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On Taking & Using Insurance Policies at the Right Time – A Study Using

Fuzzy Matrices

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Introduction

This paper has four sections. In the first section we just recall the methods of applications of CETD matrix. In section two we describe the policy related to peoples. The section three we apply the six benefits of policies by using CETD model to find out the peak age of group of people used their benefits. In final section we derived conclusions and gives suggestion based on our study.

The method of application of CETD matrix

We give a very simple but a very effective technique on the collected data. From that data we recognized the people interested to take insurance policy at the right time. Based on the words, benefits of the policy is given by the insurance scheme, six attributes are chosen and the entries are recorded in a form of matrix by taking ages along the columns and the benefits along the rows.

Average Time Dependent (ATD) matrix

Raw data transform it into a raw time dependent data matrix by taking along the rows the age group and along the columns benefits using the raw data matrix we make it into the Average Time Dependent Data (ATD) matrix (a_{ij}) by dividing each entry of the raw data matrix by the number of years i.e., the time period. This matrix represents a data, which is totally uniform. In this section we give some of the basic notions of graphs and its relation to matrices and how mean and standard deviation are used in matrices is illustrated. A brief way of obtaining the linguistic questionnaire is discussed. We now illustrate how the mean and standard deviation are used in matrices. Mean of n terms ¹

$$X_1, X_2, \dots, X_n$$
 is given by
 $\underline{x_1 + x_2 + \dots + x_n} = \overline{X}$

Standard Deviation of X_1^n , X_2^n , ..., X_n^n is given by $\sum (x-\hat{x})^2$

n-1

Refined Time Dependent (RTD) matrix

Refined Time Dependent (RTD) matrix using the average μ_i of each j^{th} column and σ_j the S.D of each j^{th} column we

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ABSTRACT

Life Insurance is important for everyone to protect family incase of their demise the insured money will save their family. Our objective of this paper to find out the peak age of people interested to take insurance policy and when they mostly use the benefits in their policy period. It has been classified into six benefitst. To study this problem, they divided and defined four types of matrices. Now we use this model to study of the people interested to take insurance policy and when they mostly use the benefits in their policy period.

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chose a parameter α from the interval [0,1] and the Refined time dependent matrix (RTD matrix), Using the formula,

 $a_{ij} \leq (\mu_j - \alpha^* \sigma_j)$ then $e_{ij} = -1$ else

else

If $a_{ij} \in (\mu_j - \alpha^* \sigma_j, \mu_j + \alpha^* \sigma_j)$ then $e_{ij} = 0$ If $a_{ij} \ge (\mu_j + \alpha^* \sigma_j)$ then $e_{ij} = 1$ We redefine the ATD matrix into the refined time dependent fuzzy matrix for here the entries are -1, 0, 1. now the row sum of this matrix gives the maximum age group.

Combined Effective Time Dependent Data (CETD) matrix

We also combine the above RTD matrices by varying the α $\in [0,1]$, so that we get the Combined Effective Time Dependent Data (CETD) matrix. The row sum is obtained for CETD matrix and conclusions are derived based on the row sums. Graphs are drawn taking the row sum of the CETD matrix along the y axis and time scale along the x-axis. These simple graphs are understandable even by a layman. Hence this method is very effective at the same time simple.

Insurance Policy

A life insurance policy provides a cash payment when a person dies. This payment is known as the death benefit. Many people buy life insurance to protect the people who are dependent on them. Others buy life insurance as a way to leave a cash gift to their spouse, children, grandchildren, and charities at their death. If you have made the decision to buy a policy, you may wonder which type of policy to choose since there are several different types of policies. The policy is written on the life of a person, known as the insured. The owner makes payments, known as premiums, to the insurance company for the policy. In return, the insurance company agrees to pay the death benefit to the *beneficiary* if the insured dies within the stated term.

Term insurance is the most basic type of life insurance. The policy is written for the term of the policy, usually from one to 30 years. If the insured dies within the stated term, the insurance company pays the death benefit to the beneficiary. When the term ends, the insurance ends. The premiums for term insurance are usually the lowest among the different types of life insurance, but will increase with the age of the insured. There is no *cash value* in a term life policy. (Cash value will be discussed in greater detail later.) This means there is no money for loans or to pay for the insurance if you can't pay the premiums.

Many employers offer a type of term insurance known as "group" term to their workers. Group policies cost less, and many companies pay the premiums. Generally, the policy is only good for as long as the worker stays with the company.

A whole-life policy pays a death benefit no matter when the insured dies. In most cases, the policy will guarantee the death benefit. The premiums are usually much higher than a term policy and the full premium *must* be paid each year. Whole-life policies have cash value. The difference between the premium and the actual cost of the insurance is put into a special account, known as the cash-value account. This cash-value account may be used to help the insured pay the "fixed" premium payments in later years. The policy owner may borrow against the cash value or receive the cash value if the policy is canceled. There may be charges associated with borrowing against the cash value or canceling the policy before the death of the insured. The insurance company may charge interest if the money is borrowed and fees to close out the account if the policy is canceled. At death, the beneficiary only receives the death benefit, not the death benefit and the cash value.

Description of the problem

In this paper, we analyzed the maximum number of people interested to take insurance policy for the benefits. We give an effective technique on the collected data. From our interviews we saw the people who are taking insurance. For that we have interviewed and recorded some people in different ages.

Under the following uses of insurance policy ie, Loan Facility, Death Benefit, Accident Benefit, Housing Loan, Maturity Benefit, Survival Benefit which are taken as the column-wise of the initial raw data matrix. The age groups in years 13-20,21-29, 30-36, 37-44, 45-50 which are taken as the rows of the matrix.

We analyze these problem using fuzzy matrix, we call the RTD matrix as fuzzy matrix for that take their entries from the set {-1, 0, 1}. So the terms RTD matrix or fuzzy matrix mean one and the same matrix. The estimation of the maximum age group is five-stage process. In the first stage we give the matrix representation of the raw data. Entries corresponding to the intersection of rows and columns are values corresponding to the network.

The 3 x 6 matrix is not uniform ie, the number of individual years in each interval may not be the same. So in the second stage we in order to obtain an unbiased uniform effect on each and every data so collected, transform this initial matrix into an Average Time Dependent Data (ATD) matrix. To make the calculations easier and simpler we in the third stage using the simple average techniques convert the above average time dependent data matrix in to a matrix with entries $e_{ij} \in \{-1, 0, 1\}$. We name this matrix as the Refined Dependent Data (RTD) matrix or as the fuzzy matrix.

The value of e_{ij} corresponding to each entry is determined in a special way described. At the fourth stage using the fuzzy matrices we obtain the Combined Effect Time Dependent Data (CETD) matrix, which gives the cumulative effect of all these entries. In the final stage we obtain the row sums of the CETD matrix. The tables given are self-explanatory at each stage. The graph of the RTD matrix and CETD matrix are given.

3.1 Estimation of maximum age group of people interested to take insurance policy by using 5×6 matrices :

In this section we apply six uses of insurance policy. That is,

 B_1 - Loan Facility

- B₂ Death Benefit
- **B**₂ Accident Benefit
- B_4 Housing Loan
- B_5 Maturity Benefit
- B_6 Survival Benefit

We have taken the value $\alpha = 0.1$, 0.2, 0.3, 0.35 to find the CETD Matrix



Graph 1. Depicting maximum age group of people interested in insurance

Policy for $\alpha = 0.1$



Graph 2. Depicting maximum age group of people interested in insurance



Table 1. Initial raw da	ta matrix of people	e interested in Insuran	ce policy of order 7 x (
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Age	B ₁	B ₂	B ₃	B_4	B ₅	B ₆
13-20	8	6	7	7	9	5
21-29	7	5	6	8	7	3
30-36	6	5	8	8	6	4
37-44	7	8	9	9	7	9
45-50	5	2	7	4	5	7

Table 2. The ATD Matrix of people interested in insurance policy of order 7 x 6

Age	B ₁	B ₂	B 3	B ₄	B ₅	B 6
13-20	1	0.75	0.875	0.875	1.125	0.625
21-29	0.778	0.556	0.667	0.889	0.778	0.333
30-36	0.857	0.714	1.143	1.143	0.857	0.571
37-44	0.875	1	1.125	1.125	0.875	1.125
45-50	0.833	0.333	1.167	0.667	0.833	1.167

Table 3. A	verage and S	S.D of the above	given ATD Matrix
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 Average
 0.8686
 0.6706
 0.9954
 0.9398
 0.8936
 0.7642

 S.D
 0.0838
 0.2468
 0.2182
 0.1979
 0.1344
 0.3657

Graph 3. Depicting maximum age group of people



Graph 4. Depicting maximum age group of people interested in insurance Policy $\alpha = 0.35$



Graph 5. Depicting maximum age group of people interested to take Insurance policy for CETD Matrix

Conclusion and Suggestions Conclusion

People started their policies at the age of 13. The maximum age group of the people used their benefits in correct time in the age from 36 to 44 as they have the Loan Facility, Death Benefit, Accident Benefit, Housing Loan, Maturity Benefit,and Survival Benefit, But some of the people used their benefits at the earlier stage in the age from 13 to 29 when they started their policies. It's happened onlydue to protection, future savings, and investments.

Suggestions

Based on our research we desired some suggestion for why people are interested to take insurance policy.

> Why We Need Insurance Life insurance is a contact by which you can protect yourself against specific uncertainties by paying a premium over a period. Since each of us during our life faces with numerous risks-falling health, financial losses, accident and even fatalities.

> Protection You need life insurance to be there and protected the people you love, making sure that your family has a means to look after itself after you are gone. It is a thoughtful business concept designed to protect the economic value of a human life for the benefit of those financially dependent on him.

➢ Retirement Life insurance makes sure that you have regular income after you retire and helps you maintain standard of living. It can ensure that your post retirement years are spent in peace and comfort.

> Savings and Investments Insurance is a means to save and invest. Your periodic premiums are like savings and you are assured of a lump sum amount on maturity. A policy can come in handy at the time of your child's education or marriage! Besides, it can be used as supplementary retirement income.

> Tax Benefits Life insurance is one of the best tax saving options today. Your tax can be saved twice on a life insurance policy-once when you your premiums and once when you receive maturity benefits. Money saved is money earned.

> Myths of Insurance Insurance is just meant for saving tax. Insurance does not give good returns. Insurance products are not flexible.

> Indemnity Legal principle that specifies an insured should not collect more than the actual cash value of a loss but should be restored to approximately the same financial position as existed before the loss.

> Premium is the consideration that the policy holder has to pay in order to secure the benefits offered by the insurance policy. It can be looked upon is the price of the insurance policy. It may be a one-time payment or periodical payment (Monthly, Quarterly, Half-Yearly, Yearly). A default in premium can endanger the continuance of the policy. If that happens, the policy will be treated as lapsed and the expected benefits.

Claims A claim is the demand that the insurer should redeem the promise made in the contract. The insurer has then to perform his part of the contract. ie, settle the claims, after satisfying himself that all the conditions and requirements for settlement of claim have been complied with.

> Agent An insurance company representative licensed by the state, who solicits, negotiates or effects contracts of insurance and provides service to the policy holder for the insurer.

References

[1] Klir, G.J., and Yuan, B., Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice-Hall, Englewood Cliffs NJ, 1995.

[2] Victor Devadoss.A, Felix.A, Immaculate Anbarasi, "Women Teachers Affected By Stress in Chennai Schools Using CETD Matrix, Volume, 2, October 2013 Pages: 189-195

[3] Vasantha Kandasamy. W.B and Smarandache Florentin, "Analysis of social aspects of migrant labours living with HIV/AIDS using Fuzzy Theory and Neutrosophic Cognitive Maps, Xi-quan, Phoenix (2004) [4]Vasantha Kandasamy.W.B and Victor Devadoss.A, "Some New Fuzzy Techniques", Jour. Of Inst. Of. Math. & Comp. Sci. (Math.Ser.), Vol. 17, No.2, (2004), 157-160.

[5]Vasantha Kandasamy.W.B and Florentin Smarandache and Ilanthenral, "Special Fuzzy Matrices for Social Scientists", Printed in United States of America, 2007.

[6] Vasantha Kandasamy.W.B and Florentin Smarandache and Kandasamy.K, "Fuzzy and Neutrosophic Analysis of Periyar's views on Untouchability", Printed in United States of America, 2005.

[7] Victor Devadoss. A, Clement Joe Anand .M, "A Solution to Control Suicide in the Domestic Violence using Combined Disjoint Block Fuzzy Cognitive Maps (CDBFCM)", International Journal of Scientific & Engineering Research, Volume, 3, Issue 6, June- 2012.

[8] Victor Devadoss. A, Clement Joe Anand. M, "Dimensions of Personality of Women in Chennai using CETD Matrix", International Journal of Computer Application, 10-17, Volume 50, No. 5, July-2012.

[9] Victor Devadoss. A, Clement Joe Anand. M, "A Solution to Control Suicide in the Domestic Violence using Combined Disjoint Block Fuzzy Cognitive Maps (CDBFCM)", International Journal of Scientific & Engineering Research, Volume, 3, Issue 6, June- 2012.

[10] Zimmermann.H.J, "Fuzzy Set Theory and its application", Fourth Edition Springer 2011.