Project Report for Course:
Decision Support Systems
Beslutsstödjande Systems
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Decision Support System------Intelligent CRM System

Abstract

ICRM system is kind of an intelligent decision support system, which can help business leaders manage customers relationship and find the business opportunities in the intelligent way. Many CRM systems in the market like SAP, Microsoft Dynamics, they are famous, but users often complains some of these systems are hard to learn, and need to pay high in each month. We tried to design our ICRM System in the principles of easy-learning, high effective and intelligent, to make decision become easier, faster, and more accurate.

Key words: Intelligent, decision tree, data visualization, easy-learning

1.Introduction

Decision support system (DSS) is a computer application system that assists decision makers to make semi-structured or unstructured decisions through data, models and knowledge through human-computer interaction.[1]

Intelligent Customer Relationship Management (ICRM) System is an intelligent DSS, to help executives manage current available customers resources, then summarize the clients' common features and find the potential future customers. Also ,

they can use our ICRM to focus on the company's hot selling products, or to predict the sales tendency.

Our ICRM supports data visualization function, and using ID3 algorithm in the backstage to classify customers and take different market strategies. And this system is good-looking and clear, easy to learn and handle.

2.Project Analysis

2.1 Background

A traditional German company that has implemented SAP and suffering from lessons learned sharing technologies offer solutions.

They are going to venture into a new market and need an intelligence CRM system to help manage current and future clients by utilizing available resources.

2.2 Problem Definition

1.Weak intelligence of SAP CRM system let this German company decision makers suffering. The reason could be high price of this system, time-consuming for training employees, hard to use, etc.

2.Plenty of available data and resources, but how to manage these resources to find out the potential market value and improve the success probability of decision making is an existing problem.

3.How to let decision makers view data in an easy way and build strategies by intelligent system, emancipate decision makers.

2.3 Objectives

1.Easy to learn, quick to get started.

2.High-interactive and pleasing interface design.

3.ICRM can support data visualization, view clients information and relationship, give decision making suggestions.

4.The System should be intelligent, help executives establish sales strategy.

5.ICRM can analyze the potential market direction and manage current and future clients.

2.4 Project Criteria

·Elegance

ICRM system with high interactive and good looking design, and it's easy to learn and operate.

·Transaction data can keep ACID attribute

Some Transaction data processes will still keep the database with ACID attribute.

·Intelligence

DSS can give out the recommended decision by intelligent algorithm, telling decision makers what strategies should be taken.

·Data Visualization

DSS using diagram or graphics to present correlation relation or trends for decision makers.

·Maintenance

To keep data is close to current latest market requires employees to enter the data into right process and administrator will update database in time.

·Authenticity

Different levels of employees can log in their own account and will be assigned with different level of permission.

·Reliability

Reports results and recommended decisions are reliable.

·Integrity

ICRM related tables can keep several data integrity: entity integrity, domain integrity, referential integrity and custom integrity.

·Adaptable

Generally applicable to general enterprises, can run in different OS.

·Alternative

Provide decision makers or managers with multiple choices and multiple results support to generate reports.

·Effectiveness

Respond quickly and provide feedback to system operators.

·Variety

Support variety of decision processes and styles.

·Controllable

The system is stable and the desired results of the system operators, are controllable and reachable.

·Potential future clients can be detected

Finding out the clients which should focus, and according to the related resources to give the recommended future clients types.

·Potential market prospect can be detected

This ICRM system can forecast the future market prospect and generate report.

2.5 Project Design

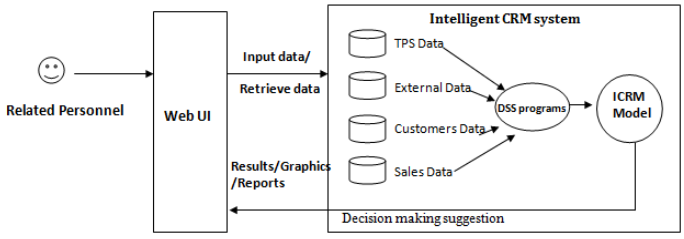


Figure1. ICRM Framework Graph

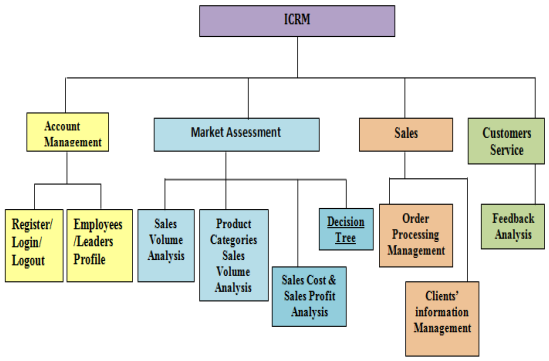


Figure2. ICRM Structure Graph

Account Management: in this part employees/leaders can register their own account, the ID number is given by company in default, but users should register their ID and related information into our database. This part is responsible to manage account registration, account login and logout.

Market Assessment: in this part, it should realize the data visualization function, showing the Sales Volume Analysis, Product Categories Sales Volume Analysis, Sales Cost and Sales Profit Analysis in an interactive visual effect. We can see the tendency in line chart or the volume comparison in bar chart. The Decision Tree part is the intelligent decision section. This section takes ID3 , will generate the decision tree by algorithm, and calculate the information entropy and information gain during the process. We just give all departments' leaders priority to see the intelligent analysis results.

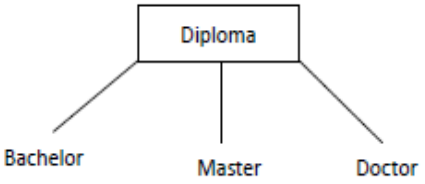
Sales: in this part, users can see the orders condition in the form of Tables, we added mouse event to enhance the interactive effect. Tables present the successful orders and termination orders' condition. System visualize clients relationship attributes in the form of pie chart.

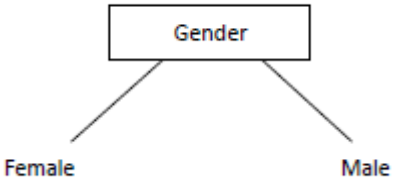
Customer Service: Customer Service Center presents clients feedback in the form of tables, you can also search case ID or order ID to check the feedback status. We believe listening to customers' feedback could learn lesson and avoid same mistakes in the future market venture. What's more, it can improve user viscosity.

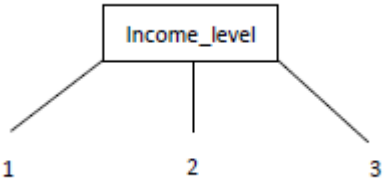
2.6 Related Work

Our ICRM Systems takes ID3 algorithm to realize the decision tree, in order to classify clients' data attributes and know which attribute influences purchasing behavior. Through the data visualization, we found the attributes like "Gender", "Marital Status" ,"Income level", "Diploma" are really matter. We tried to use decision tree such "divide and conquer" way to help officers clear thinking.

In this intelligent algorithm, firstly retrieving and recording data attributes in specified array, then begin to build ID3Tree, by computing the information entropy and information gain to know in different tree layers which attribute should be the maximum influencing factor, in this way, the tree will be built recursively.







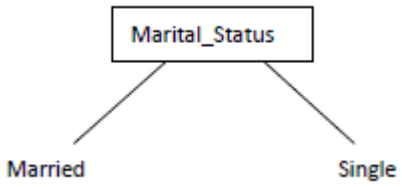


Figure 3.Clients relationship consideration attributes

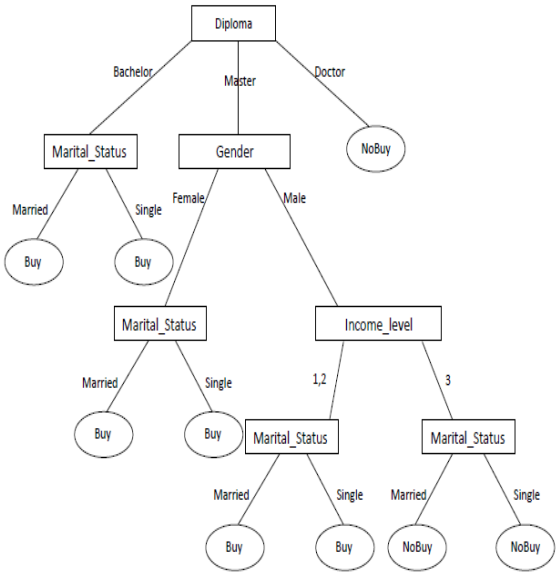


Figure 4 .ID3—Decision tree

3.Project Implementation

3.1 Tools and Project Solution

The ICRM system is MVC structure, we should choose tools to realize the model, view and controller.

We used Excel to record our data dictionary. And we considered to use MySQL to create database, which is helpful to build database model. The programming language is Java, we would like to take Java Server Page (JSP) to help us develop web application. Meanwhile using HTML, CSS to design the pleasant user interface. To make data visualization, we used Javascript and HTML and Canavs to draw graphs, and even used Highchart to add dynamic visual effect.

3.2 Project Presentation

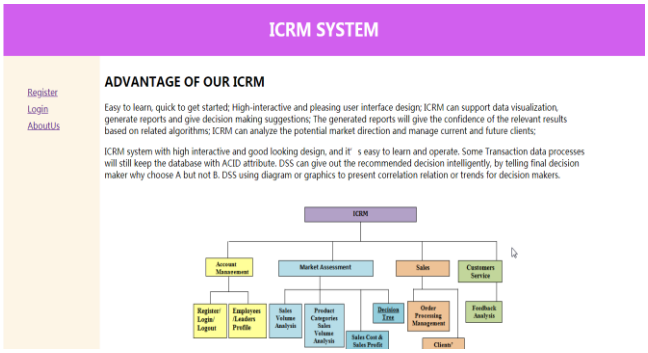


Figure 5.ICRM—Home Page

Figure 6.ICRM—Market Dept Leader Profile

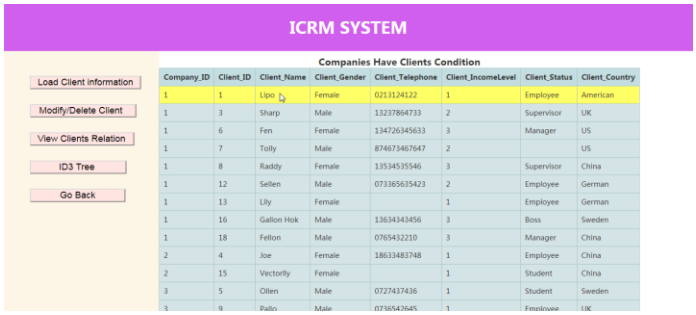
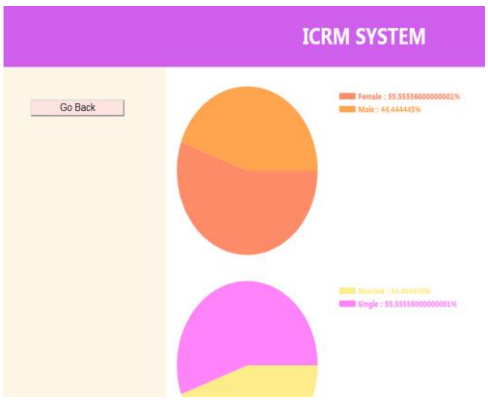


Figure 7.ICRM—Clients Information Page



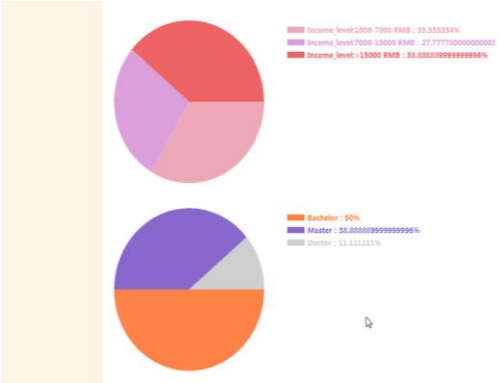


Figure 8.ICRM—View Client Relation
(From top to bottom: Gender, Marital Status, Income level, Diploma)

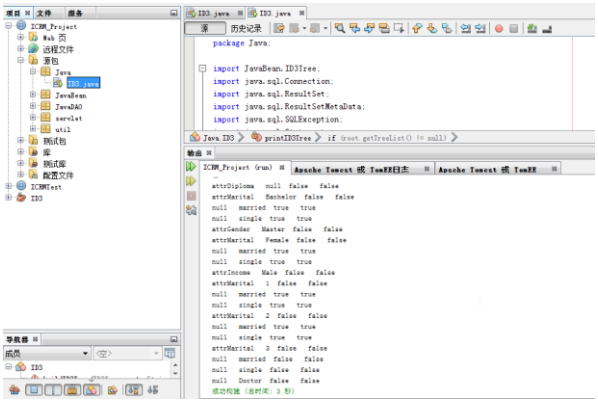


Figure 10.ICRM—ID3 Build Decision Tree

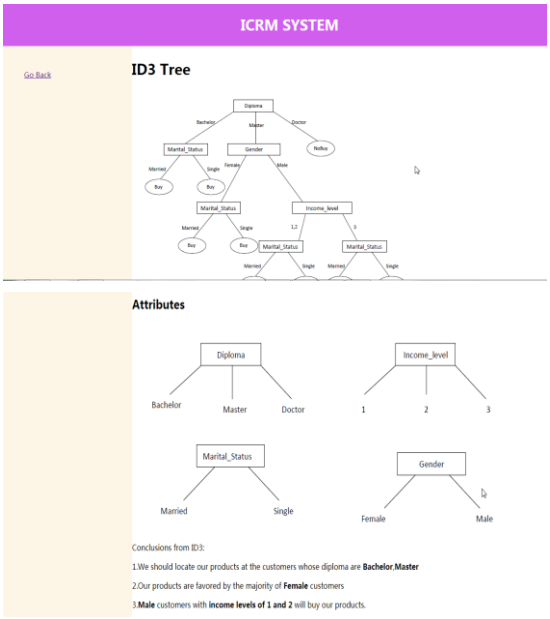


Figure 9.ICRM—Decision Tree

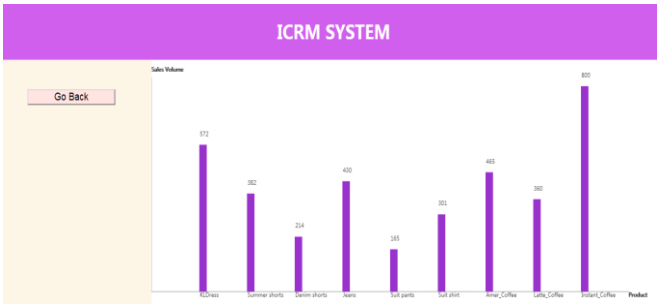


Figure 11.ICRM—Sales Volume Analysis

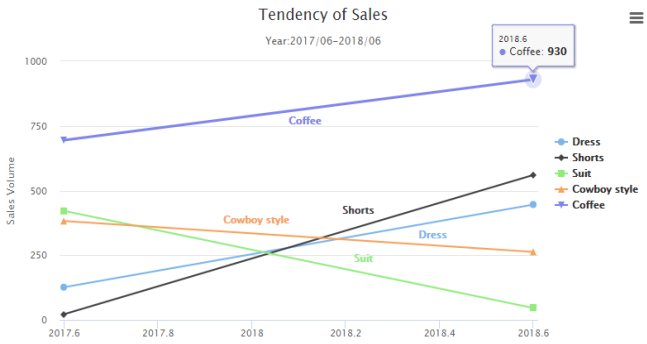


Figure 12.ICRM—Product Categories Sales Volume Analysis

In the back-end, ID3 algorithm recursively calculate and build, but the result is hard to read by general employee.(Figure 10)
So we adopted showing the conclusion in the front-end, that's much easier to understand immediately.

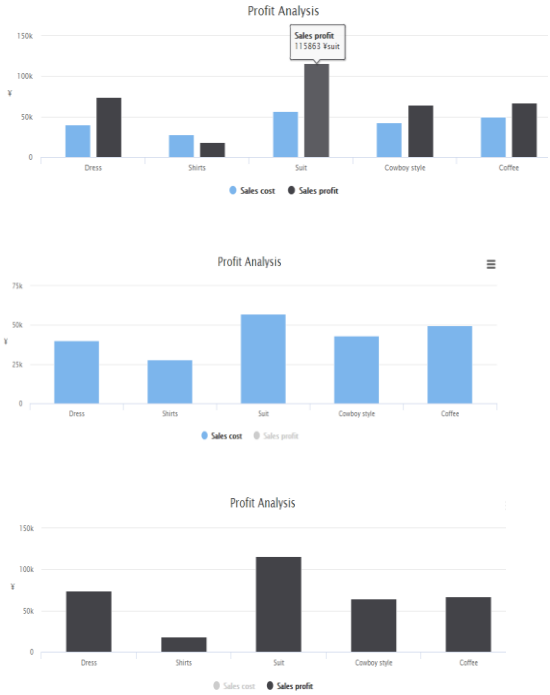


Figure 13.ICRM—Sales Cost and Sales Profit Analysis

4.Conclusion

Our team learned really a lot from this project, about how to make data visualization and how to merge ID3 algorithm in this ICRM decision Support System. Decision Support System supports solution of the semi-structured or unstructured problems. Our ICRM is easy to learn, quick to get started, with high-interactive and pleasing user interface design;

Our ICRM can support data visualization, and give decision making suggestions.

This intelligent customer relationship system can help manage current and future clients.

5.Future work

In the future work, we are going to perfect the functions, and add some plugins to increase the web page visual effect . And we will realize the useful "generate report" function.

And even though we have used the ID3 decision tree algorithm, but we also have trouble in presenting the recommended results in an interactive and clear way, we should keep on thinking.

During the ID3 algorithm process, it might have over-fitting problem, we need to take into consideration, and add information gain rate in the algorithm , we can try C4.5 in next step.

Reference

[1]https://baike.baidu.com/item/%E5%86%B3%E7%AD%96%E6%94%AF%E6%8C%81