Statistical Quantification of Gain Analysis in Strategic Management

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Summary- In this paper we have pointed out gain matching based on probabilistic approach. Gain prediction based on plotting is also depicted .We have also cited an idea of pattern analysis of arrival of related gain estimate with reliability justification at specific instants of time. Testing of randomness of sequence of gain pattern is also shown. Artificial intelligence based pattern matching has also been applied .

I. Introduction

Gain analysis plays a pivotal role in case of optimum business planning. Quantification of gain prediction is the pillar of success in terms of risk reduction as well as throughput upgradation. In forecast based strategic planning , randomization of gain is to be sensed and its relative decision support system is to be generated accordingly.

II. Sensing Randomized Gain Pattern

Let mapping function ($y_i \longrightarrow g_i$) for i=1 to n be sensed for consecutive n years where y_i is ith year and g_i be its relative gain . Aim is to achieve g_{opt} such that $| g_i - g_{opt} |$ tends to zero after g_k onwards , k being the year of successful pattern sensing . Let in a particular time slot , I = ($I_1,I_2,I_3,\ldots..I_n$) be the set of matched gain estimates.We observe all possible sequences consisting of x number of elements and y number of different estimates.Hence x+y = n. The collection of the various sequence of patterns of information element leads to the observation process in the light of sampling distribution[1]. Hence, mean = M=(2xy/(x+y)) +1 and variance= V = $[(2xy(2xy-x-y)) / ((x+y)^2(x+y-1))]$.

A. Statistical analysis of prediction

Let the time-stamp of gain sensing be at t_1. We want to concentrate on only those gain estimates which will be matched. The recognition is continued till timing instant t_2.

Case I : No information is matched :

Let X(t) be the probability of no matching in time t.o X(t+t') will be that in time (t+t').
Hence, X(t+t') = X(t)[1- € t'] where € is the constant of proportionality.

$$\lim_{t' \to 0} \frac{X(t+t') - X(t)}{t'} = - € X(t)$$

or, $X(t) = a e^{-€ t}$, where a is a constant of proportionality.
If t=0 , X(t)= a .

Case II : If only one or many gain estimate is matched :

Let $X_1(t)$ be the probability that one gain estimate is recognized successfully. So $X_1(t + t')$ id that in time t_2 . It may happen that in time t no matching occurs while it occurs in t'.The reverse may also occur.

Hence, $X_M(t) = X_M(t') = 0.5$ = equally probable.
where $X_M(t)$ is probability of successful match in t and $X_M(t')$is that in t'.

So, $X_1(t+t') = X_1(t)(1- € t') + X(t) € t'$
We can solve the value of $X_1(t)$ from the above equation and it can be represented as
$X_1(t) = € t e^{-€ t} + b e^{-€ t}$ where b is another constant of proportionality.

If b=0 , $X_1(t) = € t e^{-€ t}$
In generalized form , if n number of successful gain patterns are observed in time t , then
$X_n(t) = ((€ t)^n e^{-€ t}) / n!$.

III. Gain Prediction in The Light of Graphical Plotting

If the matched gain estimates are arranged in random order or haphazardly then there is some method for prediction based on some curvical nature [2]. We assume that the estimates follow the equation of some normal curve. Hence the position can be calculated by changing the variables of the equation of the curve at different timing instant. We can even do clustering, so that, instead

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of element detection we can concentrate on cluster detection, thereby minimizing search overhead.

We can predict the position of a particular gain estimate if there is a relation between the position of a particular timing instant and the value of the timing instant. If we have the idea of position of estimate at two timing intervals then we can predict value of the position of the estimate both at the midway position and also the extreme position, provided the matched estimates are in equidistant form. If they are not in equidistant form, in that case the incoming estimate is examined with respect to the curve fitting between the earlier estimates in accordance with exponential curve form. N's represent the gain estimates while cv's represent the curves.

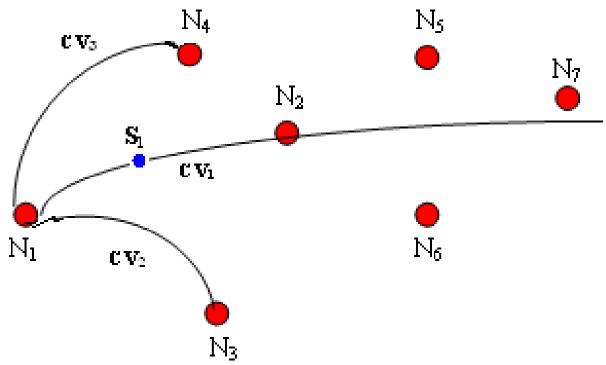


Fig.1. Curvical nature in the light of exponential form.

Theorem 1: If there bears a relation between positions of an estimate with a particular timing instant, then the same relation is valid, if the estimate is present in the midway position.

Proof: Let the equation for determination of estimate is $P_{N,t} = Me^{at}$ where $P_{N,t}$ is position of element at a time instant 't'.

'M' and 'a' are constants.

We further assume that estimates are N_1, N_2, N_3, …. and so on.

Therefore, $P_{N1,t1} = Me^{at1}$ and $P_{N2,t2} = Me^{at2}$

So, the midway interval time is $(t_1+t_2)/2$.

Now, $(P_{N1,t1} \cdot P_{N2,t2})^{1/2} = [(Me^{at1}).(Me^{at2})]^{1/2}$

$= [M^2e^{a(t1+t2)}]^{1/2}$

$= Me^{a(t1+t2)/2} = P_{S1,(t1+t2)/2}$

Hence, we conclude that the same relation is valid in midway position, in this case S_1 indicates the midway position of the curve connecting N_1 and N_2 gain estimates.

Theorem 2*:* To determine the position of a gain estimate in respect of first curve, concept of exponential growth or decay is valid.

Proof: Let the first curve CV_1 passing through estimates N_1 and N_2 is exponential curve satisfying equation,

$$P_{N,t} = Me^{at}.$$

Now estimate N_3 has to be examined with respect to curve CV_1, whether it is exponential growth (charging curve) or decay (discharging curve) curve emanating from N_1.

In Fig. 1, N_1 is connected to N_3 and the curve is exponential decay type, satisfying the equation, $P_{N3,t3} = Me^{-at3}$.

Therefore the curve fitting between the estimates N_1 and N_3 is CV_2 exponential decay curve consisting of new estimate N_3.

Similarly, in case of estimate N_4, it is exponential growth type, satisfying $P_{N4,t4} = Me^{at4}$ equation.

Theorem 3: If a particular timing instant the position of gain estimate is in form of arithmetic mean of two intervals and position of another estimate is in the form of their harmonic mean, then square root of the product of these two means reveals the geometric mean of the two timing instants.

Proof: We assume that t_1 and t_2 are two timing instants. Let at t' arithmetic mean is valid act at t'', harmonic mean is valid.

$P_{N,t}' = (t_1+t_2)/2$ and $P_{N,t}'' = 2/\{(1/t_1)+(1/t_2)\}$

Hence, $P_{N,t}' \cdot P_{N,t}'' = t_1.t_2$

$(P_{N,t}' \cdot P_{N,t}'')^{(1/2)} = (t_1t_2)^{(1/2)}$, which is geometric mean of t_1 and t_2.

IV. Gain Analysis With Reliability Justification and Likelihood Estimate

A. Concept

Let the gain patterns be G1,G2……….Gn. The business transactions by involving the patterns be A1,A2,…………..An show the reliability of condition assuming that some of the patterns are optimum among the set of all the patterns. We assume the following business transactions are dependent on the respective patterns. We further assume that out of the patterns G1, G2 and G5 jointly can generate optimized gain of A1.Similarly G3, G4 can deliver optimized gain estimate for A2.while G6, G7 for A3.

Business transactons	Gain Patterns
A_1	G_1 , G_2 , G_5
A_2	G_3 , G_4
A_3	G_6 , G_7

B. Estimation in series form

Collorary 1: Let, in a given set there are n_1 and n_2 reability factors , and G_1,G_2 are their respective geometric means,then the geometric mean(G) of the combined set of reability measure is given by $G=(G_1^{n1} \, . \, G_2^{n2})^{(1/(n_1+n_2))}$

Proof

Let, r_{11},r_{12},……….r_{1n1} be the values of reability factor of the first gain pattern set ,while r_{21},r_{22},…….,r_{2n2} be those of second one. Then,

$$G_1=(r_{11}.r_{12}. \ldots\ldots .r_{1n1}) \text{ or}$$

$$r_{11}.r_{12} . \ldots\ldots . r_{1n1} = G_1^{n1}$$

In the similar way, $r_{21}.r_{22} . \ldots\ldots . r_{2n2} = G_2^{n2}$

Hence the product of (n1+n2) values in the combined set is equal to G_1^{n1} **.** G_2^{n2} . It's therefore,evident that the geometric mean (G) of the combined set is given by, $G=(G_1^{n1} \, . \, G_2^{n2})^{(1/n_1+n_2)}$

C. Estimation over time in exponential form

Collorary 2 : If reability factor (r) exchanges over time (t) exponentially, then the value of the variable at the mid-point of an interval (t_1,t_2) i.e at (t_1+t_2)/2 is the geometric mean of it's values at t_1 and t_2.

Proof

Suppose $rt=ab^{t}_{2}$

Also, the value of r at (t_1+t_2)/2 is,

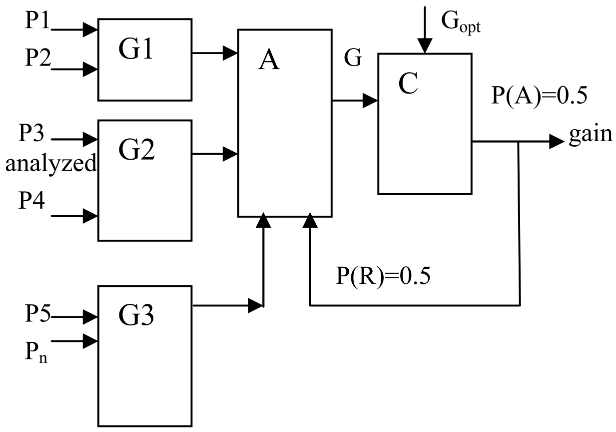
$$ab^{(t_1+t_2)/2} = \{a^2 b(t_1+t_2)\}^{1/2}$$
$$= \{(ab^{t}{}_1)(ab^{t}{}_2)\}^{1/2}$$
$$= (r_{t1}.r_{t2})$$

D. Estimation in terms of likelihood

Suppose the gain distribution f(g; g_{opt}) of a random variable g involves a parameter g_{opt} whose value is unknown, and we want to make a guess about (or to estimate) the value of g_{opt} on the basis of a random sample(r_1,r_2,r_3,…..,r_n) of size n drawn on from the various gain patterns[3]. For this,we use a suitably chosen statistic t=g(r_1,r_2,…..,r_n) , i.e. a function of the sample observations.It's a random variable whose value is completely determined by the sample values.Now, for a given sample (r_1,r_2,…,r_n),the value of 't' is g(r_1,r_2,…,r_n);it's simply a number and it's taken as the guess for the value of g_{opt}.The statistic 't' is called an *estimator* of g_{opt} while the value of 't' is obtained from a given sample is called an *estimate* of g_{opt}. .Naturally, for 't' to be a satisfactory estimator of g_{opt}, the difference |t - g_{opt}| should be as small as possible.E(t) = g_{opt} , whatever the true value of g_{opt} may be i.e. Var(t)≤ var(t^1),whatever the true value of g_{opt} may be,where t^1 is any other estimator This reveals minimum deviation towards achieving optimum gain pattern g_{opt} .

V. Gain Pattern Matching in Artificial Intelligence Domain

We assume that the parameters required for delivering gain estimate G1be P1,P2 , that for G2 be P3 and P4 , and for G3 be P5 and Pn..Let the computed or predicted efficiency is Ec , while the optimum preknown efficiency is Ep. So, as I Ep – Ec I >> 1, it implies that the deviation of the computed value from the biased values (optimum value is termed as bias value). Hence the model for this particular estimate[4,5] is as follows:



P(A)=probability of acceptance

P(R) = probability of rejection

G1,G2,G3 are gain computing blocks

A is the block of delivering weighted gain estimate G based on $\sum_{i=1}^{n}$ wi Gi , wi being weight of Gi

C is the comparator.

Here G and G_{opt} should be nearly equal, i.e. the difference between G and G_{opt} should be minimum so that it will be accepted otherwise the output will be rejected, so there are only two conditions, either accepted or rejected. So the probability of acceptance and rejection is 0.5 i.e. ½.

VI. Conclusion

The paper deals with several gain estimates which play crucial role in strategic business planning thereby reducing risk estimate. We have given statistical modeling of gain estimate sensing and related equation based pattern matching has also been cited. In this context gain analysis with reliability justification and likelihood estimate is also pointed out in the paper. Finally artificial intelligence based gain computation has been realized .

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