commonly used technologies, and there is a lack of research on diversified analysis and intelligent prediction of data and information.In this paper, information technology, deep learning, FTA method, LSM method and Dijkstra algorithm are integrated, which opens up a new research channel.

At present, the shortcomings of the tourism system are as follows: insufficient technology integration ability; Lack of information forecasting ability, safety accident prevention and handling ability; The comprehensive evaluation function of tourism information is lacking. In this paper, deep learning and FTA methods will be used to conduct comprehensive analysis and intelligent evaluation of tourism information.

2. Related technologies and algorithms, etc

Deep learning belongs to machine learning, which is to learn its inherent law. The goal is to make the machine have the ability to analyze and learn, and to recognize images, texts and sounds. Deep learning has made great achievements in data mining, machine translation, multimedia learning and other fields.[1-2]

It is an important research method in FTA system engineering, which mainly studies system security. It adopts logical method for accident analysis, and can be used for qualitative analysis and quantitative analysis.[3]

LSM method (least square method) can find the best function matching of data by minimizing the sum of squares of errors, which can quickly and simply find out unknown data, and minimize

the sum of squares of errors. It can also be used to optimize problems, etc.[4]

Dijkstra algorithm was put forward by Dutch scientist E. W. Dijkstra, which can find the shortest path between two vertices, or fix a vertex as the source node, and then find the shortest path from that vertex to other nodes to generate the shortest path tree.[5]

Floyd algorithm is named after Floyd, a professor at Stanford University (Turing Prize winner). It can correctly handle the shortest path problem of directed graphs or negative weights.[6]

3. The practical significance of the research

In this paper, DL and FTA are combined, tourism-related information is studied, safety accidents are analyzed and effectively prevented. Optimize the algorithm to realize the optimal calculation of the travel route; And can automatically repair incomplete data, etc.

The content and platform studied in this paper can be popularized and applied in tourism industry, industrial and mining enterprises, transportation field and construction industry.The tourism information management, tourism accident analysis, optimal path calculation, etc. studied in this paper are feasible in methods optimization, platform research and development, accident prediction and intelligent evaluation, and have good practical application value.[7]

4. Main research contents and key issues

4.1 Main research contents

The functions of the platform developed in this paper are as follows:

(1) Integrated management and analysis module: the least square method and other techniques are used to analyze, compare and study the tourism data, so that the information can be displayed graphically.

(2) Tourism route optimization module: using Dijkstra, Floyd and other algorithms to optimize the route and determine the optimal route.

(3)FTA module: make qualitative and quantitative analysis of safety accidents by using FTA methods, draw accident trees, realize scientific prediction, and improve tourism safety.

(4) Intelligent evaluation module: Using deep learning, neural network and other technologies to realize the analysis of tourism data, and obtain scientific and effective evaluation conclusions, which provide important basis for relevant departments.

4.2 Key problems to be solved

The key problems to be solved include information processing technology, information analysis technology, information optimization technology, intelligent evaluation technology, etc. Among them, intelligent evaluation technology is the focus of research, mainly using deep learning, neural network and other technologies to obtain evaluation conclusions including evaluation grade, comprehensive index and other parameters.

Sort and classify the key problems to be solved, and program to realize related functions. The function menu is divided into file management, data management, technical analysis, path optimization, FTA analysis, intelligent evaluation, etc. The main interface of the platform is shown in Figure 1.
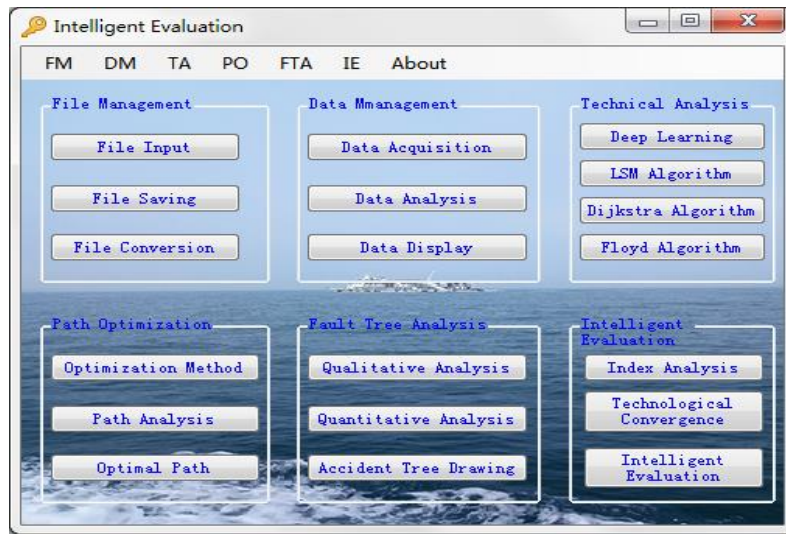
Figure 1: Main interface of platform

4.3 Technical visualization research

4.3.1 Floyd algorithm visualization

Take Floyd algorithm as an example to study data visualization, as shown in Figure 2.
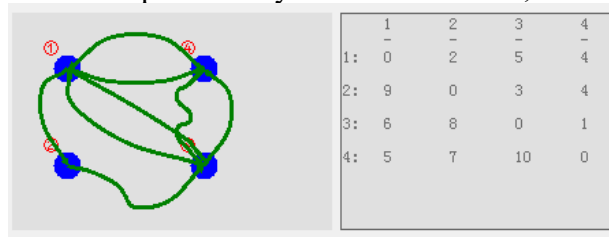

Figure 2: Example of Floyd algorithm

Some program codes are as follows:
```
Sub myDrawRoad()
    Dim g_Fy As Graphics = myPicture_Fy.CreateGraphics
    Dim p_Fy As Pen :Dim rect_Fy As Rectangle
    g_Fy.TranslateTransform(30, 30)
    g_Fy.FillEllipse(Brushes.Blue, rect_Fy)
    g_Fy.FillEllipse(Brushes.Blue, 0, 70, 20, 20) '2
    g_Fy.FillEllipse(Brushes.Blue, 100, 70, 20, 20) '3
    g_Fy.FillEllipse(Brushes.Blue, 100, 0, 20, 20) '4
    Dim sb_Fy As Brush:Dim f_Fy As Font
    g_Fy.DrawString("①", f_Fy, sb_Fy, -10, -10)
    g_Fy.DrawString("②", f_Fy, sb_Fy, -10, 60) '2
    g_Fy.DrawString("③", f_Fy, sb_Fy, 90, 60) '3
    g_Fy.DrawString("④", f_Fy, sb_Fy, 90, -10) '4
    '① to ②：The arc length is 2
    p_Fy.Color = Color.Green:p_Fy.Width = 3
    p_Fy.SetLineCap(LineCap.Flat, LineCap.ArrowAnchor, DashCap.Flat)
    g_Fy.DrawCurve(p_Fy, points, 1.0F)
```

'② to ③：The arc length is 3
g_Fy.DrawCurve(p_Fy, points_Fy, 1.0F)
　　　......
End Sub
Through the visualization module of the system, we can know that different nodes form different paths, and finally determine the optimal path.

4.3.2 Dijkstra algorithm visualization

Take Dijkstra algorithm as an example to study data visualization, as shown in Figure 3.
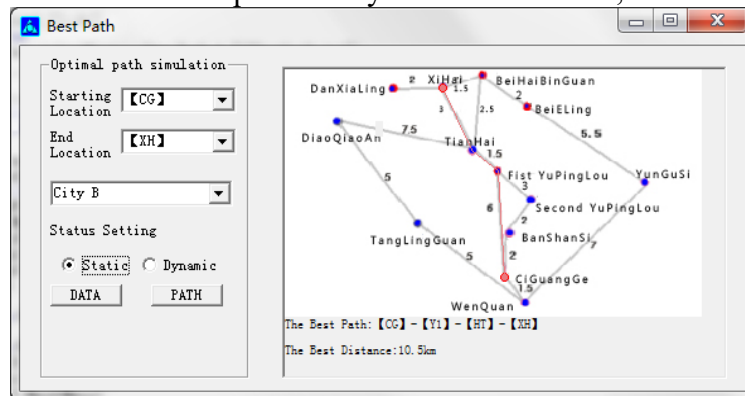

Figure 3: Example of Dijkstra algorithm

Part of the program code is as follows：

```
Private Sub MyButton_Click()
    Dim i_dijk%, j_dijk%, k_dijk%, yourNM$(1 To 500)
    If Distance_dijk(Ends_dijk) = Max_dijk Then
    Else
        txt_zj.Text &="The Best Path:"
        txt_zj.Text &= ZENG(Start_dijk)
        Mylx(0) = ZENG(Start_dijk)
    End If
    k_dijk = Ends_dijk: j_dijk = 1
    Do
        yourNM(j_dijk) = ZENG(k_dijk)
        k_dijk = Path(k_dijk): j_dijk = j _dijk+ 1
    Loop While (k_dijk <> 1)
    Mykk = 1
    For j_dijk = j_dijk - 1 To 1 Step -1
        txt_zj.Text = txt_zj.Text &"-"& yourNM(j_dijk)
        Mylx(Mykk_dijk) = yourNM(j_dijk):Mykk_dijk = Mykk_dijk + 1
    Next j
    txt_zj.Text = txt_zj.Text & vbCrLf & vbCrLf &"The Best Distance:"
txt_zj.Text = txt_zj.Text & Distance_dijk(Ends_dijk) / 10 &"km"& vbCrLf
    ......
End Sub
```

The starting point is set to [CG], the ending point is set to [XH], and the intermediate node is set to city B. Comparing multiple paths, Dijkstra algorithm is programmed and calculated. Between [CG] and [XH], the optimal path is: [CG]→[Y1]→[HT]→[XH], and the shortest distance is

10.5km.

The visualization of other algorithms will not be explained one by one.

5. Technical route of research

This project collects and processes tourism information, applies Python to data analysis, and integrates deep learning, neural network, least square method and other technical methods to realize the automatic repair of incomplete data; Use FTA for accident safety analysis; Using Dijkstra, Floyd and other algorithms to realize path analysis; Use deep learning and neural network and other related technologies to realize scientific prediction and effective evaluation; Finally, a complete application platform will be formed and promoted, implemented and improved.

The technical route can be summarized as: information collection → modeling and analysis → technology integration → algorithm optimization → function research and development → platform testing → application and promotion → upgrading and perfection.

6. Concluding remarks

This project integrates deep learning, FTA and other technologies, and applies comprehensive analysis to carry out systematic research and development on the basis of tourism data. After multi-integration of technologies, it shows great potential. The research and development of integrated management, path optimization, FTA analysis, intelligent evaluation and other functional modules are all needed by the economy and society.

Scientific management and intelligent evaluation are the needs of industry progress. The application of the research results in this paper represents a new direction of technology integration such as deep learning and FTA, and will produce good social and economic benefits.

Acknowledgements

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