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Selection of Life Insurance Policy Using Case Base Reasoning

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Abstract.

The life is uncertain, One's having a Life Insurance Policy plays a crucial role. It is a insurance of family's peace of mind. As life is full of uncertainties and life insurance policy provides the protection and financial stability after one's death but while selecting for a appropriate life insurance policy, person can trust to some insurance agent or can participate in some lengthy questionnaires in some website before obtaining and gathering a useful knowledge for selecting the right insurance policy. Based upon these two choices of selecting the insurance policy we can say that first choice can be risky, the second choice can be arduous. In this Paper we developed a case based reasoning system system for the selection of suitable Insurance Policy that overcomes these drawbacks. The matching and selection is done by two methods heuristic and qualitative rule based model.

1. Introduction

From the past decade having a Life Insurance Policy plays very crucial role. It is insurance for family's peace of mind. People decide to buy life insurance policy because of major life events that include getting married, getting divorced, having a child or experiencing the death or a friend or family member.

Life insurance policy provides a stability for financial support after someone's death. Very few researchers have developed systems for selecting criteria for life insurance Policy. "Alexander Tartakovski1, Martin Schaaf2, and Ralph Bergmann1 of University of Trier, Germany has presented an methodology to select a Life Insurance policy by extension of generalized cases using a Structural-Case-Based-Reasoning(SCBR)" [1]. This is designed to reduce some drawbacks by searching for a appropriate policy by desired person.

In this paper, we are using Case-Based-Reasoning (CBR) to select the right life insurance policies. The matching and selection in a case base reasoning is done by two methods heuristic and qualitative rule based reasoning. The structure of this paper describe here. Section two presents problem statement of the various Permanent life insurance policies with their parameters. Section three includes the CBR model. Section four includes the implementing the result and Section five include the conclusion part.

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Table.1: Problem Descriptive Table

PC	CAI	IC	FP	FFC	TDI	PCF	MGDB	BACV	WCV	CVBRS	IT	IPL	DBF	Features/ Quality of life Insurance Policy
H	H	L	L	H	H	H	H	H	H	H	M	H	L	WLI
H	H	L	H	H	H	H	L	H	H	H	M	H	H	ULI
H	H	H	L	M	H	H	H	H	L	H	H	H	L	VLI
H	H	H	H	H	H	H	H	H	H	H	H	H	H	VULI

2. Problem Statement

The table (Table 1) is problem descriptive table, shows policies whole life, universal life, Variable Life Insurance, Variable Universal Life Insurance with their fourteen important parameters: Permanent Coverage regardless of age or health (PC), Cash Account & Investment (CAI), Investment Control(IC), Flexible Premiums (FP), Flexible Face Value (FFC), Tax deferred Income (TDI), Ability to Use Cash Account to Pay Costs and Fees (PCF), Minimum guaranteed Death Benefits (MGBD), Borrow against Cash Value (BACV), Withdraw from Cash Value (WCV),Cash Value Balance Returned on Surrender (CVBRS), Investment Type (IT), Interest Payable on Loans (IPL), Death Benefit can be either face value or Sum of face value and cash account(DBF).[2]
The levels assign to each feature are High (Symbol: H and Value =2), Medium (Symbol: M and Value = 1) and Low (Symbol: L and Value = 0).
In the table 1 the First column is policy and the rest columns are representing various features of that policy. The values given in the brackets in each column is the corresponding weight assigned to the features.

3. CBR model:

CBR model is the process finding solutions of a new problem based on the solutions of similar past problem. In the tabular form of CBR model we represent the cases (policies) with attributes. The selection and matching criteria of a policy is determined by features provided in the case-base performed in CBR module. The CBR model of reasoning is shown in (Table. 2)[2].

3.1 Case base: Table 2 shows the following cases.

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Table.2: Case Base Table

3.2 Retrieval: Retrieval is done through two methods which are:

PC	CAI	IC	FP	FFC	TDI	PCF	MGDB	BACV	WCV	CVBRS	IT	IPL	DBF	Features / Quality of life Insurance Policy
2	2	0	0	2	2	2	2	2	2	2	1	2	0	WLI
2	2	0	2	2	2	2	0	2	2	2	1	2	2	ULI
2	2	2	0	1	2	2	2	2	0	2	2	2	0	VLI
2	2	2	2	2	2	2	2	2	2	2	2	2	2	VULI

3.2.1Heuristic method: The formula for selecting best policy is given below:

$DVk = |CB_k – NC_k|$; (k = l,2,3..m) …….1 With **m:** the total features count.

DV_i : k^{th} distance value between two k^{th} feature , CB_i: k^{th} value of feature of life insurance policy, NC_i: the i^{th} value of feature required by client.

$$PV_j = \sum_{j=1}^{n} DV_j \text{ ……2}$$

Where PV_j be the similarity value between the client and the j^{th} life insurance policy .Where j =l,2,3..m**,** where m is the number of features.

3.2.2Rule base model: We have used qualitative rule for the selection and matching of the Life Insurance Policy. The qualitative variables formation is done by below rules.

- Rule 1: The composition result level is equal to be very low if each of the two variables level are low
  LOW ⊕ LOW= VL (Very Low).
- Rule 2: The composition result level is equal to be value of either variable if two variables level are at equal level.
  LOW ⊕ LOW=LOW(L), MEDIUM ⊕ MEDIUM=M(MEDIUM), HIGH ⊕ HIGH =H(HIGH).
- Rule 3: The composition result level is equal to be the value of higher variable if two variables level are not equal. LOW ⊕ MEDIUM=M(MEDIUM), LOW ⊕ HIGH=H(HIGH), MEDIUM ⊕ HIGH=H(HIGH)

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- Rule 4: The composition result level is equal to be the average of higher if two variables are differ by the gap of two level.

  HIGH ⊕ LOW=M(MEDIUM)

First these rules are applied between each feature of LDV and the corresponding feature of each policy.

For example if the generated LDV is(H, M,M,M,L,H,M,M,L,L,L,M,M,H) and the corresponding features for the policy are (H, H, L, H, H, H, H, L, H, H, H, M, H, H)as shown in row 2 of table1.After matching and selection (using above mentioned rules) we choose that the Universal Life Insurance (ULI) is the best policy.

3.3 Adaptation

The considering the null adaptation, case adaption can be used to retrieved and reusing the adaptive case without any changes to solve a newer problem.

4. Implementation and Result:

The implementation of above approaches is done using Java Programming Language and system implementation is done in the following steps: Generation of Life data vector (LDV) on the client's requirements and matching and selection by calculating Euclidean distance and also by qualitative rule based model.

4.1. LDV (Life data vector)

LDV (new case) life data vector is obtained from input provided by user. Input is taking on a graphical user interface by selecting the checkboxes.

LDV is obtained as given below:

1. LDV consists of fourteen parameters like Permanent Coverage regardless of age or health (PC), Cash Account & Investment (CAI), Investment Control(IC), Flexible Premiums (FP), Flexible Face Value (FFC), Tax deferred Income (TDI), Ability to Use Cash Account to Pay Costs and Fees (PCF), Minimum guaranteed Death Benefits (MGBD), Borrow against Cash Value (BACV), Withdraw from Cash Value (WCV),Cash Value Balance Returned on Surrender (CVBRS), Investment Type (IT), Interest Payable on Loans (IPL), Death Benefit can be either face value or Sum of face value and cash account(DBF) as shown in the figure.

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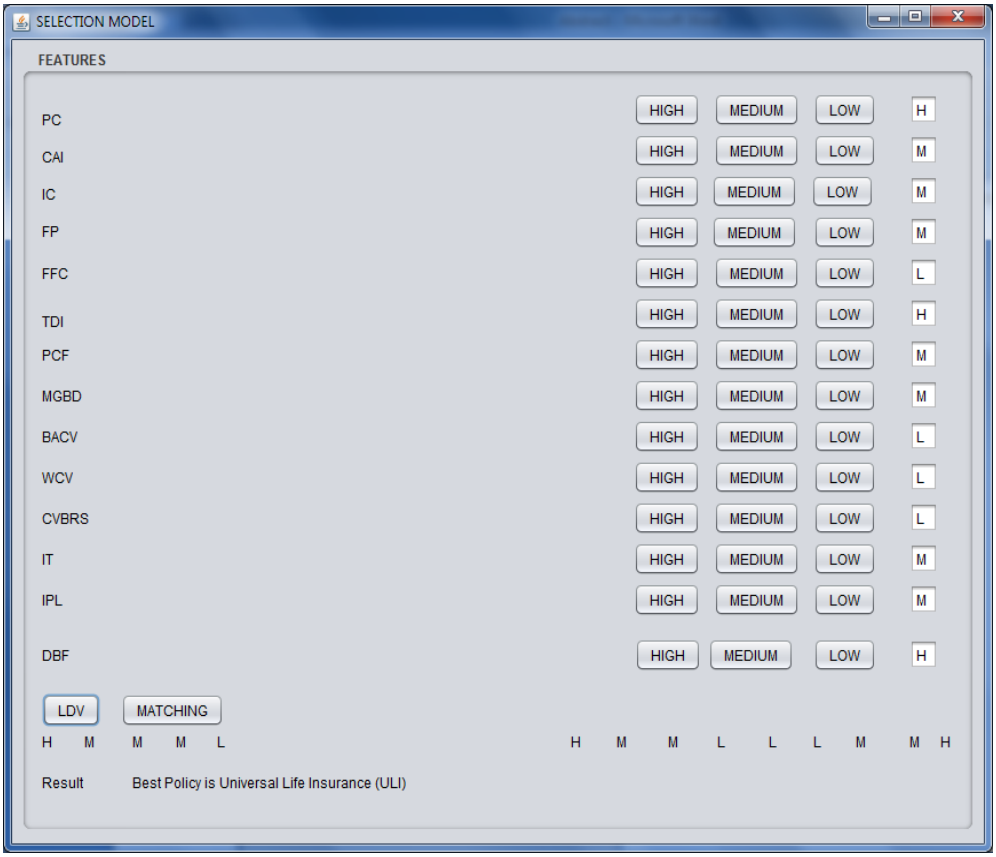

Fig.1. User generated unknown LDV and corresponding best selected policy.

2. Representing all the parameters in integer form as High (Symbol: H and Value =2), Medium (Symbol: M and Value = 1) and Low (Symbol: L and Value = 0) as shown in table.2 and stored these values in the LDV vector.

3. We then measure the Euclidean distance using eqn.1 and measure the value of PVj and the life Insurance policy for which PVj is smallest is the best matched policy with the client requirement. After calculation we get that the Universal Life Insurance (ULI) is selected as the best category policy.

5. CONCLUSION

In this paper we first applied the heuristic approach and then we used the qualitative based model and from both the methods we get an accurate result i.e. Universal Life Insurance (ULI). This policy is selected as a best category policy form the costumer's point of view.

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6. REFERNCES

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